Primer on Digital Solutions for COVID-19 Vaccination Service Delivery

Data and digital health use cases and tools to support immunization service delivery

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Digital Health Centre of Excellence

The Digital Health Centre of Excellence — DICE — was founded in the spring of 2021 as a mechanism to deliver agile and coordinated technical assistance to governments on digital health solutions. DICE's goal is to ensure more equitable coverage of quality health services, including vaccines, maternal and child health services, and nutrition investments through increased use of data and evidence.

A multi-agency initiative co-led by UNICEF and the World Health Organization, DICE provides coordinated technical assistance to national governments and partners on digital health interventions that address health priorities in the context of the COVID-19 pandemic, as well as post-pandemic health system needs, such as the following.

- Coordinated technical assistance to countries to support sustainable and scalable deployment of carefully chosen and mature digital health solutions for planning distribution of medicines and vaccines.
- Supporting service delivery and supply management.
- Epidemiological surveillance and case detection.
- Monitoring coverage of service uptake and training pf health workers.
- Communicating with the general population to generate demand and reduce misinformation.

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Cover photos: (top) Arinaitwe Angella, a midwife, draws the AstraZeneca vaccine from the vial during COVID-19 vaccination at Butanda Health Centre III in Ndorwa West Sub County, Kabala District. © UNICEF/UN0458396/ Musinguzi; (bottom) A couple listens to an audio message as Leena Sharma, an Anganwadi worker (right) holds her mobile phone, under Sajag programme in village Bhatagoan district Dhamtari, Chattisgarh, Dec. 14, 2020. © UNICEF/UN0387650/Altaf Ahmad

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Supporting institutions

The concept for this primer was developed by a team at USAID's Center for Innovation and Impact (CII). CII incubates new ideas, puts them into practice, and scales effective approaches through partnership and institutional change. CII's expertise in innovation, market-based solutions, and digital health helps accelerate impact against critical health issues.

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Foreword

The *Primer on Digital Solutions for COVID-19 Vaccination Service Delivery* was created during a time when global attention was focused on getting shots from ports into arms in low- and middle-income countries. It was originally designed to be an easy-to-use cheat sheet, and was presented in country consultations to help those engaged with vaccination efforts to plan and deploy data and digital tools effectively, and to balance the sometimes-competing imperatives to act quickly while strengthening existing systems and addressing long-term sustainability.

We are publishing this Primer as we believe its applicability extends beyond the circumstances that prompted its creation, to future pandemic threat preparedness, resilient health systems, and ongoing COVID-19 and routine immunization efforts. The case studies provide vivid illustrations of how countries adapted and scaled existing tools and systems to meet emerging, urgent needs. Digital investments made during a health crisis do not always survive beyond initial emergency funding. However, we believe the likelihood that a system vanishes after emergency funding ends is reduced when existing solutions are adapted and scaled. This enables crisis-era digital investments to have deeper impact, contributing towards long-term health systems strengthening. The case studies often highlight practical applications of the adapt and scale approach, offering useful examples for those thinking about how to prepare for and respond to future pandemic threats. The Primer also has non-crisis applications. The framework and digital use cases outlined in the Primer organize and systematize the ways that data and digital tools can be used to support both campaign and routine vaccination efforts.

This publication of this Primer was only made possible due to the resourceful and creative work that our country partners did in partnership with donors and technology providers, rolling out digital solutions to address quickly evolving challenges. It also benefitted immeasurably from peer review conducted by a variety of digital health and immunization practitioners and specialists. If this Primer is useful to any of those who helped inspire its creation, then we will consider its publication a success.

Sean Blaschke
Co-founder and UNICEF Coordinator, Digital Health Centre of Excellence (DICE)

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Introduction to the primer

Photo: U-Reporters in Korhogo, in the North of Côte d'Ivoire.
© UNICEF/UNI325669/Dejongh

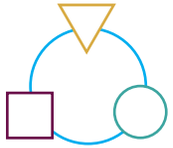
About the primer

Created in response to the COVID-19 pandemic, but designed to be useful far beyond

The COVID-19 pandemic further accelerated adoption of digital health tools in low- and middle-income countries, and focused attention on the importance of high-quality disaggregated data, to help understand what populations are most vulnerable, and how to best target immunization efforts. This primer was created to guide digital investments in support of the COVID-19 vaccination response, but is designed to be useful both beyond the pandemic, and beyond vaccine service delivery.

Aimed at strengthening primary health care and health systems

The digital solution use cases outlined here have the potential to strengthen primary health care, including routine immunizations, and health systems, if designed and implemented strategically.



Advocates for an "adapt and scale" approach to realize system-wide benefits

Unlocking system-wide benefits requires strategic investment. The approach this primer advocates for, "adapt and scale," prioritizes investing in existing systems over building new, parallel systems, and emphasizes investing in tools that can support multiple program areas, rather than just one program area. This could involve adding new features or modules to an existing system to address COVID-19 use cases.

In support of global goals, like achieving universal health coverage

As digital health and data usage in vaccination service delivery continues to expand, this primer attempts to provide guidance supporting planners and implementers in designing for digital health systems that are sustainable and help enable integrated care. In doing so, the primer seeks to support progress towards global goals, like universal health coverage (UHC), including access to quality essential health-care services, and quality and affordable vaccines for all.

Primer background and purpose

Background

The COVID-19 pandemic prompted the largest vaccination campaign effort in history, as national governments, international organizations, nonprofits and the private sector sought to vaccinate the world's population. This primer was created to support getting vaccines from ports into arms by showing how digital health tools and the data they enable can support vaccination campaigns. While many of the case studies presented here deal with COVID-19, **the approach and framework presented in this primer are well suited to support routine immunization efforts, as well as other areas of the health system**.

The primer was designed to:

Highlight a framework for digital health use cases in vaccine delivery systems, adapted from the World Bank, to help organize the ways that the global health community and policymakers think about the wide variety of ways that digital health tools and the data they enable can support vaccination efforts.

Provide real-world examples showing how digital solutions can be leveraged to improve vaccination processes. The primer provides quick examples—and longer case studies in the annex—illustrating how countries have adapted existing digital tools to meet COVID-19 immunization needs across the ten vaccination service delivery system use cases identified by the framework.

Help unlock value of country data and digital systems, by showing how the data collected through using a digital tool to address one use case can create crucial data inputs for another use case, and demonstrating how strategic planning and interoperability can facilitate data usage and sustainable health systems strengthening.

Audience

Planners and funders

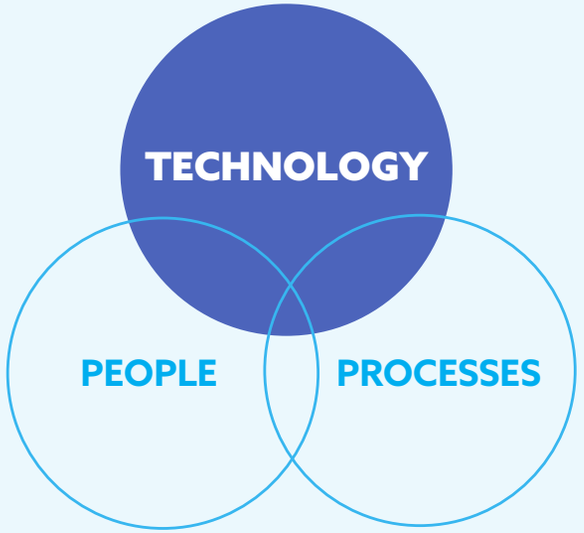
This primer seeks to expand knowledge and serve as a reference tool by outlining all the ways that digital health tools can support vaccination service delivery, to help guide investments and program planning.

Implementers

This primer outlines the specific ways digital health tools can help enable vaccine service delivery systems through a grounding framework with illustrative examples and tools to incorporate into their implementation.

Focus

This primer focuses on technology, in the form of digital health solutions. However, technology is just a tool. Tools are only effective when the people and processes deploying them are also set up for success. Digital solutions need corollary investments in 'people and processes,' like institutional and workforce capacity, country policy, and governance, to function optimally.



Digital solutions must also meet the capacity of the use environment. In some cases this may require being paired with paper-based or other 'analogue' approaches, such as use of radio in social and behavior change communication (SBCC).

