digital square

GLOBAL GOODS GUIDEBOOK

VERSION 2.0

For more information on Digital Square's philosophy, governance, and how to get involved, please visit our website at www.digitalsquare.org or email digitalsquare@path.org.

For more technical information on Digital Square's global goods, please visit our wiki at www.wikidigitalsquare.io.

Digital Square is a PATH-led initiative, which was initially funded and designed by the United States Agency for International Development and the Bill & Melinda Gates Foundation. Additional funders include Child Relief International Foundation, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ), Last Mile Health, Patrick J. McGovern Foundation, The Rockefeller Foundation, Sall Family Foundation, and Vitol Foundation.

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Endorsements

The Digital Investment Principles describe the need for donors to align around scalable, sustainable, accessible, interoperable, and evidence-based digital health global goods that meet country priorities. Digital health global public goods have an important role to play in moving the global health sector from a past era of digital health donor 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.

The global health community needs to move away from the current practice of single application solutions to a more strategic approach that acts holistically with both current country priorities and long-term goals for health system strengthening. By better coordinating the development of digital health global goods, such as those presented in this guidebook, stakeholders involved in digital health can reduce duplication and ensure that platforms are not only more aligned with priorities but that they strengthen national systems.

This guidebook is endorsed by:

How to get involved

Through our Open Application Process, Digital Square provides an opportunity for developers to discover new ways that their technologies can work together and create new partnerships; thereby, reducing redundancy and duplication of effort. Digital Square innovates by building on what works. We do this by supporting investments into interoperable, adaptable digital health tools that align with country needs and have the highest potential for success.

If you are interested in making a global good investment, telling us about a global good that has been successful and should be considered for inclusion in this guidebook, or simply learning more, connect with the Digital Square team at digitalsquare@path.org.

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Table of Contents

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Introduction

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Introduction

Digital Square is committed to supporting adaptable digital health tools that can be used across different countries and contexts. These tools, or global goods, matter because they cut down on fragmentation and duplication, accelerate scale and health impact, thereby saving lives and improving the health of people around the world.

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.
- **Services**—A software as a service (SaaS) tool that is used to manage,transmit, or analyze health-related data. These tools can be freely accessed and adheres to open data principles.
- **Content**—A resource, toolkit, or data standard that is available underan open license and that is used to improve or analyze health data management processes.

This guidebook is a living document and will be updated regularly. This edition (version 2.0) focuses on software global goods that are approved for investments through Digital Square and introduces the concept of "shelf-readiness" as well as highlights some of the global goods adaptations to COVID-19. The Health Data Collaborative Digital Health & Interoperability Working Group will help develop eligibility criteria for future versions of the guidebook to increase its comprehensiveness.

The information in this guidebook has been provided by the global goods developers and has not been validated by Digital Square for accuracy.

Overview

What are global goods?

Global goods are digital health software tools that are adaptable to different countries and contexts to help address key health system challenges. A mature digital health global good software is categorized as free and open source software, supported by a strong community, funded by multiple sources, and designed to be interoperable. It has been deployed at significant scale, used across multiple countries over an extended period of time, and demonstrated effectiveness. Global good software takes many shapes and forms, often works in conjunction with other global good software, and can fulfill many of the technology needs of a health system. Many of these characteristics are drawn from the Principles of Digital Development. This guidebook describes emergent and establishedsoftware global goods that have been successfully implemented to address various health system challenges.

The global goods included in this guidebook are classified across several dimensions, including:

Global scale:
Emergent | Established

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:
Applications | Infrastructure

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.

What can global goods do?

Digital health global goods are solutions that can be used across different health program verticals—for example, a global good used for HIV case management can also be used to help manage cases of malaria or tuberculosis. Global goods in digital health are not limited to just clinical information systems. Rather, there are global goods that have been tailored to the needs of different business domains within the health system such as health information systems, supply chain, program monitoring and evaluation, disease surveillance, and health insurance Developed by the World Health Organization (WHO), the Classification

of Digital Health Interventions v1.0 is a standardized vocabulary used to describe and compare digital health global goods in terms of digital health interventions and system categories.

A digital health intervention represents a discrete area of functionality of a digital technology to achieve health sector objectives. These interventions are intended for different users of digital health tools including health workers,[1] clients or beneficiaries, health system and resource managers, as well as data analysts. Examples of digital health interventions include "Transmit targeted alerts and reminders to client(s)" and "Manage referrals between points of service within the health sector."[2]

System categories represent the types of information and communication technologies applications and systems designed to deliver one or more digital health interventions. Examples of system categories include Logistics Management Information Systems (LMIS) and Electronic Medical Records (EMR).

What is a digital public good?

Digital Square is closely coordinating with the Digital Public Goods Alliance (DPGA),[3] a multi-stakeholder initiative co-hosted by UNICEF and the Government of Norway, and the technical leads at the WHO Clearinghouse,[4] to align the global goods and digital public goods approval processes for health solutions.

Though there are differences in criteria across these initiatives, there are opportunities for alignment that have the potential to accelerate the discovery and adoption of global goods. While efforts are underway to align these processes, several points have been agreed upon:

- Digital Public Goods are defined by the UN Secretary-General as open source software, open data, open AI 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 currently 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. The WHO Clearinghouse will include proprietary solutions mapped to specific use cases.
- Digital Square nor the WHO Clearinghouse certify global goods. The DPGA reviews digital solutions against the DPG standard, and approves them as digital public goods.
- While the majority of global goods will meet the DPG Standard required to be approved as a digital public good, there are two reasons why not all DPGs will be software 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 assess maturity and aligns and weighs in on “awarding” the title of Digital Square approved global good. In contrast, DPGs have no maturity requirement.

- Digital Square, WHO and the DPGA will be piloting the application of the 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 (CoP) for Digital Health convened by the DPGA and co-chaired by UNICEF Health.
- In future iterations of this Global Goods 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 approved global goods. Digital Square, the DPGA, and the WHO Clearinghouse will continue to cross reference respective “approvals” of global goods.

The goal for creating alignment and collaboration across these institutions is to better empower country governments, donors and digital tool implementers with a clear understanding of which digital public goods are evaluated by technical expert entities and which digital public goods are recommended based on these criteria. 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, these entities are better able to increase the discovery, adoption and support for the high-quality tools that are most needed to ensure better health outcomes for all.

How do I select global goods?

This guidebook serves as a reference to a number of digital health global goods that can be used to address health system challenges. It is arranged by the system categories of the World Health Organization’s Classification of Digital Health Interventions v1.0.

Use the Classification to determine priority health system challenges and the digital health intervention or digital functionality best suited to address it given the local context. Use the system category to locate the appropriate tool in the guidebook’s table of contents.

Why should I use global goods?

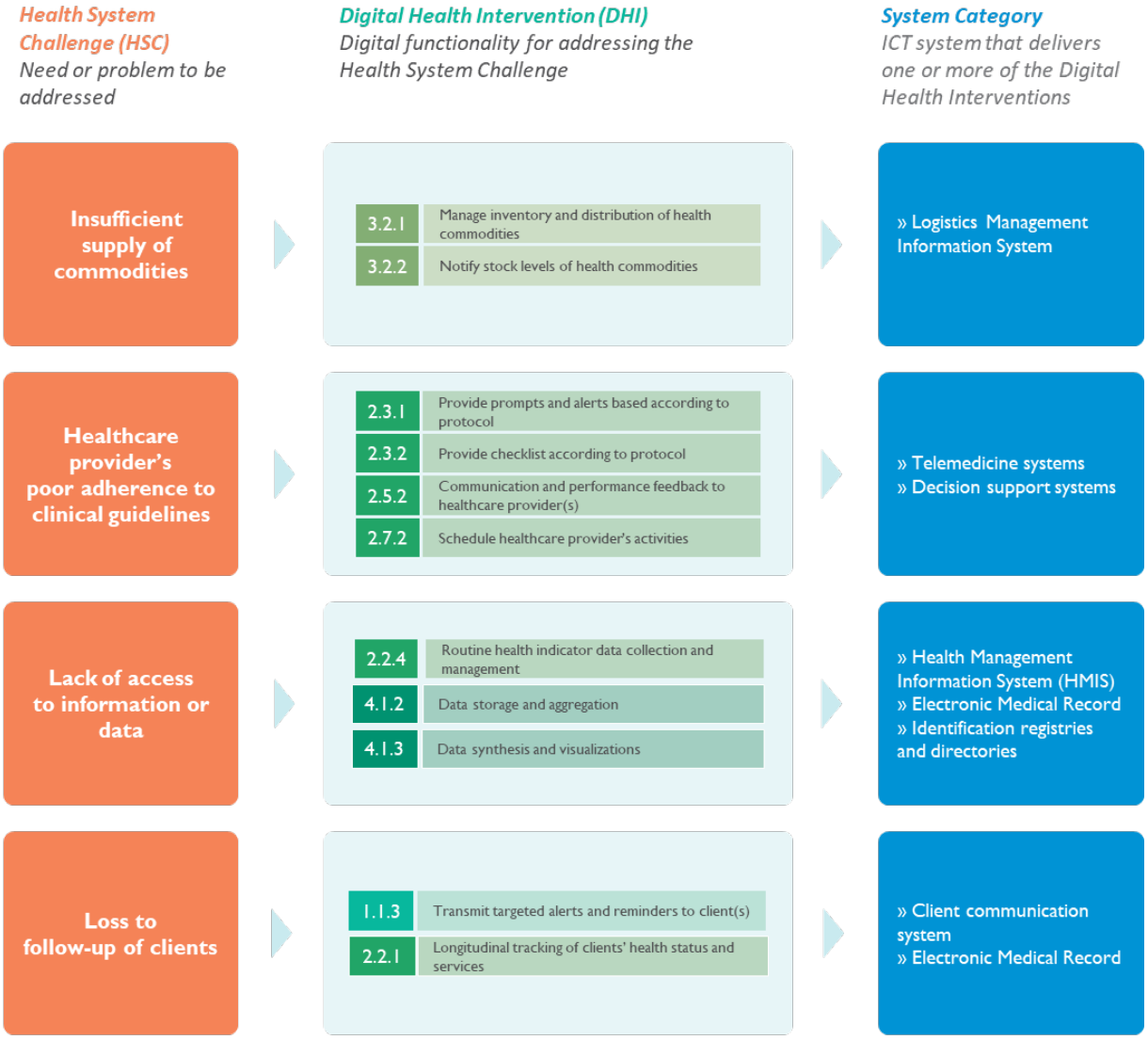
Since global goods are open source tools, there are many benefits to their use:

- Many developers contribute to a global good; therefore, vendor lock-in,a situation in which customers are unable to switch developers without asubstantial cost, can be avoided.
- Source code is freely available and modifiable so there are more opportunities for collaboration across organizations and health programsareas.
- The cost of new feature development and software maintenance is shared across users and supporters of global

goods, so resources canbe focused on adaptation and implementation.