Framework: Digital health and data use cases for COVID-19 vaccine delivery systems

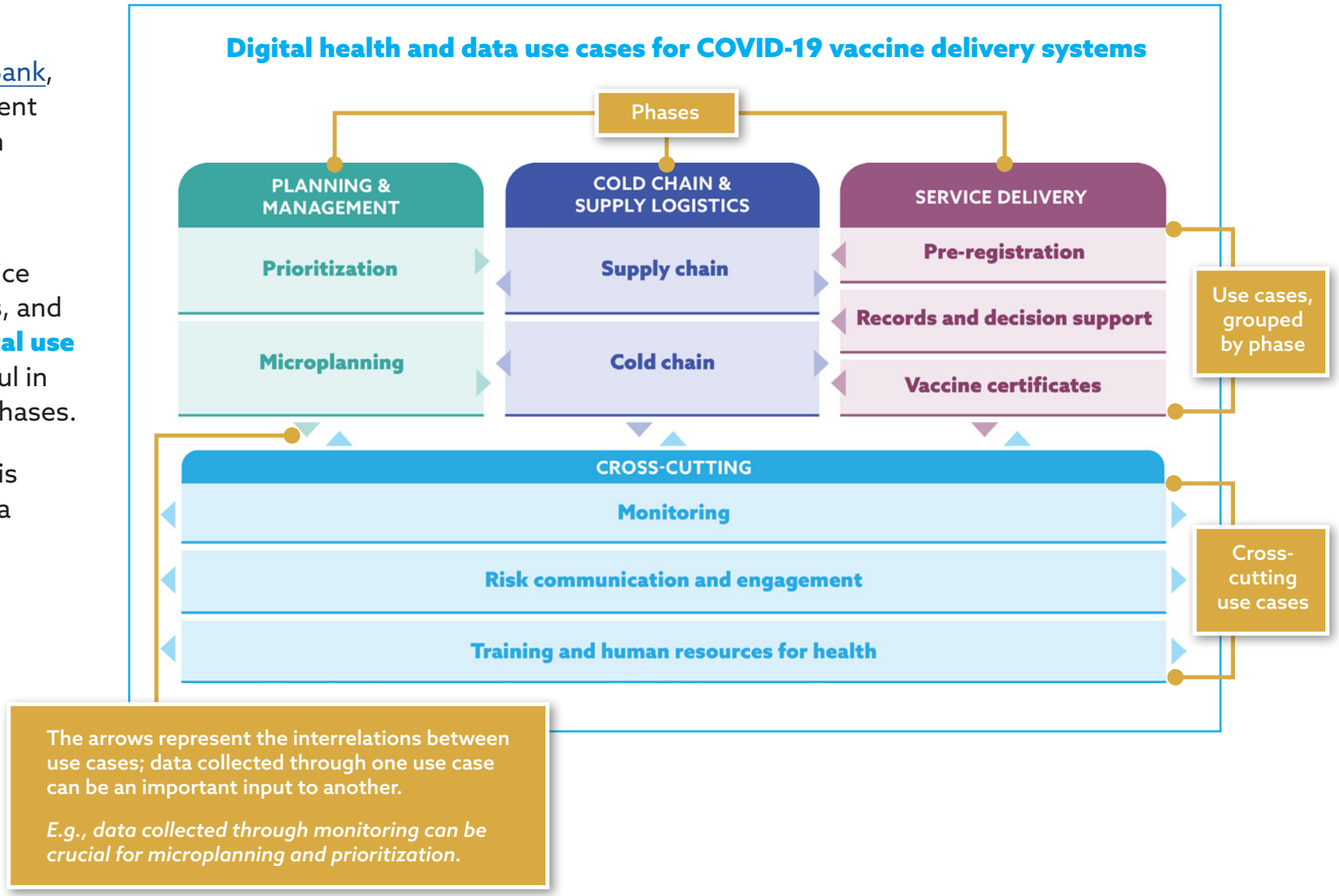
Photo: Health workers in Jamaica working with the CommCare platform. © UNICEF/2020/Sheil

About the framework

The following framework, adapted from the World Bank, organizes the many different ways that digital tools can help enable vaccination service delivery.

It breaks vaccination service delivery into three phases, and calls out ten specific **digital use cases** that might be helpful in each phase or across all phases.

Use case, in this context, is an opportunity to deploy a tool to solve a problem.



Digital health and data use cases for COVID-19 vaccine delivery systems

PLANNING & MANAGEMENT

Prioritization

Identifying and targeting missed, vulnerable, and/or other client populations at a national, regional, or sub-regional level.

Microplanning

Creating detailed, delivery-level operational plans for reaching target populations with health interventions, based on information including geographic accessibility and vaccination access points.

COLD CHAIN & SUPPLY LOGISTICS

Supply chain

Managing health care goods and services to make sure they are available in the right quantity, at the right place and time. This also involves ensuring vaccine safety, including detecting counterfeit products.

Cold chain

Managing temperature, equipment functionality, and capacity to protect vaccine quality.

SERVICE DELIVERY

Pre-registration

Scheduling support and appointment reminders to help organize and manage vaccination efforts.

Records and decision support

Documenting immunization records that track the type of vaccine received and date, linked with patient identity if feasible, to help avoid dropouts and ensure vaccination schedule completion.

Vaccine certificates

Providing verifiable evidence of vaccination status.

CROSS-CUTTING

Monitoring	Sharing, analyzing, visualizing, and using data to improve vaccine campaign quality, including through disease surveillance, by conducting spot-check analyses to understand vaccine coverage, and tracking information about adverse events following immunization (AEFI). Data compiled through other use cases represent a key input for monitoring to support adaptive management across other use cases.
Risk communication and engagement	Public engagement to support dissemination of information, combat misinformation, encourage health seeking behaviors, and enable client engagement.
Training and human resources for health	Training health workers on COVID-19 protocols; capturing and maintaining information for workforce planning; management; and regulation.

Framework adapted from World Bank report, Digital Platforms for Covid-19 Vaccination Delivery.

Cross-cutting considerations for investing in digital health solutions

Photos: (top) April 28, 2021, Cliniques Universitaires de Kinshasa (Kinshasa, DR Congo). Joseph Langana, 46 years old, is vaccinated against COVID-19 as part of the vaccination campaign launched on Monday, April 19, 2021. © UNICEF/UN0457855/Magwinda

(bottom) 23-year-old UNICEF volunteer Sadman Sakib Uddin helps community member Abdul Jalil, 55 years old, register using a mobile phone during the COVID-19 vaccination registration campaign at Madartek, Bashabo on October 10, 2021. © UNICEF/UN0537595/Kiron

Considerations for digital health implementations

When confronting a fast-moving disease outbreak, speedy response is critical; however, for emergency response digital health implementations **to be effective** and **sustainably support health systems beyond the end of emergency funding**, it is important to plan and implement digital health systems in keeping the following six considerations.

1. **Understand the enabling environment for digital health systems**
2. **Follow established processes and guidance when implementing digital health systems**
3. **Adapt and scale**
4. **Conduct thorough requirements gathering**
5. **Consider global goods and digital public goods**
6. **Leverage data exchange**

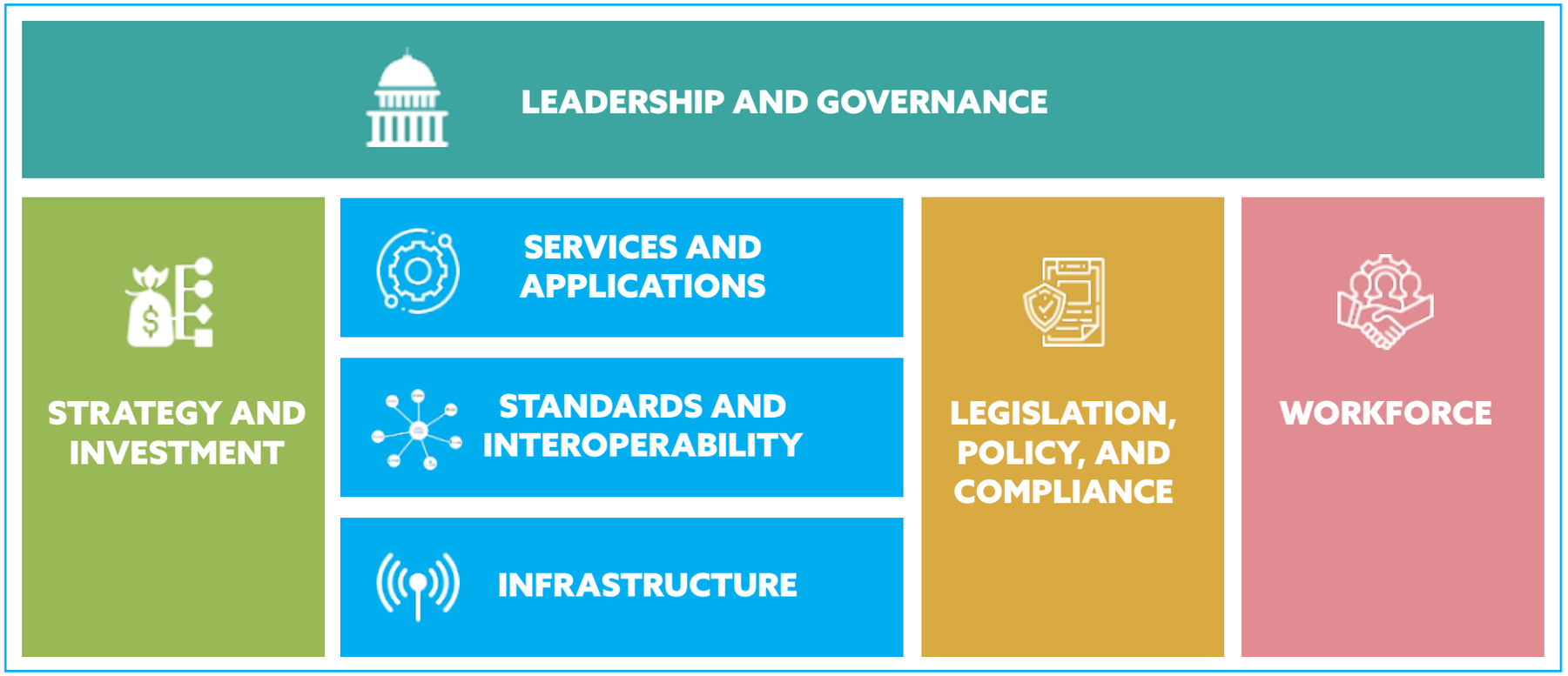
1 Understand the enabling environment for digital health systems

Understanding the enabling environment can help ensure investments are **context appropriate** and **designed for sustainability**.

Definition:

The **enabling environment** is an important contributor to the success of digital health systems. It includes attitudes, actions, policies, and practices that stimulate and support effective, efficient functioning of organizations, individuals, and programs and is made up of the "building blocks" below.