- Software development best practices in requirements gathering and useracceptance testing, have already been undertaken, and so resources can be focused elsewhere.

Examples of linkages across health system challenges, digital health interventions,and system categories.



Source: WHO Classification of Digital Health Interventions v1.0.

Examples of global health organizations, normative agencies, and investors calling for greater collaboration in the digital health ecosystem.

Interoperability allows global goods to provide additional benefits including:

- Improved data analysis and synthesis.
- Support for continuity of care as clients engage at point of serviceacross the healthcare system.
- Reduced collection 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 included in the Appendix.

What is the price of a global good?

Global goods are open source solutions; therefore, there is no cost to access the code for the global good. However, there is always a cost in deploying an information system or digital health intervention. These costs may include the procurement of services to configure, extend, or model the tool within its existing architecture. As digital health tools are deployed as part of a national health information system, there may also be costs associated with aligning the tool to existing and emerging policies and strategies.

How do I implement global goods?

Global good implementation may differ from that of commercial or proprietary software, as there are often different organizations responsible for development and implementation. There are many roles in the undertaking of implementing a digital health intervention to address a health need, some of which include 'Solutions Architect', 'Implementation team, 'Development team', 'Training and Support services' to name a few. Implementation Service Providers often cover many of these roles

and may partner with local teams and other groups to augment their services in support of achieving the desired outcome. Exciting models are often the pairing with local teams to ensure knowledge transition and strengthening of local capacity to better prepare for long term sustainability of a solution in a particular context.

A non-exhaustive listing of some of the considerations each of the roles should be taking one through:

- **Solutions Architect** and the analyst team is generally responsible for working with the client to clearly unpack the business vision mapped to the technical intervention. They, themselves or working with a team, are often responsible for outlining the “definition of success” of a projectand clearly articulating how to measure completeness or success of the technical implementation.
- **Development teams** are responsible for making any required software code changes that may have been identified through the analysis phase of the project and contextualizing the software to the local environment. Many global goods, by nature, are designed in a manner to lessen the need for software developers and allow customization through configurations.
- The **Implementation Team** may be a mix of the above roles but often are composed of persons who are knowledgeable of how the global good / health tool operates and all the configuration options. This team is responsible for deploying the tool and ensuring that it is workingin the health space required and specified for the project.
- The **Training and Support Services Teams** carry the responsibility of effectively training staff and users of the tools to both use the software as well as support the end users of the tool. This team generally is planned to engage for longer periods of time (3-6 months and onwards) and is a pivotal player in moving to local capacity building and support.

An implementation services provider will generally cover all/many of the laid out rolls and will generally guide you through several considerations such as:

- **Where should the software be deployed?** Software can be deployed from 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. Review legislation or policies that may limit choices, 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, and consider whether there is sufficient electricity or network connectivity to deploy centrally or if locally-deployed servers are needed.
- **What size computer servers are needed?** You can determine the size based on the expected load of the deployment, including the estimated number of concurrent users, system-managed data, and network traffic.
- **How will software users obtain technical support?** Open source tools (and some proprietary ones) may not have a dedicated help desk team providing technical support; therefore, consider how to provide technical support in your intervention design. 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 will elevate higher-level technical support concerns to the second tier of representatives at the implementer or developer's office.

- **What adaptations does the software need?** Digital health software tools should be adapted to meet the needs of a particular context. The implementation service provider can assist with a requirements gathering process to understand the users' needs and necessary customizations.
- **Are software developers needed?** 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. They can be hired to provide these types of services. For less established global goods, consider filling this role internally or sourcing a local information and communications technology (ICT) partner.
- **How will you validate the intervention is working as expected?** Is there a legal and or compliance quality assurance plan that you require?

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[1] The term "health workers" is not limited to solely clinical service providers but applies to all people engaged in actions whose primary intent is to enhance health. https://www.who.int/whr/2006/06_chap1_en.pdf.

[2] World Health Organization website, https://www.who.int/reproductivehealth/publications/mhealth/classification-digital-health-interventions/en/. Accessed April 3, 2019.

[3] 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.

[4] 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 cases.

COVID-19 Response

Digital Square is leveraging its unique role and strengths to support countries, donors, and partners in the response to the COVID-19 pandemic. Harnessing existing relationships across the global digital health ecosystem, we mobilize our robust network of partners in coordinated response.

As an initiative hosted and led by PATH, Digital Square works closely with PATH's departments of global health security, malaria, primary health care, and the broader digital and data portfolio to more comprehensively support country partners in ensuring essential health services remain available.

Digital Square promotes the development, adoption, and re-use of digital health global goods, increasing the availability, adaptability, and maturity of digital tools deployed. Approved Digital Square global goods are quickly adapting their software to add COVID-19 specific modules for case reporting, contact tracing, communication with frontline health workers, training and tools for health workers, supply chain management, facility mapping, and other use cases.

Comparison of Digital Tools used in the COVID-19 Response

Countries have access to a large, complex ecosystem of digital platforms that can support COVID-19 response. The process of selecting the most appropriate platform for a country's specific needs or context can be overwhelming without clear information about the benefits and limitations of the options. Several new resources have been developed to support in-country assessment and decisions about digital technologies for COVID response.

Digital Square efforts

In recognition that this is a rapidly evolving landscape, Digital Square has been working across donors to collate a comparison of digital tools that are currently used in the COVID-19 response. Included in the comparison is an analysis of a number of functional and non-functional requirements. Including in this document are the following digital health tools: DHIS2, SORMAS, Go.Data, EpiInfo, CommCare, ODK, Kobo Toolbox, Excel and non-digital paper tools. This comparison is a dynamic document meant for community updates. The document can be accessed on the Digital Square wiki.

The OpenHIE COVID-19 Taskforce began in April 2020 in response to the interoperability and data sharing needs of the global community. The endorsed Terms of Reference are:

- Identifying and collating information relating to data standards and exchange relevant to the Covid-19 response
- Identifying gaps in and establishing standards for data exchange priorities

- Provide documentation and guidance (to both the global good community as well as proprietary software tools) to improve adherence to these standards
- Ensure that rapidly deployed solutions can be integrated into the national digital health architectures

Global Good Deployments

Digital Square offers technical assistance to support global good partners. This includes supportfor technologies to customize their solutions including aligning solutions with global standards for data exchange, as well as support for deployment in countries where ministries of health have agreed to scale the tools. Additional information on COVID-19 adaptations can be found in the global good entries in this guidebook. Digital Square has provided support to the following global goods for COVID-related activities:

- **SORMAS:** Digital Square is supporting SORMAS, a digital health global good electronic Integrated Disease Surveillance and Response (eIDSR) tool that has a COVID-19 module and is deployed in Ghana and Nigeria. These countries were able to instantly deploy COVID-19 surveillance and response capabilities by updating the global good system they had already been adopted.
- **DHIS2 Tracker:** The DHIS 2 Tracker is an extension of the DHIS 2 platform and supports management, data collection, and analysis of transactional or disaggregated data. The Tracker shares the same design concepts as the overall DHIS 2 - a combination of a generic data model and flexible metadata configuration through the user interface that allows for rapid customization to meet a wide range of use cases. COVID-19 packages have been developed to support both aggregate and case-based surveillance, contact tracing and follow up, ports of entry screening and follow up, and analysis through pre-configured indicators and dashboards. All COVID-19 packages can be deployed out-of-the-box with the DHIS2 Android app for mobile data collection. The packages support workflows and tasks for different types of users involved in the COVID-19 response (e.g. contact tracers, laboratory users, clinicians, epidemiologists and response teams). Point of Entry: The DHIS2 Tracker has adapted with a points of entry screening . This functionality enrolls travelers who have visited high-risk locations at points of entry for 14-day monitoring and follow-up. Uganda deployed this new DHIS2 Tracker feature because it needed to strengthen border screening and tracking of truck drivers to help prevent the import of new cases of the disease. After launch, Uganda linked the DHIS2 point of entry screening to the country's lab information management system so that both systems could exchange data. (https://www.dhis2.org/uganda-covid-surveillance) Contact Tracing: DHIS2 strengthens contact tracing by enabling identification and follow-up of contacts of a suspected or confirmed COVID-19 case. COVID-19 Case-based surveillance enrolls & tracks suspected cases; captures symptoms, demographics, risk factors & exposures; creates lab requests and captures laboratory data about the case; links confirmed cases with contacts; and monitors patient outcomes.
- **OpenLMIS:** OpenLMIS is a powerful, open source, cloud-based electronic logistics management information system (LMIS) purpose-

built to manage health commodity supply chains. OpenLMIS manages the electronic LMIS process at over 10,000 health facilities in 8 geographies across Africa, across all major health programs including vaccines. Supply Chain Use Case: OpenLMIS adapted its tool so countries can optimize their use of the software to encourage good supply chain management of COVID supplies. OpenLMIS launched a separate, simplified instance called OpenLMIS COVID-19 Edition, which is a lighter weight and quicker start up tool to help countries get started right away to manage COVID-related commodities (based on the WHO product list). OpenLMIS is adapted for the COVID-19 response in Angola, Benin, Cameroon, Cote d'Ivoire, Guinea, Malawi, Mozambique Tanzania, and Zambia.

- **OpenELIS:** The Open Enterprise Laboratory Information System (OpenELIS) is a global opensource software. It serves as a laboratory information system tailored for public health laboratories in resource-constrained settings to support best laboratory practices and accreditation. OpenELIS can work offline and is available in English and French. LABORATORY SYSTEMS: OpenELIS Global has added COVID-19 metadata to support laboratory systems. It focuses on interoperability by including LOINC codes. Users can immediately use the adaptations in the software to add tests for SARS-CoV-2 to their laboratory test catalog to facilitate tracking of laboratory tests and results.
- **mHero:** Deployed during the Ebola outbreak in West Africa, mHero connects iHRIS with UNICEF's RapidPro SMS platform, allowing rapid two-way messaging between Ministries of Health and frontline health workers. Digital Square supports the core development of mHero which is being deployed in Uganda and soon in the Democratic Republic of the Congo (DRC) to communicate with health workers during the COVID-19 pandemic. IntraHealth is exploring connection with other services such as Twilio and WhatsApp, as well as using the mHero Connector to connect with DHIS2, OpenMRS, and other global goods using FHIR Standards. Digital Square continues to advocate for addition resources and investments in global goods to further enhance the options for countries.
- **Commcare:** CommCare is an offline-capable mobile data collection and service delivery platform used in over 80 countries. CommCare is popular for its offline case management capabilities proven to be effective at scale. It is designed for everything from simple surveys to comprehensive longitudinal data tracking. It allows for easy digitization of surveys, has forms that are intuitive for end users, utilize simple device deployment, and includes translation features. As the COVID-19 pandemic swept the world, Dimagi quickly pivoted into supporting response and mitigation efforts in the United States and LMICs. Our prior experience with Ebola helped us rapidly design and deploy a set of free, templatized CommCare applications and reporting options using mobile, web, and SMS. These applications have been applied to a wide variety for COVID-19 use cases, including community preparedness, contact tracing, facility readiness assessment, port of entry screening, and health worker education. To date, more than 25,000 users from more than 70 organizations and governments have used CommCare for a variety of use cases in over 30 countries. A report by Johns Hopkins University determined that CommCare is one of the two most useful platforms for COVID-19 response. The implementers vary across

countries and deployments. In some countries implementations were led by Government partners predominantly from Ministries of Health while others have been supported by iNGO, NGO, or other partners. Among our government partners, CommCare is being used or is in development with the following international governments: Belize, Ethiopia, Guatemala, Madagascar, New Delhi (India), Peru, Sierra Leone, Togo, Zambia. Within the United States, CommCare is the designated government COVID-19 contact tracing system for Navajo Nation, Philadelphia, New York, New Jersey, Alaska, and Colorado. Generous and flexible funding allowed Dimagi to develop these apps, collaborate and coordinate with other digital development organizations, and stand up a dedicated COVID-19 response team that has provided hands-on support to many countries and large

More information on the global goods can be found in the entries.

Data Standards

Digital Square is co-leading the new OpenHIE COVID-19 Task Force, which supports collation of information relating to data standards and data exchange relevant to the pandemic response. The goal of this task force is to ensure that rapidly deployed solutions can be integrated into national digital health architectures and contribute to long-term health system improvements. Leading up to the formation of this group, Digital Square led the documentation of data models and standards used as part of the COVID-19 response, including international standards such as the International Classification of Diseases (ICD) and Health Level Seven Fast Healthcare Interoperability Resources (HL7 FHIR), and standards for global good tools such as DHIS2 Tracker, CommCare, and Surveillance Outbreak Response Management and Analysis System (SORMAS). The task force is focused on four key topics:

- Collating information relating to data standards and exchange relevant to the COVID-19 response.
- Identifying gaps in and establishing standards for data exchange priorities.
- Providing documentation and guidance, to both the global good community as well as owners of proprietary software tools, on adherence to these standards.
- Ensuring that rapidly deployed solutions can be integrated into the national digital health architectures.

Through these activities, the task force aims to document FHIR mapping and prototyping for case reporting and contact tracing, map data elements into a standard data dictionary format.

To support the adoption of the outputs from the OpenHIE COVID-19 Task Force, Digital Square is coordinating with the Digital Square Global Goods Community on the application of the task force's outputs. Digital Square is also supporting resource identification for software updates and adaptations required to implement data and data exchange standards, as well as system maintenance as technologies are adapted and strengthened for the recovery phase.

Additional Digital Health Resources for the COVID-19 Response

Johns Hopkins assessment

In July 2020, Johns Hopkins published an assessment of digital platforms that have an established presence in several low- and middle-income countries (LMIC), and either have been or could be rapidly reconfigured to address COVID-19 related case management and contact tracing needs. The assessment includes a review of the following tools: CommCare, Community Health Toolkit (CHT), DHIS2 Tracker, Go.Data, ODK, OpenSRP, RapidPro, SORMAS, and WelTel. The platforms were selected based on their existing deployment, flexibility, and adaptability for COVID-19 use cases, their ability to support multiple languages, and stakeholder interest in how these applications can be leveraged in response to COVID-19. The full report can be accessed here.

UNICEF Country Mapping for COVID-19 Response

UNICEF is implementing a comprehensive health response to COVID-19, focusing on outbreak control and mitigation of the collateral impacts of the pandemic, including the risks to the continuity of health services for children, women, and vulnerable populations in conflict-affected areas.

A particular priority area is to support countries for the planning, introduction, and deployment of the COVID-19 vaccine. As part of this effort, UNICEF has initiated a country mapping of relevant Digital Health tools and technologies that can be leveraged to support countries' health initiatives and other sectors, for their response to COVID-19. The mapping is organized around priority areas that support countries in assessing program readiness to introduce COVID-19 vaccines, identifying gaps and prioritizing actions for enhanced readiness, and identifying opportunities for financial support. These categories include: Budgeting; Planning and Coordination; Vaccine, Cold Chain, Logistics & Infrastructure; Demand Generation & Communication; Training & Supervision; Prioritization, Targeting & COVID-19 Surveillance; and Monitoring & Evaluation.

If you want to update the country mapping, please use the comment function and the UNICEF team will update the information accordingly. This mapping tools is free to use by anyone who wishes to know which solutions already exist at country level and that can be deployed for frontline health workers for COVID-19 response and recovery efforts.

How do I use this guide?

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

- **Novice:** A person who is new to digital health and is interested in learning more about digital health tools planning or supporting 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.
- **Evaluator:** A person who is reviewing one or more proposals for a digital health intervention and wants to learn about planning 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.

Each role lists a number of useful resources. This list is not exhaustive and will be updated with each new publication of the guidebook.

Novice

Questions	Resources
I'm not familiar with many of the terms in the guidebook. Where can I find definitions for common digital health terminology?	The AeHIN Terminology Guide has definitions for common digital health terminology. Use this resource to look up unfamiliar terms in this guidebook.
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. A 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 Digital Health 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 infrastructure and 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 the publication, Guidance for Investing in Digital Health 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?	MEASURE Evaluation Interoperability Maturity Model 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 its status.

Donor

Questions	Resources
How does Digital Square invest in global goods?	Digital Square's investments follow detailed governance processes that leverage a Peer Review Committee, Board, and Investment Review Committee. 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 type in order to allow for more significant modification over the term of the subaward, if required.
And what are approved global goods?	Approved global goods include those which have submitted applications in response to a Notice. These include applications for specific work packages in response to a Notice. The applications are reviewed by the Digital Square Peer Review Committee and Investment Review Committee. 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. Approved Digital Square global goods cover nearly all of the World Health Organization Digital Health Intervention Classifications. Many global goods are adaptable to support multiple interventions.
What is the Digital Square procurement process?	Digital Square will pursue competitive Procurement Processes to facilitate investment in global goods [1]. The funder will work with Digital Square to select the appropriate procurement process. Upon funder or Board selection of successful applicant(s), Digital Square will notify selected applicant(s) to begin the subaward process.

Global Good Entries

digital square

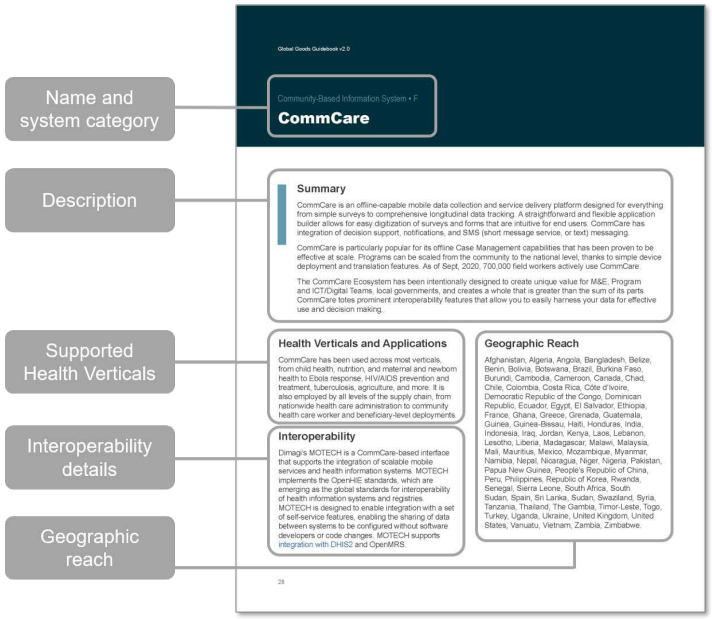
Global Good Entries

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.