Building blocks



Source:WHO/ITU National eHealth Strategy Toolkit, adapted from WHO/ITU *Digital Health: Planning National Systems* course material.

Key questions and coordination:

To plan digital health solutions that sustainably contribute to **health system strengthening**, it is important to design them to fit within the digital health landscape and maturity level, to align with national policy, and to coordinate with national bodies.

LANDSCAPE

Types of analysis questions to ask:

- What digital health interventions are already taking place?
- Are there interventions addressing this use case?
- What kinds of health information systems can be tapped into?
- What kinds of softwares are being used?

Resources: DH Atlas, UNICEF DH landscaping, Map & Match

MATURITY

Types of analysis questions to ask:

- Where does this country fall with respect to digital health maturity?
- What workforce capacity exists to support digital health work?
- What kind of infrastructure exists to support/limit the intervention?
- Are there policies or legislation to review for this country before developing a digital health intervention?

Resources: Navigator for DH Capability, GDH Index

POLICY

Align with national priorities and strategies:

- National Health Priorities
- National Digital Health Strategy
- Health Sector Plan
- District Plan
- National eGovernment Strategy

GOVERNANCE

Coordinate actions with the proper national body:

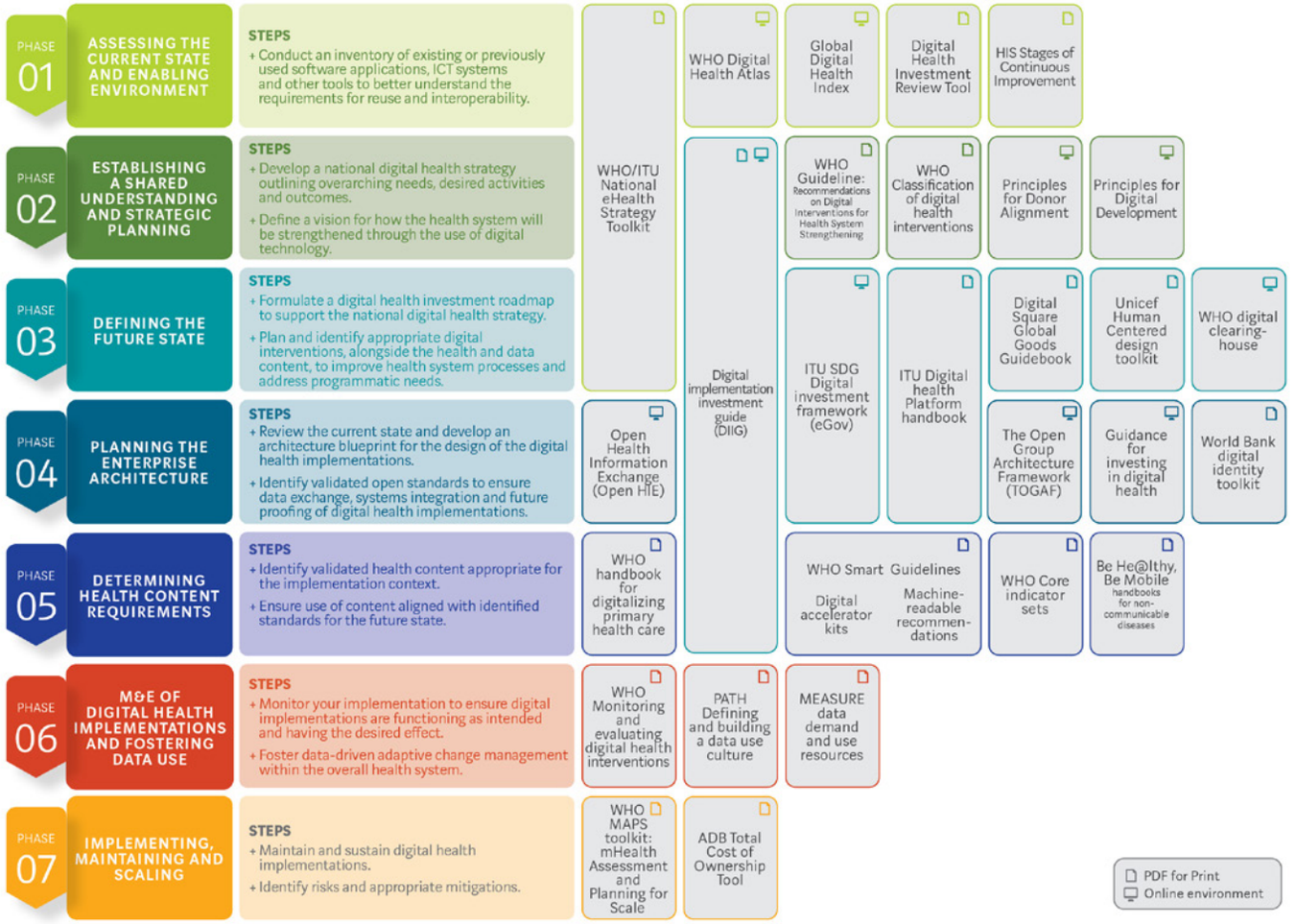
- National Digital Health Working Group, or other technical working groups
- Health Sector Planning Group
- Donor/Investor Coordination Group
- Ministry of IT
- Telecom regulator
- Data ownership, storage and management

Adapted from WHO/ITU *Digital Health: Planning National Systems* course material.

2 Follow established processes and guidance when implementing digital health systems

The World Health Organization (WHO) Digital Implementation Investment Guide (DIIG) provides guidance for digital health system implementation, and maps connections to other important guidance documents that can help when planning and implementing a digital health system.

Planning and implementing a digital health enterprise: phases, steps, and resources



3 Adapt and scale

Approach: Doing a landscape analysis (or using a pre-existing one) before implementing a new digital solution in a country or region is important because it provides insight on what digital systems are already in use there.

With this knowledge, it is possible to assess whether there is a system that could be:

ADAPTED to meet the required use case

There may already be solutions that have the ability to be modified, for example by adding a new module, to address the new need. Adapting solutions helps prevent creation of parallel tools that do similar things, and can help break down silos between programmatic areas to promote integrated patient care.

Identify tools that can be adapted for COVID-19 vaccine distribution, to meet new needs.

SCALED to cover the required service area

There may already be solutions that fit the use case, but that do not cover the required service area. Scaling existing solutions can be more time and cost effective, because you are leveraging pre-existing systems, and some users may already be familiar with the tools. It also prevents fragmentation between systems.

Identify tools already deployed for COVID-19 response and vaccine distribution, scale them to meet needs.

Benefits:

- Enhance sustainability, as investment is going into pre-existing tools that are already incorporated into the health system.
- Adapting and scaling existing digital solutions is often cost effective and reduces duplicity.
- This approach fosters time efficiency by not building from scratch.

4 Conduct thorough requirements gathering

Create simple, complete, and well structured sentences to define the requirements

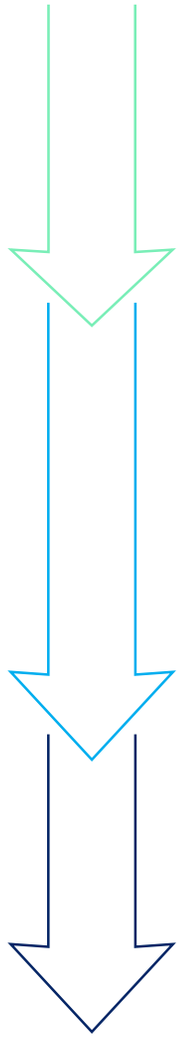
- Requirements clearly define the **needs** and **wants** of information systems that support the **activities** in business processes.

Emphasize "what" should be done, not "how" to do it

- Requirements should be described in a way that is **independent of technology and or applications**
- Requirements should be **clear and concise**, so that all workgroup participants can understand them.

Target components that are in scope for your project

- Requirements should be measurable for evaluation purposes.



Guidelines:

Employ **user-centered design** practices to thoroughly understand the existing intervention, the problem within it, user needs and pain points.

Address the **actual problem(s)** with the technologies deployed.

Consider using approaches like bottleneck analysis or root cause analysis to pinpoint problems.

Develop **clear and specific requirements** that both the project team and the developers understand.

Iterate as you develop the tools using **agile methodologies**.

Adapted from WHO/ITU *Digital Health: Planning National Systems* course material

5 Consider global goods and digital public goods

Global goods are open source, digital health applications designed to mitigate some of the generic cons of open source software.

They are:


Free and Open Source Software (FOSS), Adaptable to different countries and contexts.


Supported by a strong community.


Funded by multiple sources.


Deployed at significant scale.


Designed to be interoperable across commonly used systems.

For more examples, see Global Goods Guidebook.

Understanding FOSS:

- Many tools highlighted in this Primer are global goods, and so are free and open source software (FOSS).
  - » "**Free**" means that anyone is freely licensed to use, copy, study, and change the software in any way.
  - » "**Open source**" means the source code for the software openly shared so people can improve or adapt the software's design.
- FOSS decreases risk of vendor lock-in, and can help facilitate government ownership.
- **Free in this context does not mean without cost**; implementing and maintaining digital tools will cost money.
- Factor these costs in when **budgeting and calculating total cost of ownership.**

Sources: https://wiki.digitalsquare.io/index.php/What_are_Global_Goods, adapted from Digital Health: Planning National Systems course material

6 Leverage data exchange

Why it matters:

- The digital health use cases described in this primer **rely on**, **provide**, and/or **collect data**.
- Planning to **support data exchange between digital solutions** can improve the effectiveness and sustainability of the vaccination service delivery system and support decision making.
- Using **standards-based and interoperable solutions** facilitates data flow between digital solutions and can improve overall system sustainability.

For more on interoperability and digital health architecture, please see:

USAID Vision for Action in Digital Health

Digital Implementation Investment Guide (DIIG)

Global Goods Guidebook

OpenHIE Framework

Map & Match

Three approaches:

INTEROPERABILITY

- Interoperability can facilitate direct, real-time data exchange between digital systems.
- Interoperability is achieved through architecture enabling software to use common data elements and communicate.
- While the **most robust approach**, time and coordination constraints may present challenges to multi-system interoperability.

INTEGRATION

- Integration connects digital systems so that data from one system can be accessed continuously and automatically by the other.
- Integrations must be done on a system-by-system basis and there is a limit to how many systems can be integrated.

DATA EXTRACTION & INGESTION

- Data can be downloaded from multiple sources and uploaded to a central location for analysis.
- This type of solution may not support real-time monitoring, and may be more appropriate for periodic analyses.

Use Cases: Delivering COVID-19 vaccinations with digital solutions

Disclaimer: The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the publishers of this primer in preference to others of a similar nature that are not mentioned.

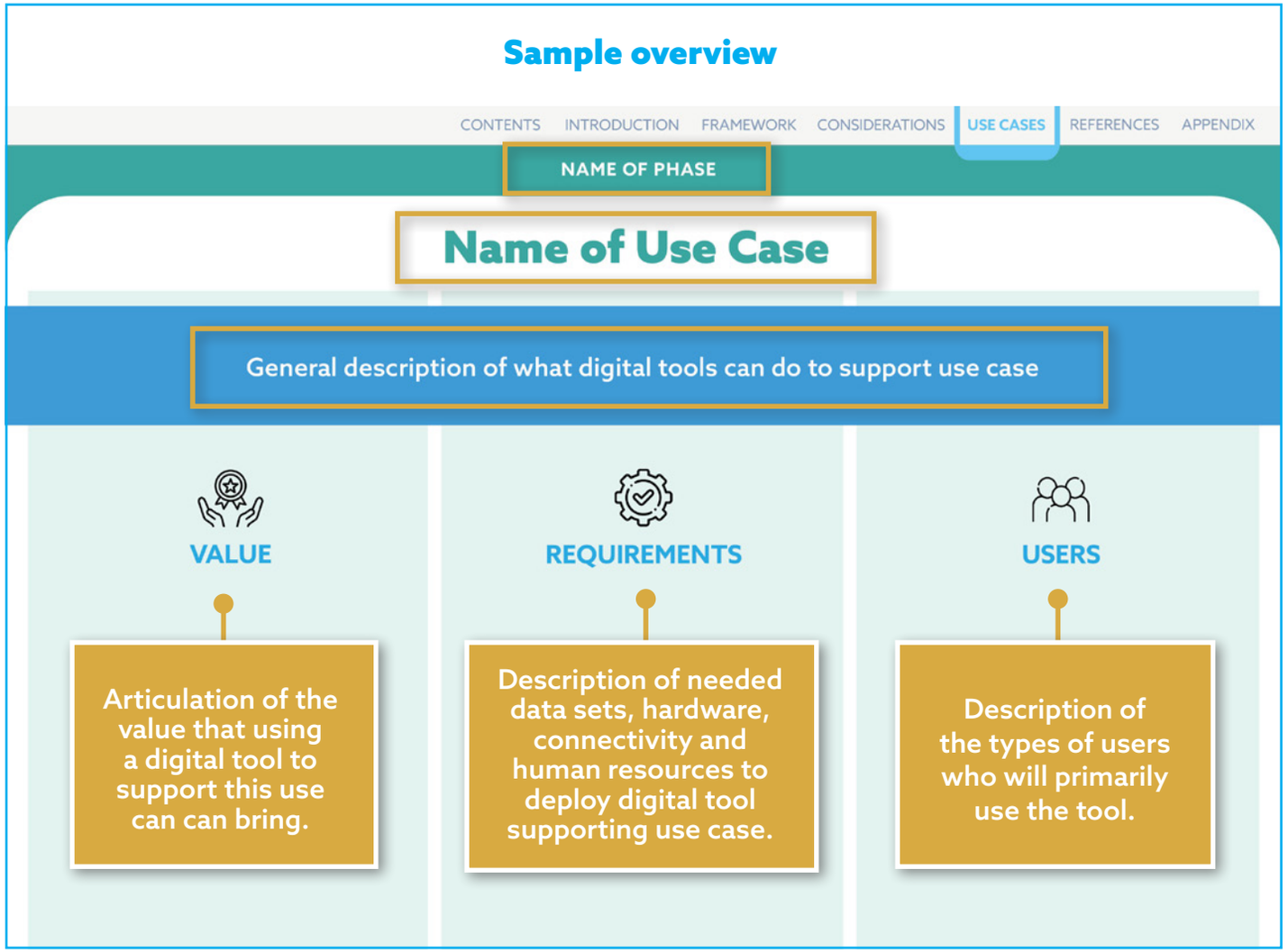
Photo: COVID-19 call centre staff member holds a phone at the call centre in Mogadishu, Somalia on 30, 2021. © UNICEF/UN0436019/Taxta

How to navigate this section

Each of the following use cases has three components.

1. An **overview**.
2. A **real world example** of a digital tool meeting the use case.
3. A sampling of **digital tools** that can support the use case.*

* *Note that these are not exhaustive lists, and that the mention of specific tools does not imply that they are endorsed or recommended by the publishers of this primer.*



PHASE: PLANNING & MANAGEMENT

Prioritization

Digital prioritization tools can inform equitable vaccination approaches, leveraging demographic, geographic, surveillance, and health data contained in other databases to reach missed, vulnerable, and/or strategic populations.*

VALUE

- Leverage previously compiled data to support strategic and equitable vaccine strategies.
- Ground prioritization using geographic data to account for population and resource distribution, and barriers to access.
- Enable targeting of populations based on existing data, such as vaccination rate, age group, essential worker status, etc., with targets automatically updating as input data updates.
- Create a basis for an accountable, transparent system for prioritization.

REQUIREMENTS

Data

- Existing datasets containing demographic data, core geographic data including spatial demographics, health infrastructure locations, and administrative/reporting area boundaries, road networks, and surveillance and/or health data.

Hardware

- Desktop computers.

Connectivity

- Internet, servers.

HR

- Data scientists, GIS analyst.

USERS

Primary

- Health system managers.

Secondary

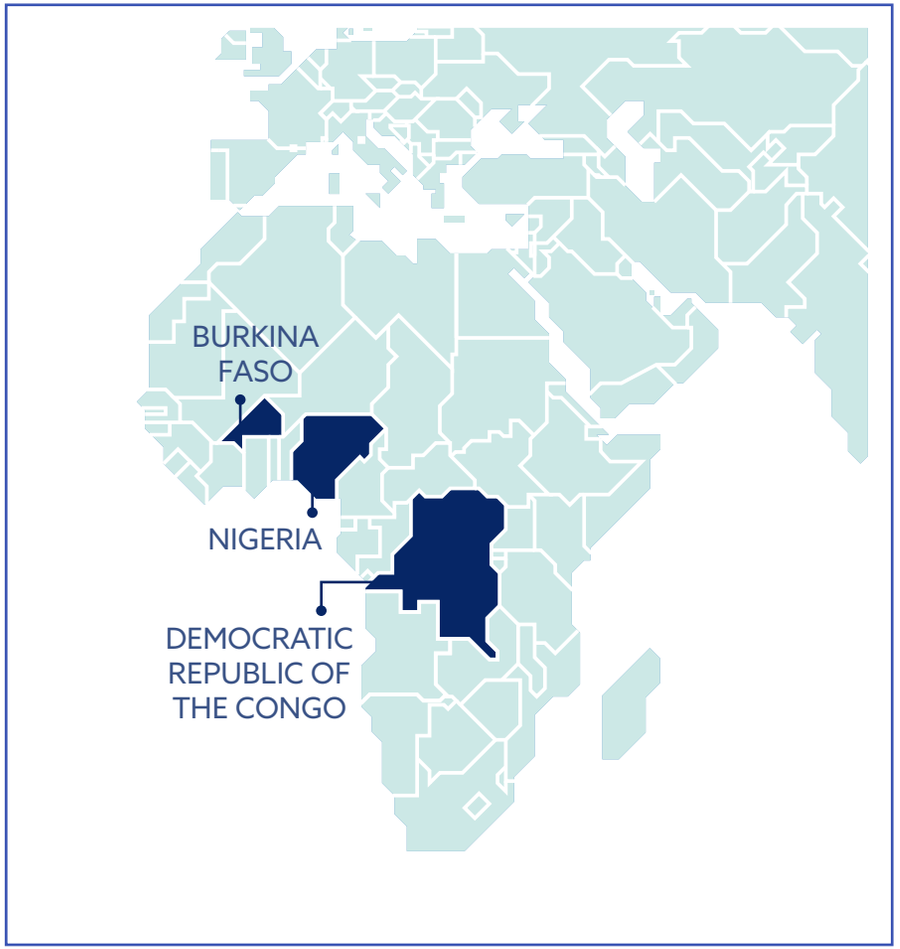
- Health care providers.

* Public authorities should only repurpose personal data contained in existing government databases for vaccine delivery where relevant individuals would have reasonably foreseen their data being used for the purposes of such a public health initiative, or where there is a clear legal mandate for the public authority to repurpose the original database.