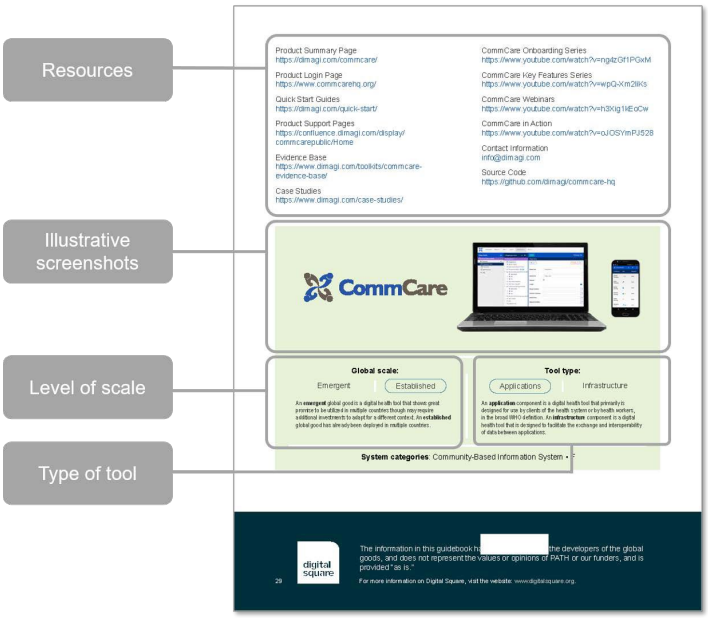
System Categories

B	Civil registration and vital statistics			
	OpenCRVS			
E	Clinical terminology and classifications			
	Open Concept Lab			
F	Community-based information system			
	CommCare	Community Health Toolkit	ODK-X	
G	Data interchange interoperability and accessibility			
	OpenHIM	Instant OpenHIE	OpenFn	
H	Electronic medical record			
	Bahmni	OpenMRS	OpenSRP	Tamanu
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 resource 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	

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
- **Decsription**
  High-level overview of the global good and its intended purpose.
- **Supported Health Verticals**
  Relevent 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.



- **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 a infrastructure component.

Civil Registration and Vital Statistics • B

OpenCRVS

Summary

OpenCRVS is an open-source digital public good to help achieve universal civil registration (CR) and evidence-based decision making in all country contexts.

Health Verticals and Applications

OpenCRVS is is a rights-based civil registration system that:

- Registers births and deaths occurring in both health facilities and in community settings
- Monitors operational performance
- Integrates data from multiple systems
- Produces raw data for the creation of vital statistics and evidence-based decision making

OpenCRVS is now available on a Mozilla public licence v.2;

OpenCRVS is interoperable with a number of systems to leverage existing data that can be used for civil registration purposes and to make services more efficient:

Health: OpenCRVS integrates with existing health systems in order to share data related to births and deaths (this has been successfully tested with DHIS2 in Bangladesh).

Current use cases include:

1. To receive birth/death notification information from a health system
2. To allow Registration Agents to view this data and complete the formal civil registration process
3. To see disaggregated data related to the notifications received from health systems

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

Communication: OpenCRVS works with a short message service app for sending text messages to notify the applicants of the processing status and when their birth/death registration certificate 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 such as registration completeness rates per locality. This data is also disaggregated by a number of characteristics including gender.
- A real-time operational data dashboard that provides civil registration managers with the information to provide targeted support to improve services e.g. time taken between birth registration and certificate collection.

A data export of civil registration data that can be used by the National Statistics Office to produce accurate and timely vital statistics.

Interoperability

OpenCRVS is designed to be interoperable and uses the OpenHIM interoperability layer to enable an OpenHIE compliant and FHIR standards-based data exchange.

Geographic Reach

Bangladesh, South Africa, United Kingdom.

Resources

Website
www.opencrvs.org

Contact Information
Edward Duffus, ed@newlegacy.digital

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

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 (distributed under MPLv2 with a health care disclaimer) 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 the diagnoses, procedures, and other data definitions used to calculate them.

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.
- 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.
- Providing an electronic service for management, publication, and distribution of information standards to the health system in a variety of 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 currently consists of an application programming interface (API) core that can stand alone and a thin web user interface to simplify access. OCL has also implemented OpenHIM to support custom presentations and synchronization of metadata between information systems. OCL is cloud hosted on Amazon Web Services.

Geographic Reach

US, Ethiopia.

Resources

Website
https://openconceptlab.org/

Wiki
https://github.com/OpenConceptLab/oclapi/wiki

Contact Information
Jonathan Payne, jon@openconceptlab.org

Source Code
https://github.com/OpenConceptLab

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 offline-capable mobile data collection and service delivery platform designed for everything from simple surveys to comprehensive longitudinal data tracking. A straightforward and flexible application builder allows for easy digitization of surveys and forms that are intuitive for end users. CommCare has integration of decision support, notifications, and SMS (short message service, or text) messaging.

CommCare is particularly popular for its offline Case Management capabilities that has been proven to be effective at scale. Programs can be scaled from the community to the national level, thanks to simple device deployment and translation features. As of Sept, 2020, 700,000 field workers actively use CommCare.

The CommCare Ecosystem has been intentionally designed to create unique value for M&E, Program and ICT/Digital Teams, local governments, and creates a whole that is greater than the sum of its parts. CommCare totes prominent interoperability features that allow you to easily harness your data for effective use and decision making.

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 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.

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 Pages
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/

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

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

CommCare Webinars
https://www.youtube.com/watch?v=h3Xig1kEoCw

CommCare in Action
https://www.youtube.com/watch?v=oJOSYmPJ528

Contact Information
info@dimagi.com

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

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 care delivery. It is designed to support community health systems and teams delivering care in the hardest-to-reach communities. The CHT is being co-created by the community as an open-source project. Medic Mobile, a US 501(c)(3) public charity incorporated in the United States, 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 services; early childhood development and nutrition; HIV and tuberculosis; ; 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 person 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 policy makers as they 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 backend 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 largest CHW networks supported by the CHT are in Kenya, Nepal, and Uganda. The CHT also supports community health networks and health systems in Burundi, DRC, Ghana, India, Indonesia, Malawi, Mali, Niger, South Africa, Tanzania, Togo, and Zimbabwe.

Resources

Community Health Toolkit Project Site
https://communityhealthtoolkit.org/

Community Health Toolkit Documentation Site
https://docs.communityhealthtoolkit.org/

Features and Demo Access
https://communityhealthtoolkit.org/features/

Community Health Toolkit YouTube Channel
https://www.youtube.com/channel/UC181IppaxJy9MhnIGkcUpKg

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

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

Community Health Application Framework GitHub
https://github.com/medic/cht-core

Medic Mobile Blog
https://medicmobile.org/blog

Contact Information
Josh Nesbit, CEO of Medic Mobile
josh@medicmobile.org

Jacqueline Edwards, COO of Medic Mobile
jacqueline@medicmobile.org

Francesca Henri, Community Manager
francesca@medicmobile.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 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

ODK-X

Summary

The ODK-X suite lets you build custom apps to gather, manage, and visualize your data just as well in the field as you do in the office. In ODK-X, developers and data managers can create data management applications that consist of survey forms as well as Javascript-based apps. These allow you to render 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 on mosquito releases. Custom web views and data visualizations, as well as complex workflows are common in ODK-X applications.

Interoperability

The ODK-X suite allows for the invoking of arbitrary intents (external programs) on Android devices. With the REST API 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 groups permission can be easily extended to the mobile device using an organization's pre-existing users (e.g., DHIS2, OpenLMIS, Microsoft's active directory style accounts, LDAP).

Geographic Coverage

As of 2020, implementation had taken place around the world in over 100 countries with example health deployments in countries including: India, Sri Lanka, Vietnam, Indonesia, Australia, New Caledonia, Vanuatu, and Fiji (World Mosquito Program); Ethiopia and Zambia (PATH); Kenya (University of Washington HOPE Study); Uganda, DRC, Bangladesh, Pakistan, and Haiti (UNEPI and WHO); Colombia, Panama, Peru, Venezuela, Chile, Ecuador, Honduras, Bolivia and Bahamas (IFRC).

Resources

Website
https://odk-x.org/

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

Docs 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 the OpenHIM can support are:

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

Interoperability

The Open Health Information Mediator (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, and provides a centralised 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 HL7 FHIR) required by client systems to interact with the HIE, making it easier and faster for point of service applications to connect to the HIE.

Geographic Reach

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

Resources

OpenHIM Website
http://openhim.org

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

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

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

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

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 OpenHIE 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 technical persons to illustrate how interoperability can work to 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 these 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 will 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 their task
- Reproducible, version-controlled infrastructure for user-contributed tests of the OpenHIE Architecture profiles, workflows, and use cases.
- Production-ready containers and orchestratable 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 components of a health information exchange for particular use cases and workflows. One of the core components of Instant OpenHIE is the interoperability layer, enabling interoperability and data exchange in a health information exchange (HIE) and providing a single point of entry into the HIE. The OpenHIM (an open source middleware component designed to ease interoperability between disparate information systems) is used as a reference technology here, and forms part of the Instant OpenHIE core package.

Geographic Coverage

Initial efforts have focused on creating a core prototypical health information exchange 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.

Resources

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

GitHub
https://github.com/openhie/instant

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

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

User Guide
https://openhie.github.io/instant/

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

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

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 ETL, 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. OpenFn can integrate with any application, providing a clean interface to work with existing APIs and a fully extensible scripting environment. It can be run on the cloud or locally, has enterprise and fully-open-source variants.

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 or NGOs to:

- Synchronize cases between mobile phones and a central MIS so that community health workers have up-to-date access to patient data.
- Pay individuals via mobile money (e.g., MPESA) transactions when certain conditions are met in a management or HR system.
- Send referrals and sensitive case data between service providers that use distinct systems.
- Receive CHW visit data in real time from a mobile app and load it into DHIS2.
- Reformat patient data to adhere to standards (e.g., FHIR HL-7) 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 50 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 standards, and automate any rote digital process. The tools themselves range from lightweight NodeJS apps to robust and highly-fault-tolerant enterprise applications running on the ErlangVM. They are typically used in their hosted forms on the cloud or deployed with Docker and/or Kubernetes.

Geographic Coverage

Afghanistan, Bangladesh, Bolivia, Brazil, Cambodia, Cambodia, Chile, Democratic Republic of the Congo, Ecuador, 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, USA, Vietnam, Zimbabwe

Resources

Website
https://www.openfn.org

Blog
https://blog.openfn.org

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

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

GitHub
https://github.com/OpenFn

Feature Guide
https://showcase.dropbox.com/s/OpenFn-for-Health-JMV3t9O0GwTewi2sJPoGv

Implementers Guide
https://docs.openfn.org/

User Guide
https://docs.openfn.org/

YouTube
https://www.youtube.com/channel/UCxRChYNpaKEFdfatHKagPbQ/videos

Contact Information
admin@openfn.org

Source Code
https://github.com/OpenFn

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 OpenMRS medical record platform, with a user interface built from the ground up. It also supports Odoo (formerly OpenERP), OpenELIS, and dcm4chee, 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 demonstrate integration with the Shared Health HIE.