CASE STUDY **Prioritization**

The COVID-19 Situational Analysis Project

- The governments of Burkina Faso, the DRC, and Nigeria are using Premise to remotely collect data, providing hyperlocal insights into how COVID-19 is affecting vulnerable communities.
- The data is segmented by age, profession, gender, and financial situation; it also provides information on COVID-19 vaccine hesitancy.
- Through this data, the Situational Analysis Project was able to provide USAID's Bureau of Humanitarian Assistance and other humanitarian aid actors with information to evaluate and improve public health messaging aimed at infection prevention and COVID-19 vaccine uptake.



With any software solution, data quality is a key consideration. To help ensure high quality data, invest to support program design, data sourcing, human resources capacity sharing, and supervision.

TOOLS Prioritization

Tool type	Example of tools
Data systems	• AccessMod* • Premise • Reveal*
Visualization tool for existing data	• Apache Superset* • DHIS2* • Grafana* • Akuko • QGIS* • Tableau • PowerBI

* See details on FOSS DPG and/or Global Goods on page 21

PHASE: PLANNING & MANAGEMENT

Microplanning

Digital microplanning tools can leverage geospatial data on health infrastructure, health facility catchment areas, distribution of target populations, satellite imagery, and travel-time estimation to help users understand if a service or facility is accessible to the population within its catchment area equitably.

VALUE

- Optimize location of vaccination delivery points to maximize coverage.
- Assess gaps in supply and human resources versus target populations.
- Help ensure comprehensive geographic coverage to avoid missed communities.
- Promote equitable vaccine delivery, reaching remote and marginalized populations.
- Target social and behaviour change activities (pre, during and post outreach activities) in communities with vaccine hesitancy.
- Track vaccination sessions to improve coverage.

REQUIREMENTS

Data

- Datasets containing demographic, geographic, and/or health data.

Hardware

- Desktop computers, smartphones or tablets.

Connectivity

- Internet, cellular data, servers.

HR

- System administrator, technical program manager, GIS analyst.

USERS

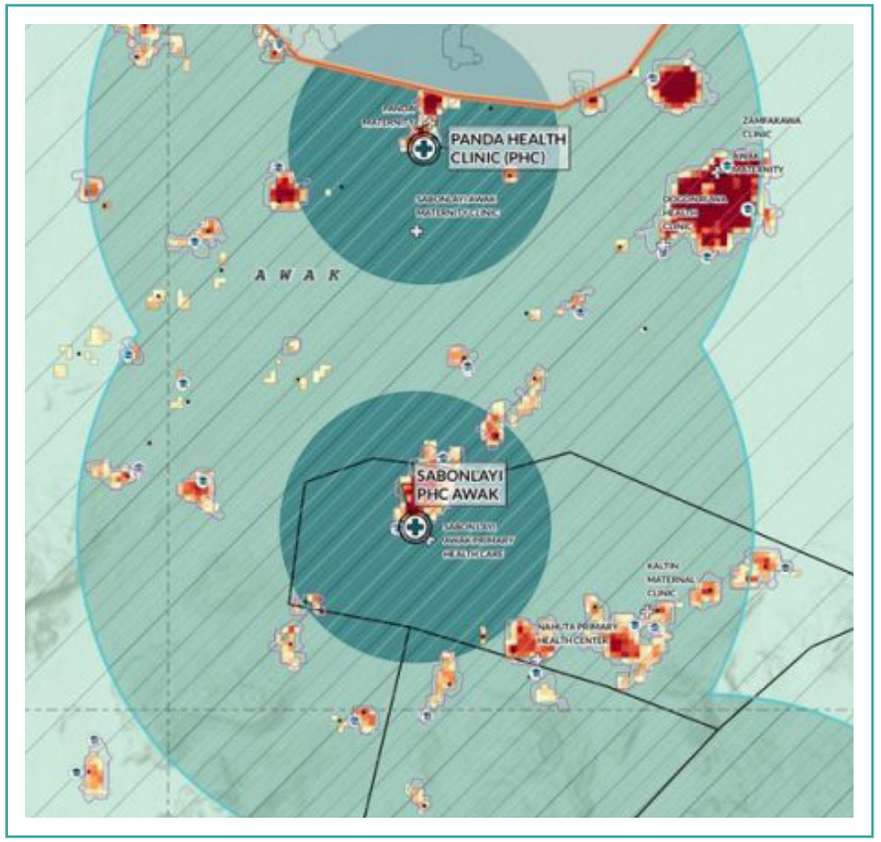
Primary

- Health care providers.
- Health system managers.

CASE STUDY **Microplanning**

Interoperable platforms map opportunities

- Nigeria's National Primary Health Care Development Agency (NPHCDA) is using GRID3 data and maps as a primary digital microplanning tool.
- GRID3 offers geo-referenced infrastructure and demographic data for development to create hyperlocal paper planning maps that show priority and target population estimates, or local government areas, to support microplanning in Nigeria.
- The solution also allows staff supporting vaccine campaigns to use digital maps to: navigate to distribution sites (point-based or household), capture real-time data, create population and mobility estimates, and build infrastructure maps.



Examples of GRID3 maps produced for COVAX interventions in Nigeria. © GRID3

See additional case study on page 59

TOOLS Microplanning

Tool type	Example of tools
Data collection on handheld device and desktop geospatial analytics support	• CommCare* • Community Health Toolkit* • Crosscut • DHIS2* • KoBoToolbox (Subset of ODK) • mSupply Mobile • ODK* • OnaData (Subset of ODK)* • OpenSRP FHIRCore • QGIS*
Advanced data collection and analytics, including satellite imagery, structure counts, ability to configure teams and campaigns	• AccessMod* • GRID3 • OpenSRP* • Reveal*
Publication and maintenance of health facility geolocation data	• Common GeoRegistry • Global Health Sites Mapping project* • Global Open Facility Registry (GoFR)*
Messaging and data collection	• mHero* • RapidPro*

* See details on FOSS DPG and/or Global Goods on page 21

PHASE: COLD CHAIN AND SUPPLY LOGISTICS

Supply chain

Digital tools to support pre-registration allow clients to signal intent to get vaccinated, facilitate scheduling, and provider appointment reminders.

VALUE

- Increase data reporting speed and accuracy.
- Reduce stockouts.
- Automate routine reporting and calculations offering time-savings for health workers.
- Improve supply chain cost effectiveness.
- Increase accountability through improved visibility.

REQUIREMENTS

Data

- Standardized product information, standardized health facility lists.

Hardware

- Desktop computers, smartphones or tablets.

Connectivity

- Internet, cellular data, servers.

HR

- System administrators, technical program manager.

USERS

Primary

- Health system managers.
- Health care providers.

CASE STUDY **Supply chain**

Taking stock of logistics data for health

- In Cameroon, the Open Logistics Management Information System (OpenLMIS) COVID-19 Edition is enabling tracking of vaccines, PPE, and other COVID-19 related products in 50 facilities with plans to expand to 250 more.
- The simplified OpenLMIS COVID-19 Edition has all the features and functionality of the original version packaged into a tool that is quicker to deploy and designed specifically for COVID-19 response.
- The system can automatically calculate monthly consumption of health commodities — based on past consumption data — to foster improved supply chain management. Additionally, the tool helps to track vaccines expiration dates.

OpenLMIS is deployed in over 10,000 health facilities in nine countries in Africa, across all major health programs including vaccines.

See additional case study on page 60

TOOLS Supply chain

Tool type	Example of tools
Last mile solutions	• CommCare* • Community Health Toolkit* • DHIS2 Vaccine Delivery Toolkit • OpenSRP*
Logistic management information systems	• eVIN • Entuition Vesta • Field Supply • Logistimo* • Medexis • mSupply • mVaccination • OpenBoxes • OpenLMIS* • Zebra Vital Vaccine Monitor

* See details on FOSS DPG and/or Global Goods on page 21

PHASE: COLD CHAIN AND SUPPLY LOGISTICS

Cold chain

Digital cold chain tools can support temperature monitoring and logistics planning, automating, and simplifying processes to help ensure that clients receive effective vaccines.

VALUE

- Simplify process to check temperature logs.
- Monitor cold chain equipment from remote locations.
- Prevent stock orders when appropriate cold storage is unavailable.
- Notify health staff when temperature excursions occur.

REQUIREMENTS

Data

- Vaccine and cold chain equipment temperature data, and location data.

Hardware

- Dependent on solution; may include digital temperature loggers, smartphones or tablets, and desktop computers.

Connectivity

- Dependent on solution; may include internet, bluetooth, servers.

HR

- System administrators, technical program manager.

USERS

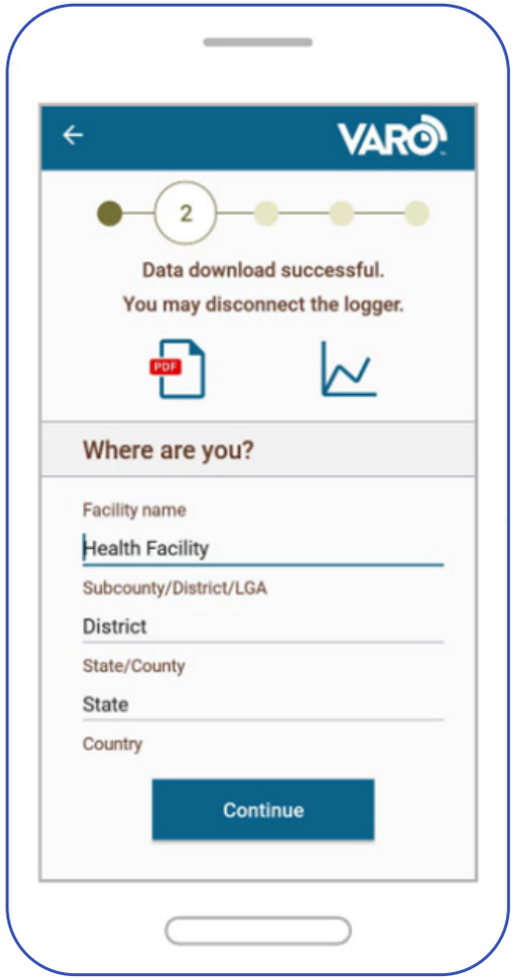
Primary

- Health system managers.
- Health care providers.