Geographic Reach

Armenia, Bangladesh, Belarus, Cambodia, Cameroon, Ethiopia, Georgia, 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.

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

Contact Information
contact@bahmni.org

Source Code
https://github.com/bahmni

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

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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. 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 and so can be customized for different uses.

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 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 is a reference tool used for the shared health record component of OpenHIE and as the source for individual-level clinical data from visits and encounters. A shared health record (SHR) facilitates the sharing of clinical information between the health information system to enable better patient care, thus improving health outcomes. The SHR is a means of allowing different services to share health data stored in a centralized data repository. It contains a subset of normalized patient data from various systems such as the electronic medical record, laboratory information system, and more. This record is queried and updated between the different institutions and systems that are authorized to do so. An SHR is distinct from a data warehouse; it is an operational, real-time transactional data source.

Geographic Reach

The OpenMRS system works in more than 5,500 medical sites for about 12.6 million patients in more than 64 countries.

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, and 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.*

Resources

OpenMRS Website
https://openmrs.org

Atlas - Map of Places Where OpenMRS is Used
https://atlas.openmrs.org

Talk - Our Discussion Forum
https://talk.openmrs.org

Wiki - About Our Software and Community
https://wiki.openmrs.org

Demo
https://openmrs.org/demo/

OpenMRS Brochure
https://github.com/hannahkleyn/openmrs-contrib-brochure/blob/master/OpenMRS_Brochure.pdf?raw=true

OpenMRS Case Studies
https://openmrs.org/category/case-studies/

Introducing the Open Medical Records Systems Project (OpenMRS) - YouTube Presentation
https://www.youtube.com/watch?v=qCazfU6kPyA

OpenMRS Guide for the New and Curious
https://wiki.openmrs.org/display/docs/Guide+for+the+New+and+the+Curious

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

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

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

OpenSRP

Summary

Open Smart Register Platform (OpenSRP) is an open source mobile health platform to empower frontline health workers and simultaneously provide program managers and policymakers with current data for decision-making and policymaking.

Health Verticals and Applications

Due to its functionally, modular and technologically adaptable architecture, OpenSRP has been used to build localized applications for reproductive, maternal, newborn, child, and adolescent health; immunization; early childhood development; malaria rapid diagnosis, malaria management, tuberculosis treatment management, as well as COVID Testing and Screening.

Interoperability

OpenSRP provides a best-in-class user experience for frontline workers using tablet and smartphone Android-based devices. It pushes that data to a deployment management system (OpenSRP Server), and integrates with an electronic medical records system (OpenMRS) to provide scalable data management across large geographic areas. OpenSRP can also integrate with third-party systems like DHIS2 for automated reporting, RapidPro for direct-to-client messaging, and electronic data warehouses for robust data visualisation and analytics. Each component of the platform provides a function that supports health facility - or community-based health workers, centralized management of deployment, and a robust data repository that follows industry best practices.

Geographic Reach

Bangladesh (3 projects around RMNCH: mCARE study, BRAC, UNICEF), Indonesia, (2 projects: Malaria RDT Study, COVID CTS App), Kenya, (Malaria RDT Study), Thailand, Namibia, Zambia (Malaria work and Indoor Residual Spraying based on Reveal), Eswatini and Zambia (Neglected Tropical Disease work, based on Reveal), Vietnam (RMNCH and ECD Work), Zambia (Zambian Electronic Immunization Registry - ZEIR), Tunisia (Electronic Immunization Registry), Mauritania (Electronic Immunization Registry), Liberia (Community based Childhood Immunizations), Malawi (Health Facility based eRegister project - various health domains), Togo, Guinea, Liberia, Chad, Democratic Republic of Congo (UNICEF Child Friendly Communities Project for CHWs - focussed on RMNCH).

Resources

Website
https://smartregister.org

Contact Information
Matt Berg, info@smartregister.org

Source Code
https://github.com/OpenSRP

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 record • H

Tamanu

Summary

Tamanu is a free and open-source patient-level electronic medical record (EMR) for desktop and mobile that has been developed specifically for low resource and remote settings. Tamanu allows health workers to monitor and manage patients through the continuum of care in hospitals, health centres, clinics and in the field using flexible system configurations. Both desktop and mobile systems are designed as offline first, with powerful syncing capabilities allowing users to work seamlessly with or without internet and with no click latency.

Health Verticals and Applications

Tamanu supports a broad range of features that enables the management of patients across all levels of health care. The desktop-enabled version allows a full suite of functionality, including appointment scheduling, births and deaths registration, admissions, location management and discharges, diagnoses, procedures and clinical documentation. The system also supports medication, laboratory and radiology orders and requests. The mobile version offers stripped-down functionality, capturing diagnoses, treatments, clinical documentation, and the recording of events such as births, vaccinations, ante-natal visits and deaths. The mobile functionality also supports patient screening for NCDs, clinical decision support and treatment pathways using a configurable programs module with adaptable internal logic.

Interoperability

Tamanu is designed to interface with existing patient administration systems and allow full integration with laboratory (currently working with Senaite) and radiology management systems. Tamanu can also integrate with third-party systems such as DHIS2, mSupply & Tupaia.

Tamanu desktop and mobile communicate over HTTP; as long as 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 API.

Geographic Coverage

Indo-Pacific Region

Resources

Website
https://www.tamanu.io

YouTube
https://www.youtube.com/watch?v=gGIhxmP7YAc

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

tamanu

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 record • H

Facility management information system • K

Global Open Facility Registry

Summary

Data points such as the name and location of health facilities are essential to health information systems, reports, 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, and governments often do not have access to a flexible, secure platform for facility management and information exchange.

For example, a district health office may maintain a list that includes all the public health facilities in its geographic area. A medical council may maintain a list of all the physicians it has licensed in the country, including the provider's current district and post, whether it's a private, public, faith-based, or NGO-managed facility. These two lists together may provide valuable, expanded information about health service coverage in the district but lack a consistent unique identifier or naming convention for each facility. Reconciling data from these two lists was previously a manual and time-consuming process. Facility Match changes that.

Facility Match can speed up and improve the accuracy of developing and maintaining canonical lists of facilities for information systems and applications. Whether it's a registry of schools, farms, health clinics, or something else, Facility Match can save technologists and officials time and ensure more accurate data.

Health Verticals and Applications

Facility match drives health information exchange across health verticals, strengthening comprehensive clinical care, dynamic case-based surveillance, data-driven public health policy, and epidemic control. Facility Match 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.

Interoperability

Facility Match can pull facility data from multiple data sources and is interoperable with DHIS2, iHRIS, and any FHIR server. It supports the mCS profile of FHIR and through its HAPI FHIR Server backend, 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

Facility Match has been used to support the PEPFAR Data for Accountability, Transparency and Impact Monitoring (DATIM) project to match 80,000 facilities across numerous administrative levels in 21 countries, which include: Botswana, Burundi, Cameroon, Cote d'Ivoire, Democratic Republic of Congo, Ethiopia, Eswatini, Haiti, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, South Africa, South Sudan, Tanzania, Uganda, Ukraine, Zambia, Zimbabwe. It has also been used by the Ministries of Health in Guinea, Liberia and Sierra Leone to reconcile facility lists.

Resources

Website
https://www.facilitymatch.net/

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

GitHub
https://github.com/openhie/facility-recon

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

User Guide
https://facility-recon.readthedocs.io/en/latest/user/index.html

YouTube
https://www.facilitymatch.net/documentation

Contact Information
digitalhealth@intrahealth.org

Roadmap
https://facility-recon.readthedocs.io/en/latest/roadmap.html

Developer Guide
https://facility-recon.readthedocs.io/en/latest/dev/index.html

Quick Start Guide
https://facility-recon.readthedocs.io/en/latest/quick/index.html

FACILITY MATCH
Global Open Facility Registry

Global scale:

Emergent | Established

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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

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 social protection systems such as 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 core designation 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 a variety of other system categories and digital health interventions.

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

Information and communication technology systemcategories: 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 interfacesare 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 UHC sub-group of OpenHIE. An interoperability layer based on FHIR standards allows to connect to electronic medical record systems, master facility lists, client registries, reporting platforms, and health facility ledger systems.

Geographic Reach

Cameroon, Chad, Djibouti, DRC, Gambia, Nepal, Tanzania.

Resources

openIMIS Home Page
https://openimis.org

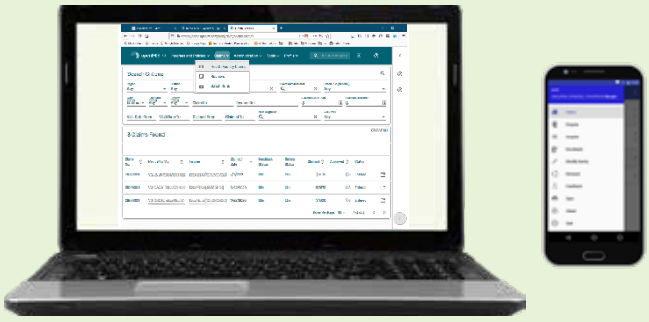
openIMIS Demo Server
https://demo.openimis.orgopenIMIS

Code Repositories
https://github.com/openimis

openIMIS Wiki
https://openimis.atlassian.net/wiki/spaces/OP

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 composed of 11 in- country and regional organizations, providing day-in, day-out 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.

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 turn key 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. More than 2.3 billion people live in countries using DHIS2. With the inclusion of NGO-based programs, DHIS2 is used in more than 100 countries.

Resources

Website
https://www.dhis2.org/

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

DHIS2 YouTube Channel
https://www.youtube.com/c/Dhis2Org

DHIS2 Online Academy
https://academy.dhis2.org/

Contact Information
post@dhis2.org

Documentation
https://docs.dhis2.org/

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

dhis2

Global scale:

Emergent | **Established**

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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 organisations to share health facility data and collaborate to establish an accessible global baseline of health facility data.