CASE STUDY **Cold chain**

Taking the temperature for cold chain

- The Kenya Expanded Programme on Immunization (EPI) used Varo as part of an inventory exercise to capture temperature data from thousands of Cold Chain Equipment (CCE), giving insights into equipment inventory and performance.
- Varo is a free app that allows users to download and email temperature data from standard 30 day temperature loggers.
- Reports can be automatically aggregated by the free app Pogo, helping administrators assess CCE performance and plan interventions like warranty claims and service visits.
- The Kenyan Ministry of Health also uses Nexleaf Analytics' ColdTrace tools to monitor the temperature of COVID-19 vaccines in transit from the national storage site in Kitengela to regional facilities.



A smartphone displaying the Varo interface. © Varo.

See additional case study on page 61

Citations: Nexleaf Analytics and Varo

TOOLS Cold chain

Tool type	Example of tools
Logistics management information systems to support cold chain	• DHIS2* • mSupply • OpenBoxes • OpenLMIS* • OpenSRP*
Free solutions to support temperature monitoring using 30 day temperature loggers	• Varo* • Pogo*
Remote temperature sensing systems	• Nexleaf Analytics • Parsyl

* See details on FOSS DPG and/or Global Goods on page 21

PHASE: SERVICE DELIVERY

Pre-registration

Digital pre-registration tools to support pre-registration allow clients to signal intent to get vaccinated, facilitate scheduling, and provider appointment reminders.

VALUE

- Facilitate vaccine scheduling for clients and health care providers.
- Help implement prioritization.
- Provide input data on current vaccine demand levels to inform stock level decision-making, microplanning, and demand generation activities.
- Support behavioral compliance.

REQUIREMENTS

Data

- Identification system for clients (e.g., phone numbers).

Hardware

- Smartphones or tablets, servers.

Connectivity

- Internet and/or cellular data.

HR

- System administrators, technical program manager.

USERS

Primary

- Client.

Secondary

- Healthcare provider.

CASE STUDY **Pre-registration**

Pre-registration

- Tanzania is using Chanjo Covid Tracker, a public-facing web-based app for appointment bookings and registering for COVID-19 vaccinations.
- The tool captures full name, age, sex, residence, occupation, history of COVID-19 infection, comorbidities, and information on date and location of vaccine doses received.
- Preregistration is possible using a national ID, a passport or driving license. The system creates a unique number that can be linked to a vaccination certificate.
- The tool sends automatic acknowledgments of appointment booking, a statement of vaccination following the first dose, SMS text reminders for second doses, and reminders for no-shows.
- Registration was previously done on paper, and this digital tool has helped reduce queue time for appointments.

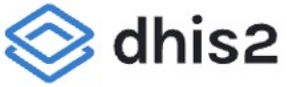
The Chanjo Covid Tracker sends automatic acknowledgments of appointment booking, a statement of vaccination following the first dose, SMS text reminders for second doses, and reminders for no-shows. © UNICEF/Tanzania/Gomi

See additional case study on page 66

Citation: Centre for Research on Health and Social Care Management at SDA Bocconi & MMGH

TOOLS Pre-registration

Tool type	Example of tools
Scheduling tools	• DHIS2* Note: Pre-registration in DHIS2 is typically in conjunction with custom apps via public web portals, for example in Laos or South Africa. • DIVOC* • RapidPro*
Appointment reminders	• CommCare*



* See details on FOSS DPG and/or Global Goods on page 21

PHASE: SERVICE DELIVERY

Records* and decision support

Digital records and decision support tools can support client vaccination records, which include information such as the date of receipt, type of vaccine, any immediate negative reactions, and client identity to facilitate continuity of care. They also help make data available to support other aspects of vaccine delivery, and provide prompts and job aids to help guide health workers through a care encounter.

VALUE

- Support vaccine records linked to client identity.
- Track and report stock use and support stock need estimations.
- Support scheduling of further doses.
- Collect data that can be used to estimate coverage, and guide demand generation activity.
- Save health workers' time by eliminating duplicative data entry for reporting and automating calculations.
- Provide prompts, alerts, checklists and screening according to protocol.

REQUIREMENTS

Data

- Identification system for clients, if supporting case management.

Hardware

- Smartphones or tablets, servers.

Connectivity

- Periodic access to internet and/or cellular data.

HR

- System administrators (dependent on solution), technical program manager.

USERS

Primary

- Healthcare provider.

Secondary

- Client.

* including immunization directories.

CASE STUDY **Records and decision support**

Lightweight electronic immunization records

- Health Information System Program (HISP) Rwanda supported Rwanda's MOH to customize the immunization package from the DHIS2 COVID-19 Vaccine Delivery Toolkit.
- HISP Rwanda re-purposed local DHIS2 applications to develop a paperless process from start to finish for vaccine management. This enabled an information cascade in all health centers and hospitals, both public and private, and facilitated information sharing at the district and national level. The tool also sends SMS text reminders to recipients about second dose appointments.
- The solution integrated with the National ID Agency to pull individuals' information from the national ID system as part of an automated registration process, which reduced time spent on data entry.

On 04 March 2021, a Rwanda Biomedical Center staff member scans a barcode to digitally record information about vaccines allocations to district hospitals.
© UNICEF/UN0426120/Kanobana

See additional case studies on page 62 page 63 page 64 and page 66

Citation: Centre for Research on Health and Social Care Management at SDA Bocconi & MMGH

TOOLS Records and decision support

Tool type	Example of tools
Frontline-oriented tools	• DHIS2 Tracker* • CommCare* • Community Health Toolkit* • mSupply • OpenSRP* • SanteSuite*
Facility and hospital electronic medical records (EMRs)	• Bahmni COVID-19 Starter Kit • OpenMRS* • OpenSRP* • SanteSuite • Tamanu*

* See details on FOSS DPG and/or Global Goods on page 21

PHASE: SERVICE DELIVERY

Vaccine certificates

Digital vaccine certificate tools can provide verifiable evidence of vaccination status.

VALUE

- Enable access to globally recognized certification of vaccine status.
- Prevent false claims about vaccination status.
- Support continuity of care for Covid-19 vaccinations.

REQUIREMENTS

Data

- Client name, birthday, data for each vaccination event, vaccination certificate metadata.

Hardware

- Servers for data storage (if not cloud based), devices (printers, scanners).

Connectivity

- Internet.

HR

- System administrators, data entry personnel, technical program manager.

USERS

Primary

- Client.
- Health care provider.
- Health system manager.
- Public health authorities.
- Border control.

CASE STUDY **Vaccine certificates**

Two digital public goods for COVID response

- In Jamaica, UNICEF — as part of COVAX — worked with the Ministry of Health (MOH) to launch the open source standards-based Digital Infrastructure for Vaccination Open Credentialing DIVOC system to issue vaccinations certificates for the whole country.
- The DIVOC tool was made interoperable with their existing COVID-19 vaccination tool (CommCare).
- Together, the system offers an end-to-end national digital COVID-19 vaccine process to manage and record scheduling, patient screening, vaccine administrator checklists/documentation and reporting, and provides real time data on vaccination progress.

Vaccines procured by the COVAX Facility are offloaded from cargo planes. © UNICEF/UN0427050/Bongyereirwe

Digital Infrastructure for Vaccination Open Credentialing (DIVOC), a Digital Public Good developed in India, has provided over one billion electronic vaccine certificates in India implemented as part of the Winning Over COVID-19 (CoWin) initiative.

See additional case study on page 65

TOOLS Vaccine certificates

Tool type	Example of tools
Certificate rendering service tools that are compliant with the WHO's Digital Documentation of COVID-19 Certificates	• OpenSRP* • DHIS2* • DIVOC* • SMART Health Card

In August of 2021, WHO published international standards to define a Vaccine Certificate. Some solutions, such as DHIS2 and CommCare, must be configured to be compliant and do NOT do so by default. This publication strongly recommends against deploying a non-standard based solution as it will not be recognized by other countries or at borders.

* See details on FOSS DPG and/or Global Goods on page 21

CROSS-CUTTING

Monitoring

Digital monitoring tools, such as mobile apps and information systems, can support near real-time monitoring of vaccine delivery process to facilitate adaptive management, rapid data collection, aggregation, and analysis across multiple use cases.

VALUE

- Support adverse effects following immunization (AEFI) reporting.
- Facilitate vaccine uptake understanding to inform demand generation activities.
- Support understanding of vaccine coverage.
- Support disease surveillance.
- Track supplies, human resources, and vaccine sessions.
- Enable prompt decision-making for corrective actions.

REQUIREMENTS

Data

- Indicator definitions, and datasets containing, e.g. demographic, geographic, supply chain, and/or health data.

Hardware

- Desktop computers.

Connectivity

- Internet/cellular data, servers.

HR

- System administrators, technical program manager.

USERS

Primary

- Health system manager.
- Health care provider.

CASE STUDY **Monitoring**

Pivoting use of DHIS2 in Sri Lanka

- In Sri Lanka, HISP Sri Lanka worked with the Ministry of Health (MOH) to expand their existing DHIS2 Tracker system to provide the National COVID Centre with a dashboard to track COVID-19 vaccinations.
- The tool allows MOH to advise district-level staff and facility members and provide reports to both vaccination centers and facilities.
- The solution was developed in-country by adapting their existing COVID-19 DHIS2 modules used for disease surveillance.
- The Sri Lankan-developed DHIS2 module was used to develop a global COVID-19 module that has been implemented in more than 50 countries.

COVID-19 vaccine in a cold box from the first shipment of 264,000 AstraZeneca doses, part of the first allocation of the 1.44 million doses of COVID-19 vaccines from the COVAX Facility to the Ministry of Health Sri Lanka.
© UNICEF/UN0429175/UNICEF Sri Lanka

See additional case studies on page 66 and page 67

Citation: Exemplars in Global Health, Innovative management of COVID-19 Vaccine Delivery in Sri Lanka

TOOLS Monitoring

Tool type	Example of tools
App-based survey/data collection tools	• KoBoToolbox (based on ODK) • Novel-T • ODK* • OnaData (based on ODK)*
Survey/data tools that work over SMS text, other channels	• mHero* • RapidPro* • Viamo • Turn.io
Service delivery aggregate systems tools	• CommCare* • Community Health Toolkit* • OpenSRP* • SORMAS • DHIS2*
Adverse Events following Immunization (AEFI)	• DHIS2* • VigiFlow

* See details on FOSS DPG and/or Global Goods on page 21

CROSS-CUTTING

Risk communication and engagement

Digital risk communication and engagement tools can enable coordinated, interactive communications between the public, healthcare providers, and other audiences. Information can be communicated via text, interactive voice response, or chat applications, and are usually done in partnership with telecom companies or third party aggregators.

VALUE

- Drive demand generation.
- Distribute accurate vaccine information.
- Combat misinformation for infodemic management.
- Facilitate communication across health care settings.
- Monitor safety and support counterfeit detection.
- Support microplanning.

REQUIREMENTS

Data

- Telecom/aggregator partnerships.

Hardware

- Mobile phones.

Connectivity

- Cellular data, servers that interface with telecom backbone.

HR

- System administrators, technical program manager.

USERS

Primary

- Health system managers.
- Health care providers.
- Clients.

CASE STUDY **Risk communication and engagement**

Adaptable tools for targeted mass messaging

- In Malawi, UNICEF worked with the Ministry of Health (MOH) and partners to build a scalable, SMS-based COVID-19 communications and management solution using RapidPro.
- The tool allows the MOH to reach those in quarantine, perform real-time tracking of symptoms, and align to infection prevention and control measures.
- The solution's interoperability with other components of Malawi's electronic disease surveillance system makes information available instantly to authorized users and facilitates straightforward data aggregation.
- It also integrates with social media messengers (e.g. WhatsApp, Viber).

UNICEF's RapidPro is one of the most widely adapted mass communication tool in low- and middle- income countries for both mass and targeted communication.

Daisy Simeza, Chief Nursing Officer at Mzuzu Central Hospital, one of the first to get the COVID-19 vaccine in Malawi. © UNICEF/UN0428643/Mvula

See additional case study on page 68

TOOLS Risk communication and engagement

Tool type	Example of tools
Software platforms that integrate with RapidPro which can be used for mass communications, targeting audiences, and reaching frontline health workers	• DHIS2* • CommCare* • OpenMRS* • SORMAS* • mHero* • OpenSRP* • Community Health Toolkit*
Mass and targeted two-way communication; mobile learning and IVR; chatbots; mobile surveys; rumor reporting	• HealthBuddy* • HealthConnect • Internet of Good Things • Moodle* • Telegram • Twilio • Viamo • turn.io • WhatsApp • WelTel

* See details on FOSS DPG and/or Global Goods on page 21

Training and human resources for health

Digital training and human resources for health (HRH) tools can enable health worker training through training modules and courses available via mobile phone (including SMS text) or computers, and help capture and maintain high-quality information for health workforce planning, management, and regulation.

VALUE

- Enable on-demand, time-saving remote training, helpful during periods when in-person gatherings risk infection, for distributed workforce, and to provide flexible learning.
- Update curriculum automatically and provide guidance to keep pace with evolving pandemic conditions.
- Provide insight into location and number of trained health care workers.
- Digitize supportive supervision.

REQUIREMENTS

Data

- Data on healthcare workforce, digitized training curriculum.

Hardware

- Dependent on solution, desktop computers, basic phones, smartphones or tablets.

Connectivity

- Internet, cellular data, servers.

HR

- Dependent on solution, technical program manager, data scientist.

USERS

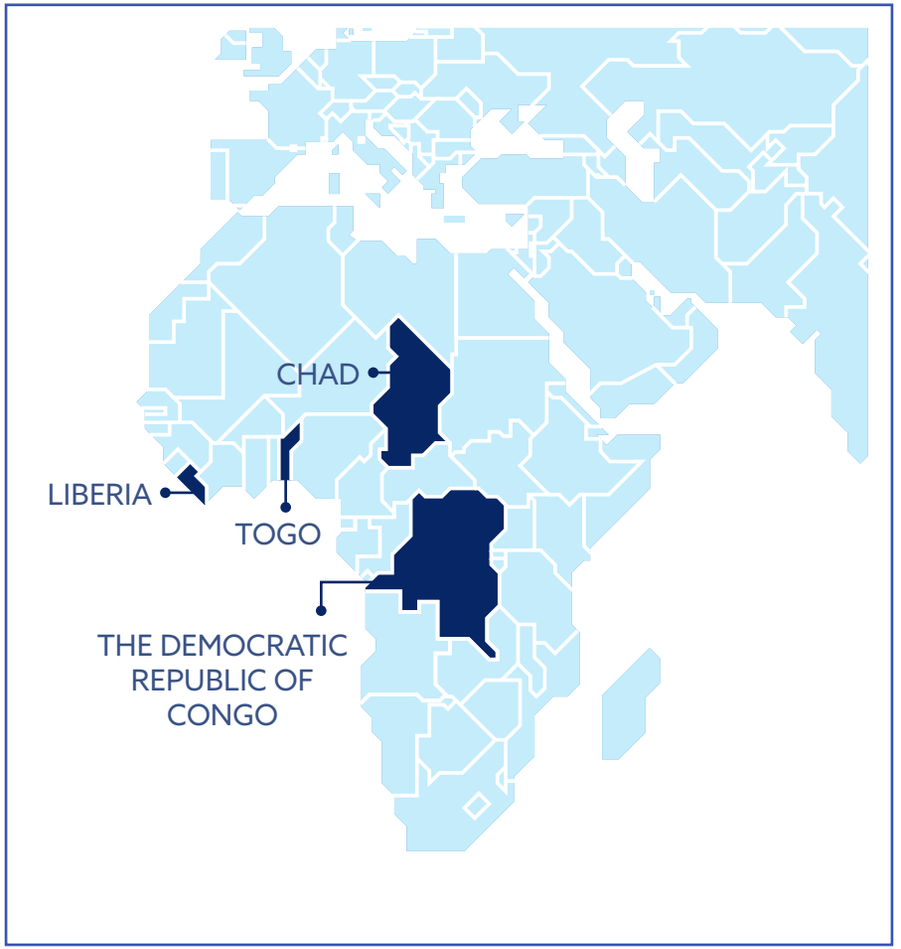
Primary

- Health system manager.
- Health care provider.

CASE STUDY **Training and human resources for health**

Training using digital tools

- UNICEF created a series of nine digital courses with the COVID-19 Digital Classroom consortium and the World Health Organization. These are available on Facebook Messenger, SMS text, Moodle, Telegram, Viber, WhatsApp, and Internet of Good Things.
- In Liberia, Chad, the DRC, and Togo, community health workers are being trained using the courses covering a range of COVID-19 topics, including basic information on the virus; prevention and protection measures; and relevant information on COVID-19 vaccines.
- The resources are available for anyone to use and adapt to support health workers on the ground so that they can readily deploy to the communities in their care.
- Currently, UNICEF is working with more than 10 countries to deploy the content for frontline health workers responding to the pandemic, including Community Health Workers, and there is demand to expand the course modules to cover other topics, like MNCH.



See additional case study on page 69

Citation: UNICEF Innovations

TOOLS Training and human resources for health

Tool type	Example of tools
App-based/messaging tools that can be used for training	• CommCare* • Community Health Toolkit* • Oppia Mobile* • Internet of Good Things* • OpenSRP* • Moodle* • mHero*
Human resources information system	• iHRIS*
Video-based tools	• Zoom* • WhatsApp* • Skype*
Platform agnostic training and content, appropriate for messaging tools	• COVID-19 Digital Classroom • UNICEF Messages for Covid-19* • WHO Academy • READY web-based series of COVID-19 micro-trainings* • READY Risk Communication and Community Engagement Training Toolkit*

* See details on FOSS DPG and/or Global Goods on page 21

References

Photos: (left) On March 31, 2016, Winny Moreira (17), holds a mobile phone in Taiobeiras municipality in the Southeastern state of Minas Gerais, Brazil. © UNICEF/UN017615/Ueslei Marcel; (right) Munta Hussen, 26, is a mother of two. She lives in Afar, Ethiopia. She is getting her first covid-19 vaccine as her son looks on. © UNICEF/UN0446643/Tadesse

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Appendix: Additional case studies

Note that not all use cases are covered in the appendix.