Health Verticals and Applications

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

- Maintaining baseline health facility data. By sharing data to OpenStreetmap stakeholders in the health cluster including the Ministry of Health are able to support the maintenance of baseline health facility data.
- Sharing baseline health facility data. When disease outbreaks arrive it is vital to have health capacity data up to date and available in an accessible format.
- Planning a vaccination rollout campaign. Knowing the geolocation and capacity of health facilities is vital for planning a vaccination campaign.
- Responding to disease outbreak events. Epidemiologists need to know the capacity of health facilities in order to respond to regional disease outbreak events.
- Maternity care. Open and accurate health care facility data is a valuable resource for pregnant women looking for support when planning a birth.
- Health capacity planning - Open and accurate health care facility data supports the possibility of Public-private partnerships and capacity planning.
- Support for Social entrepreneurs - Open and accurate health care facility data provides an enabling environment through which to support entrepreneurs focused on improving health outcomes.

Interoperability

Healthsites uses OpenStreetMap (OSM) as the data store.

As such the data is available under an Open Data base License (ODbL) In addition to OSM the data is made available for download off the healthsites.io platform in a shape file format and published through an open API.

In addition this baseline data is published to the Humanitarian Data Exchange (HDX) where it is made available in a variety of accessible formats including (Shape, GeoJSON, .CSV including HXL tags)

Healthsites data is consistently identified as one of the most downloaded data sets on the HDX platform

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

Geographic Coverage

Healthsites.io has a Global reach.

Healthsites.io uses openstreetmap.org as the data store which is a global resource.

The project supports individual facility updates and publishes National shapefiles of downloadable

health facility data. The open API allows regional analysis.

It is part of the Global Open Facility Registry (GOFR) solution linked to the Design and Analysis Toolkit for Inventory and Monitoring (DATIM).

Resources

Website
https://healthsites.io/

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

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

GitHub
https://github.com/healthsites/healthsites

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

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

YouTube
https://youtu.be/KtGNV_Lnakg

Contact Information
Mark Herringer | sharehealthdata@healthsites.io

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

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

Effective health workforce management is crucial for countries to address health worker shortages and meet the health care needs of their people. 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. Unfortunately, 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 forms an integrated human resources information system, enabling countries to more easily collect, maintain, and analyze health workforce data and manage health workforce resources at a ministry of health (MOH), district health offices, and health care facilities.

Health Verticals and Applications

Each health vertical/business can leverage the following features to support managing 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 the MOH 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 FHIR protocol to allow seamless data exchange with other FHIR-compliant health systems or OpenHIE compliant systems. iHRIS also supports other interoperability standards, including: Care Services Discovery for health worker information, SDMX-HD 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.

Resources

iHRIS Website
https://www.ihris.org/

Demo Page
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/

Contact Information
digitalhealth@intrahealth.org

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

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 (PCMT)

Summary

The Project Catalog Management Tool aims to connect product catalogs in order to show a clear journey from manufacturer to patient. It establishes master data that includes 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 have to interact with Product Catalogs - either explicitly as a part of a health supply chain as a participant to other's health catalogs - from clinical contexts to financing and health management. PCMT helps every organization, big and small, understand those catalogs and the product's they contain. Easy to get started, it 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 is focused on performing a pivotal role in health system interoperability as a reference technology as an OpenHIE Product Catalog and in general with a wide variety of IT systems. PCMT supports an open REST web-api as well as 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 in HL7's FHIR suite.

Geographic Coverage

PCMT is currently at varying levels of adoption in: Malawi, Rwanda, Ethiopia and Cameroon. The base open-source product that PCMT builds upon, Akeneo, is used across the globe in many different sectors.

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://www.youtube.com/channel/UC27eVYhcAQJuuRa-g1ktLVw

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

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

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 | Pharmacy information system • U

Pharmadex

Summary

Pharmadex is a web-based tool that helps NMRAs streamline and track medicines registration to ensure that they have the most updated medicines available and approved for prescribing and use. 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 is a Java-based application that can run on a desktop or an Android tablet/smart phone.

Pharmadex was developed by the USAID-funded Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program, implemented by Management Sciences for Health (MSH).

The current USAID MTaPS Program (2018-2023) is supporting NMRAs to implement electronic pharmaceutical management information systems using Pharmadex.

The USAID MTaPS Program is planning to add new modules to Pharmadex to expand functionality with import/export and registration and inspection of pharmacies.

Health Verticals and Applications

- Comprehensive system management: An administrator can configure and manage the system
- Transparent process: An applicant (distributor or manufacturer) can submit and track an application or amendment
- Product lifecycle management: Enables coordinators and evaluators to assign and track evaluations; regulators to approve, renew, suspend, or cancel a product; and health care users to search for and verify approved products
- International standards access: Provides access to international standards terminology databases and dictionaries
- Monitoring and evaluation: Enables overview of aggregate data and management information
- Adjustable modules and user privileges: Allows modules to be added or removed and user access to be restricted

Interoperability

Currently an API is not available but can be built.

Geographic Coverage

Bangladesh, Ethiopia (now advanced into eRIS), Namibia and Mozambique.

Resources

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

Blog
Not available yet

Demo
https://pharmadex.msh.org/

GitHub
https://github.com/MSH/Pharmadex

Wiki
Not available yet

Feature Guide
Not available yet

Implementers Guide
https://github.com/MSH/Pharmadex

User Guide
https://github.com/MSH/Pharmadex

YouTube
Not available yet

Contact Information
digital@msh.org

Source Code
https://github.com/MSH/Pharmadex

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: | 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 LMICs. This along with implementation of siloed digital health solutions, that often implement multiple patient identifiers (IDs), create significant barriers to operationalizing strategies for enabling holistic person-centered care and achieving universal health coverage (UHC). These barriers also make it difficult to reduce the burden of indicator reporting on frontline health workers, improving the accuracy and timeliness of data, and building integrated, national digital health ecosystems.

SantéMPI origins go back to 2006 when its predecessor was developed to create a reference implementation Canada's national digital health architecture. It has since been enhanced and refined through ongoing frontline feedback, and investments by governments, private sector, and non-governmental organizations.

SantéMPI is a next-generation, robust, fully featured Master Patient Index/Client Registry (MPI/CR) platform that helps overcome these barriers by facilitating the implementation of national scale unique health IDs. It is a key building block needed to facilitate data harmonization, sharing and interoperability across national digital health landscapes. It implements all existing interoperable specifications and requirements related to Client Registry in the OpenHIE specification, and supports Client Registry as a service, including HL7 FHIR standards and widely deployed legacy HL7v2 standards. SantéMPI provides a proven platform for integrating both existing solutions and future solutions.

Health Verticals and Applications

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

Interoperability

SantéMPI supports the following interoperability standards:

- GS1
- HL7 FHIR
- HL7 v2
- PDQ or PDQm - (Mobile) Patient Demographics Query
- PIX or PIXm - (Mobile) Patient Identifier Cross Reference
- XDS - Cross-Enterprise Document Sharing

Geographic Coverage

Global

Resources

Website
http://www.santesuite.com

Blog
http://blog.santesuite.org/

GitHub
https://github.com/santedb

Wiki
https://help.santesuite.org/

Feature Guide
https://help.santesuite.org/

Implementers Guide
https://help.santesuite.org/

User Guide
https://help.santesuite.org/

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

Contact Information
info@santesuite.com

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

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 an open-source digital health software platform that allows Ministry of Health (MOH) leadership teams, financial and technical investors, and technology partners to help improve the coordination of digital health project activities. DHA was developed by WHO and partners as a web- based technology inventory and assessment web platform to enable governments and financial and technical investors to coordinate investments and manage information about existing and planned digital health deployment related to scale, functionality, data capture, investment, and use.

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

The DHA is an inventory registry to help monitor and coordinate individual digital health projects in a specific country. The registration process includes a standard questionnaire which 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 from OpenHIE architecture. The local Ministry of Health team can then leverage this information to enhance planning activities in-country.

Geographic Reach

The DHA has registered projects from 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, Uganda, Nigeria, Malawi, Lesotho, and Sri Lanka.

Resources

Website
www.digitalhealthatlas.org

Contact Information
digital-health-atlas@who.int

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

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; 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-demand data enabled by tool 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–driven interoperability, CGM works with a country's existing health management information system specifically to improve measurement and data quality. Other components include the client registry as well as shared health records.

Geographic Reach

CGM is currently rolled out in India in four provinces, with plans to cover the entire country by 2020. Welthungerhilfe has a large footprint in both Southeast Asia and Africa and intends to roll out CGM in every constituency.

Resources

CGM Video Walk
https://we.tl/t-QwyonGyBRb

CGM Web Page
https://childgrowthmonitor.org/

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

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

Markus Matiaschek, MMatiaschek@gmail.com

Ayanda Ntombela, Ayanda.Ntombela@welthungerhilfe.de

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

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 effective 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 in a laboratory, or part of a national laboratory network.

English and French 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 labs.
- OpenELIS has advanced feature sets to help labs achieve a high throughput 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 (Ebola, COVID19, etc).
- Routine testing for every health facility is fully supported
- Tuberculosis testing features help to diagnose and manage MDRTB cases.
- OpenELIS has been used in just about every setting where there is a lab

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 APIs and tools available to help meet your goal.

- Viral Load and Early Infant Diagnosis Dashboards for displaying comprehensive up-to-date national data
- FHIR and HL7 interfaces for exchanging test requests and results with EMR systems, and other test requesting systems.
- Airport arrival application for COVID19 screening
- Connections to demographic systems for importing demographics
- FHIR based Consolidated Server for comprehensive lab data collection
- Ability to send high-priority results via email and SMS text messaging
- Out of the box connectivity with OpenMRS via the FHIR module

Geographic Coverage

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

Resources

Website
openelis-global.org

Demo
global.openelis-global.org

GitHub
https://github.com/I-TECH-UW/OpenELIS-Global-2

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

User Guide
built into the application

YouTube
video.openelis-global.org

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

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

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

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 other infectious disease outbreaks.

Interoperability

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

Geographic Reach

Vietnam.

Resources

OpenLabConnect GitHub
https://github.com/OpenLabConnect/OpenLabConnect

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

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

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

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-premise.

Health Verticals and Applications

OpenBoxes can be used to manage products across the full spectrum of health services, including primary care, HIV/AIDs, Cancer care, Tuberculosis, and others. It supports a wide range of supply chain workflows including:

- Create a purchase order and manage shipping, receipt, and invoice reconciliation for purchased items
- Create shipments from a purchase order or packing list, print custom shipping documents, and send notifications to specific stakeholders upon shipment or receipt.
- Manage inventory of health commodities, including bin tracking and expiration management
- Receive electronic stock requests from facilities, verify against inventory, and track request fulfillment patterns
- Perform basic forecasting using inventory on hand, demand from requests, stock in shipments and on purchase orders, and user-defined stock levels

Interoperability

The OpenBoxes team is engaged in the 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, Rwanda, Liberia, Sierra Leone, Malawi, Madagascar, and the USA.

Resources

Website
https://openboxes.com/

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

Demo
https://openboxes.com/demo

GitHub
https://github.com/openboxes/

Feature Guide
https://openboxes.com/features/

Implementers Guide
https://openboxes.com/docs/

YouTube
https://openboxes.com/videos

Contact Information
support@openboxes.com

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

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, the Expanded Program on Immunization, family planning, and nutrition, to HIV and tuberculosis.

Each health vertical/business can leverage the following features to support the management of its supply chain:

- **Requesting and ordering:** Use stock data to generate orders using the configurable approval process.
- View and fulfill orders from other facilities and send shipments to initiate a receiving process.
- **Inventory management:** Capture inventory data and stock movements to provide an overview of full stock availability for any program or product.
- **Mobile integration:** Leverage mobile tools to track stock movements at facilities with limited connectivity through third-party products like OpenSRP and SIGLUS.
- **Reporting and analytics:** Easy-to-use dashboards and reporting metrics across all programs and facilities make it simple to capture data from third-party applications.
- **Cold chain inventory management:** Capture cold chain equipment inventory, functional status, and temperature status.

Interoperability

OpenLMIS believes in a world where many systems can interoperate to deliver better health care and provide end-to-end visibility in supply chains. With standards-based interoperability, countries can determine which systems are best for which function without giving up the ability to share data across all systems for critical decision-making. Through application programming interface–driven interoperability, OpenLMIS works with a country's existing health information system to increase supply chain efficiency. OpenLMIS supports IHE's mCSD and mADX with FHIR, GS1 (GTIN, GLN), REST with JSON, and OAuth2.

Geographic Reach

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

Resources

OpenLMIS Website
http://openlmis.org/

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

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

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

Short Demo Videos on YouTube
https://www.youtube.com/results?search_query=openlmis+3.3

Contact Information
info@openlmis.org

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

OpenLMIS

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 delivers 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 out to frontline health workers including those in the most remote locations, and it allowed frontline health workers to share important information about issues they were facing in their facilities and communities. The Liberian Ministry of Health and Social Welfare continues to use mHero, recognising the important role of mHero in prioritizing health sector communication across the country's health system.

In addition to the ongoing use of mHero in Liberia, several countries recently deployed mHero for COVID-19 response coordination and communication.

There are countless ways that mHero can be used:

- **Message blasts to all health workers**, such as words of encouragement and appreciation for the work being done;
- **T**
  segments of health workers, such as knowledge checks for participants in a particular training or announcements of health campaign dates for different districts;
- **One-way communication**, such as notification of new policies or procedures;
- **Two-way exchanges**, such as checking stock levels of essential medicines;
- **Routine communication**, such as reminders about submitting reports;
- **Non-routine communication**, such as important updates or urgent warnings during an emergency;
- **From the MOH**, such as validating the personal information in their human resource records;
- **Initiated by health workers**, such as reporting cases of infectious diseases.

Interoperability

Interoperability is a key feature of mHero. mHero brings together data from existing health information systems and locally popular communication platforms.

mHero can connect any FHIR-based database, such as iHRIS, OpenMRS, and certain DHIS2 deployments

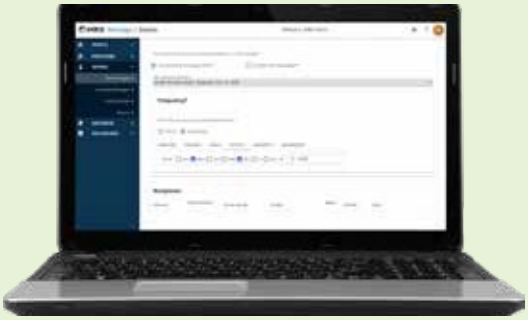
with communication systems like RapidPro, Facebook Messenger, and WhatsApp. For example, it can use facility data from DHIS2 and health worker contact information from iHRIS to send out SMS messages via RapidPo. This is done by using global interoperability standards for health information exchange, like FHIR, and the mHero Connector which is an implementation of the mACM standard.

Additionally, an iHRIS instance is not a prerequisite for mHero - basic health worker contact information from a non-iHRIS registry can be pulled in to an iHRIS 5 interface which permits easier and more streamlined contact and group management when compared to using RapidPro alone or attempting to manually sync between a registry and communication platform.

mHero's architecture is flexible to also quickly add connections to other communication channels including 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, we are also enhancing mHero 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.

Lastly, mHero conforms with the Flow Interoperability (FLOIP) standards making it possible to send out flows designed for other platforms as well as making it possible for mHero to use all Flow-results compliant platforms for syncing of contacts and contact groups,

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:

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 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 difficult to optimize service delivery and ensure interventions reach recommended coverage thresholds. Reveal is an open source platform and approach that utilizes aspects of spatial intelligence, including high resolution satellite imagery, machine learning risk models, as well as front-end mobile tools, to assist governments and implementing partners plan, guide, monitor and adjust health campaigns, ensuring services are delivered in the most efficient and effective way possible.

Health Verticals and Applications

Reveal is capable of supporting multiple health verticals. To date, Reveal has been configured and deployed to help support the delivery of interventions related to malaria, neglected tropical disease and childhood vaccination campaigns. More specifically, these interventions include Indoor Residual Spraying (IRS), Insecticide Treated Net (ITN) distribution, Focal Investigations (FI), Mass Drug Administrations (MDA), and finally, childhood vaccination registrations. Possible additional applications include, but are not limited to, family planning and reproductive health services; childhood nutrition services, HIV; as well as risk communication and community engagement (RCCE) campaigns.

Interoperability

Reveal is built on the Open Smart Register Platform (OpenSRP), which is an open source digital register platform, based on global standards of care, that integrates with existing country health information systems and architectures.

Reveal has also been built using HL7 FHIR standards, and has a tested interoperability layer. While Reveal implementations have not yet required testing of messaging standards consistent with OpenHIE, we aim to demonstrate this in 2021, by building an API to create aggregates aligned with the IHE ADX Technical Framework. In addition, we aim to set up a test server aligned with HL7 FHIR to demonstrate data exchange per relevant workflows, including 6.2 Aggregate Reporting; 6.4 Care Services; 6.5 Patient Identity Management Workflows; and 6.6 Shared Health Record.

Furthermore, Reveal makes use of the Common Geo-Registry (CGR); a platform, developed through the Digital Solutions for Malaria Elimination (DSME) project, that hosts a master list for each of the geo-objects being used across a number of different health information systems and disease intervention programs. Through this integration, all data collected through Reveal references the same IDs for all geo-objects, providing a means to create consistency as operations progress.

Finally, Reveal integrates with several algorithms developed by the DiSARM team, allowing outputs and risk scores from these models to be visualized in the planning module as ‘risk maps’. Such algorithms include a building cluster algorithm, a residential structure classification algorithm, and a population estimation algorithm.

Geographic Reach

Reveal has been deployed, or is in the process of being deployed in Zambia, Nigeria, Namibia, Eswatini, Senegal, Angola and Thailand, Kenya and Rwanda. Additional expansion is planned for in 2021 and ongoing.

Resources

About
https://revealprecision.com
https://akros.com/mspray/

Research, Media, and Success 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://www.ncbi.nlm.nih.gov/pmc/articles/PMC4704423/

http://www.cidrz.org/mspray-spatial-data-to-improve-intervention-coverage/

Contact Information
Anna Winters awinters@akros.com

Source Code
https://github.com/OpenSRP/opensrp-client-reveal

Reveal
REDEFINING PRECISION

Global scale:

Emergent | Established

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Tool type:

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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. The mission of SORMAS 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. SORMAS includes disease-specific process models for 54 infectious diseases.

Health Verticals and Applications

According to the World Health Organization classification of digital health interventions, SORMAS classifies as follows:

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.

Furthermore, SORMAS includes user specific interfaces and workflows for 22 different users, including hospital informants, laboratory officers, surveillance officers, community officers, point of entry officers, and epidemiologists. Of the 54 diseases included in SORMAS, 18 include disease specific case-based outbreak response process models. With this approach, SORMAS addressed the strategic goal of the 2017 Berlin Declaration for the G20 Health Ministers and the core capacity requirements laid out in the International Health Regulations.

SORMAS is available in different set-up concepts:

SORMAS-Common provides one central database of all users and participating heath authorities of a country or jurisdictional area. Different user roles have different user rights.

SORMAS-Local is an isolated docker container-based instance for the respective local health authority without any interfaces to other systems.

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

SORMAS-eXtra Layer is an expansion of SORMAS-eXchange by which anonymized data form all participating SORMAS-X-instances is extracted to a central database for joint analyses and cross border analyses of transmission chains.

SORMAS-SymptomDiary allows for the patient or contact person to feed symptom monitoring data directly into SORMAS.

SORMAS-Mobile is an android base secured mobile app version of SORMAS that allows offline utilization and wireless synchronization with the respective main system (SORMAS-C, or L or XL).

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/TC215 and

OpenHIE standards like HL7 FHIR.

The current SORMAS framework is connected to other applications such as Prospective Monitoring and Management (PIA), Clinical Data Capture (Climedo) and SurvNet@RKI via an integrated SORMAS2SORMAS API endpoint and communication protocol.

A prototype API for DHIS2 exists, and a fully functional HL7 standard based FHIR SORMAS adapter version has been developed and is being piloted in Ghana and Nigeria since November 2020. SORMAS adheres to contextual standards of the Integrated Disease Surveillance and Response system, the International Health Regulations, and Centers for Disease Control and Prevention's Epi Info application.

Geographic Coverage

Nigeria (nationwide), Ghana (nationwide), Germany (deployment ongoing towards nationwide), Switzerland (12 of 26 cantons), France (14 of 18 regions), Fiji (nationwide), United States (some states).

Resources

SORMAS Website
https://sormas.org/

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

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

Short Demo Videos on YouTube
https://sormasorg.helmholtz-hzi.de/overview-video.html

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

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

sormas

Global scale:

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System categories: Public Health and Disease Surveillance • V

Appendix

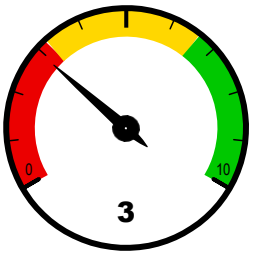
digital square

Global Good Maturity Model

To help identify areas in which investment is needed in global goods, Digital Square collaborated with the digital health community, including the Digital Health & Interoperability Working Group of the Health Data Collaborative, 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:

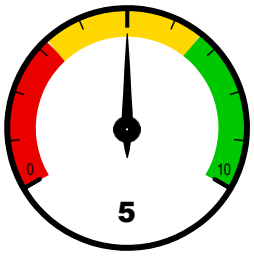
- **Global Utility:** Assesses how widely the tool is used, how well funded it is, and other metrics measuring its adoption and potential for use.
- **Community Support:** Assesses both support for a community of users (such as documentation and multilingual support) and engagement of the user community 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, adaption, and sustainability.



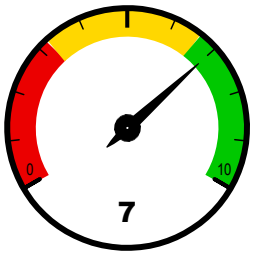
Global Utility

- 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 wiki: https://wiki.digitalsquare.io/index.php/What_are_Global_Goods.

The global Goods Maturity model is a framework that has been, and continues to be, used to support the developers, implementers, decision makers and donors as they consider the areas of a global good and their varying levels of maturity. A developer may consider the maturity of the global good and adjust their product roadmap to better support areas such as community Support or Software scalability etc. Implementers are able to leverage the GGMM and understand the level of community resources available to themselves as they consider deployment. Decision makers are able to combine software maturity, community support and Global Utility 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 the levels of maturity and create a stronger vision of where investment would be well suited and the scale/functionality and adoption of tools.

[3] OpenHIE website, https://ohie.org. Accessed October 12, 2018

OpenHIE

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

Formally formed in 2013, OpenHIE evolved from the work initially begun in 2009 to establish the Rwandan Health Information Exchange (RHIE). 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 (CoP) are now being leveraged or explored in multiple countries. Today, over 450 community members are working together, with standards bodies and with technology providers to align the world towards appropriate uses of standards and to further grow and evolve the OpenHIE community. This community has had direct influence on countless national eHealth strategies, including Nigeria, Kenya, Uganda, Tanzania, Ethiopia, South Africa, Rwanda, Malawi, Liberia, Sierra Leone, and many of the countries supported by the Asian eHealth Information Network (AeHIN). Many of these countries are moving past plans, to concrete implementations of health data sharing architectures.

OpenHIE Background

Health information systems typically operate independently of one another. Each member of a team (primary care physicians, specialists, nurses, technicians, public health practitioners, community health workers, and corresponding 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. Many other 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 those in resource-constrained countries through open and collaborative development and support of country-driven, large-scale health information-sharing architectures like:

- 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.

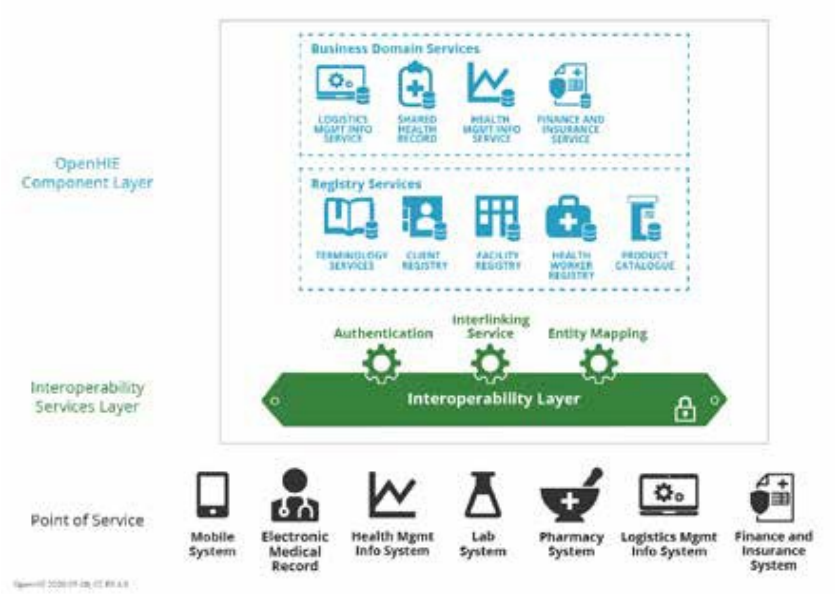
OpenHIE Architecture

The OpenHIE community supports interoperability by creating a reusable 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.

OpenHIE's architecture is made up of software components, all interacting/ interoperating to ensure that health information from various point-of-service systems is gathered into a health information exchange. To accomplish this, the exchange normalizes the context in which health information is created across multiple dimensions including:

1. Who received health services
2. Who provided the services
3. Where the services were received
4. What particular care and services were received
5. What products may have been involved in treatment
6. Who has financial responsibility

This separation of concerns supports quality, safety, and continuity of care, and facilitates the appropriate use of information needed for population health and metrics calculation.



OpenHIE Components

Terminology Service (TS)

The Terminology Service component of the OpenHIE architecture provides a centralized source for the HIE's standards and definitions, including terminologies, ontologies, dictionaries, code systems, and value sets. Other HIE components can use these standards and definitions to normalize clinical data and achieve consistent aggregation and reporting.

Client Registry (CR)

The identity of an individual who receives health services is crucial to enabling health care record sharing across institutions and systems. Yet, sharing health care records can be a challenge in a complex environment where there are multiple systems across multiple health care institutions and each institution and/or system has a different way to identify their clients. Even in environments where citizens are assigned national identification cards, there is a need to ensure the unique identity of an individual among the myriad of fragmented information systems that collectively represent a person's electronic health record. The Client Registry is designed to assist in uniquely identifying individuals who receive health care services by:

- Maintaining a central registry of all patients and their demographics and assigning a unique identifier to each patient.
- Linking patient registration entries that result due to changes in patient demographics (patient moved to another location), data entry errors during patient registration, or missing demographic information.
- Enabling health care workers to identify facilities at which a patient has received care.

Facility Registry (FR)

The purpose of a health facility registry is to act as the central authority to collect, store, and distribute an up-to-date and standardized set of facility data. The resulting standardized and current facility dataset stored in the registry is called the Master Facility List (MFL). While these concepts are closely related, a facility registry can be understood as the technology that manages and shares facility data and the MFL is the standardized data stored in the tool.

Health Worker Registry (HWR)

The Health Worker Registry serves as the central authority for maintaining the unique identities of health workers within a country. The Health Worker Registry is a database containing a minimum dataset of details of all health workers working in both the public and private sectors.

With multiple and disparate sources of data on health workers, it is a complex task to pull together and maintain a master and canonical list of all health workers in a country. The health worker registry seeks to reduce the complexity of this task by:

- Pulling the minimum dataset of health workforce information from the various source data systems.
- Merging the source data systems into an authoritative registry of health workers according to a data governance policy.
- Allowing queries of health worker information by client systems.

OpenHIE Product Catalogue (PC)

A Product Catalogue serves as the source of truth about what a Product is within an HIE. It sources the information for this role through two expected means: 1) as the ongoing result of a process of master data management to properly define and categorize medical products and 2) as derived data on the proper definition and categorization of medical products (e.g., GS1 GDSN).

OpenHIE Interoperability Layer (IOL)

While the roles of other OHIE components that provide services may be more easily understood, it is the IOL that secures and orchestrates the exchange of information. Similar to an orchestra conductor, the IOL provides the central force that enables all of the HIE components to work together and interact with Point-of-Service systems outside the HIE.

OpenHIE Business Domains

The OpenHIE architecture can be applied to multiple business domains that describe clinical and health system needs. These business domains encompass activities such as:

- Routine reporting of health system indicators for monitoring and evaluation.
- Provision of a longitudinal record of a client's clinical care and health status across all health verticals.
- Management of medical commodities as part of the health system supply chain.
- Purchasing of health care goods, services, and interventions on behalf of a covered population.

OpenHIE Finance and Insurance Service

Finance and Insurance Service stores, categorizes, and facilitates the administration of centralised claims and finance related data to care provision to patients within the HIE. The service receives claims/financial data from Point of Service applications (including financing applications acting as a point of service interface outside of other PoS systems) and curates the management of them.

Shared Health Record (SHR)

The Shared Health Record facilitates the sharing of clinical information between health information systems to enable better patient care, thus improving health outcomes.

The Shared Health Record is a means of allowing different services to share health data stored in a centralized data repository. It contains a subset of normalized data for a patient from various systems, such as an electronic medical record or the Laboratory Information Management System. This record is queried and updated between the different institutions and systems that are authorized to do so. The Shared Health Record is distinct from a data warehouse; it is an operational, real-time transactional data source.

Health Management Information System (HMIS)

A Health Management Information System, also called a Routine Health Information System, facilitates the collection of periodic health service delivery and public health indicators from a variety of information systems and the effective use of information at facility, district, and higher levels to help improve health care outcomes.

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Scan here to learn more about the Global Goods Guidebook.