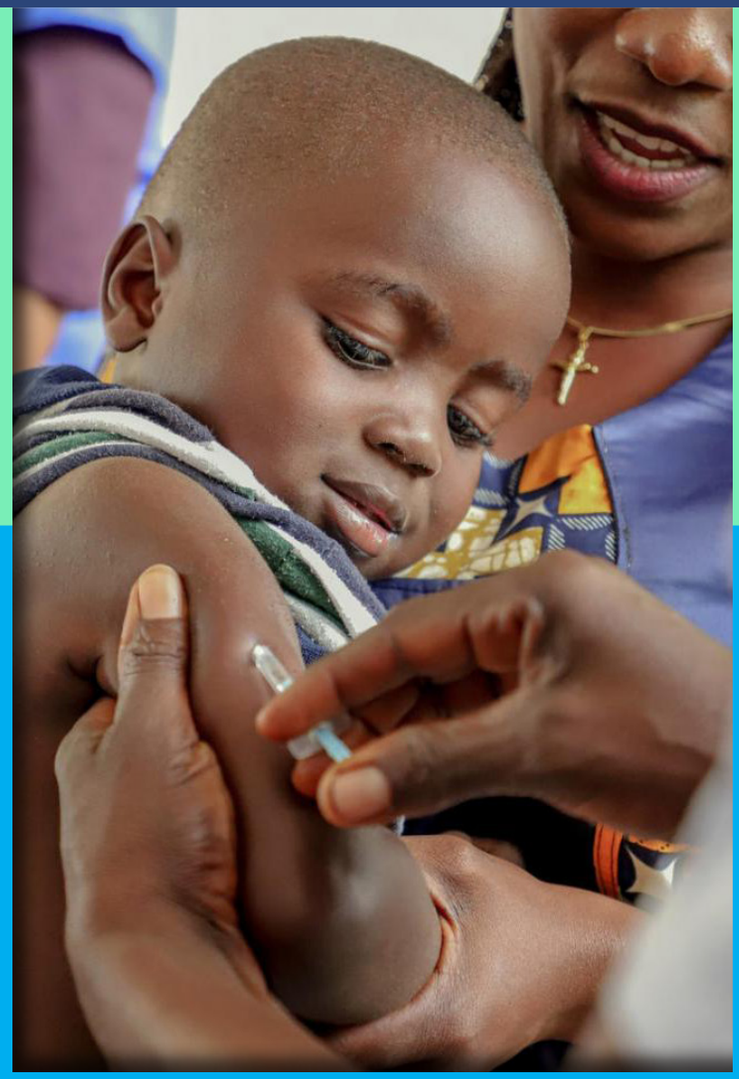
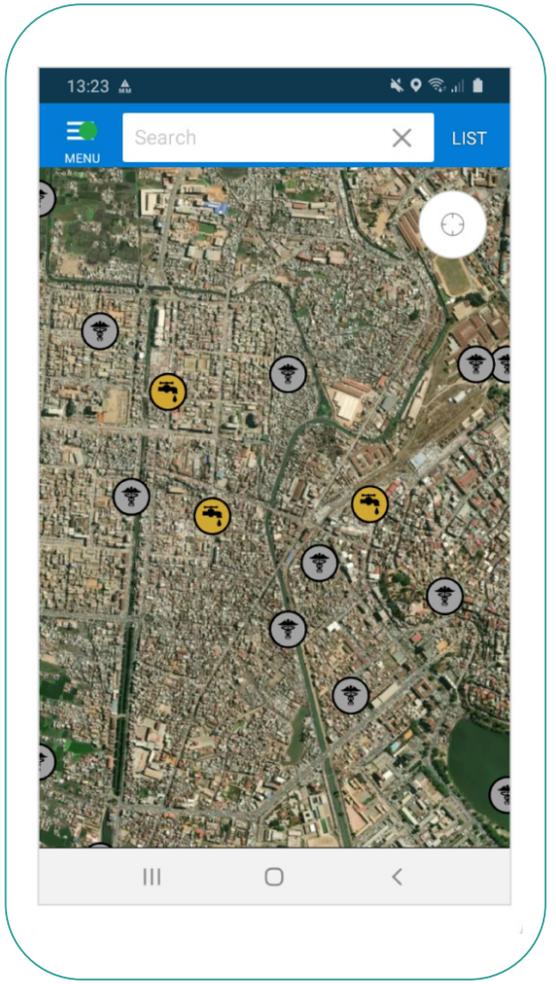


Photo: © UNICEF/UN0287582/Diefaga

CASE STUDY

Microplanning

At the global level, UNICEF is using OpenSRP in its Digital Health Strategy for solutions from microplanning, data collection, analysis, reporting, mapping, and visualization of data at scale (often in conjunction with ODK and other platforms). UNDP is likewise tapping into OpenSRP to foster microplanning and reduce their reporting burden. For COVID-19 response, microplanning capability includes support to plan and view assignments for specific health workers/ teams, such as those conducting outreach and vaccinations, as well as scheduling tasks, recording if it has been completed, and planning for auto-reporting (e.g., vaccinations administered, household risk-screening completed).



This End User Supply Monitoring platform lets users navigate a map of nearby service points (e.g. healthcare facilities, schools, water points) or search for a specific location. To support lengthy trips, these maps and inventory information of entire districts are available to download for offline use. © ONA

See related use case on page 29

CASE STUDY

Supply chain

In Cameroon, the Open Logistics Management Information System (OpenLMIS) COVID-19 Edition is enabling tracking of vaccines, PPE, and other COVID-19 related products. The tool has been rolled out in 50 facilities with plans to expand to 250 more. A simpler version of OpenLMIS, the OpenLMIS COVID-19 Edition has all the features and functionality of the original version packaged into a tool that is quicker to deploy and designed specifically for COVID-19 response. Monthly consumption of health commodities is automatically calculated by the system and is based on past consumption data fostering improved supply chain management. OpenLMIS is deployed in over 10,000 health facilities in nine countries in Africa, across all major health programs including vaccines.

Laos' mSupply-DHIS2 integration enables flexible review of data elements for item and/or location-specific monitoring and is configured to support the analysis needs of a variety of health programs. Laos has integrated mSupply and DHIS2 to facilitate joint analysis of logistics and health program data to achieve more actionable analysis and support efficient planning. DHIS2 is used to bridge two eLMIS and Health Management Information System platforms, while mSupply is optimized for procurement and supply chain management. The interoperable approach to integration Laos selected was through the use of native APIs in both systems to push key mSupply data to an aggregate DHIS2 form on a weekly basis to enable logistics analysis in relation to health data within DHIS2.

A volunteer checks the temperature of people waiting to get the COVID-19 vaccines provided by COVAX facility in Lao PDR. © UNICEF/ UN0451771/Siriphongphanh

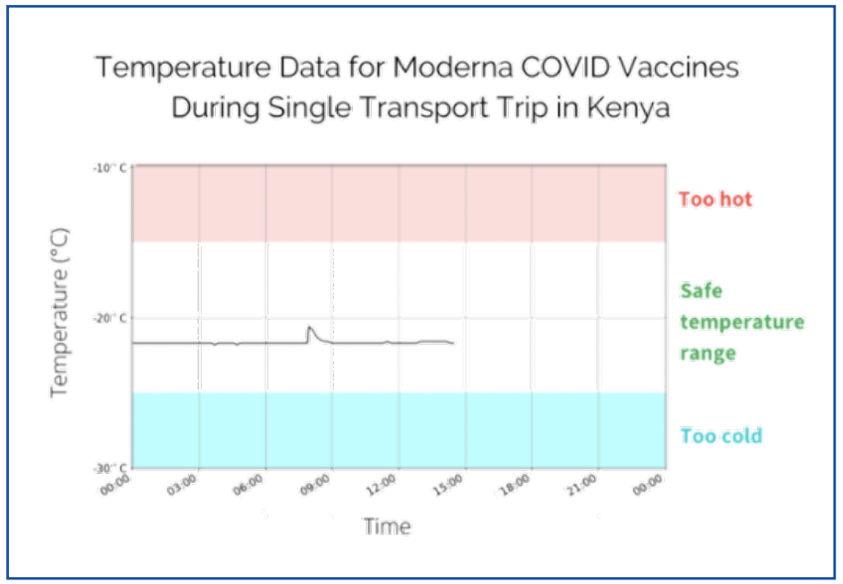
See related use case on page 32

CASE STUDY

Cold chain

In late 2020, mSupply ColdChain was piloted in a cold storage facility at a central medical store in Liberia, monitoring temperature fluctuations every few minutes across four sensors and displaying this data in an easy-to-digest visual format. Data on temperature breaches from the pilot helped identify faulty equipment for repair, thus avoiding potential stock spoilage. This information has enabled integration with national inventory systems for monitoring and comprehensive decision making. The same technology has also been used to monitor the temperature of the COVID-19 vaccine stock in the South Pacific nation of Cook Islands.

The Kenya Expanded Programme on Immunization (EPI) has utilized Varo as part of a national Cold Chain Equipment (CCE) inventory exercise where 4,218 Varo reports were created by hundreds of ministry personnel, giving insights into both equipment inventory and performance. Three counties within Kenya (Mombasa, Nairobi, and Turkana) are utilizing Varo routinely to monitor CCE status in 206 facilities. Health workers transmit Varo reports monthly which are reviewed by county and sub-county administrators to assess CCE performance and plan interventions such as warranty claims and service visits. The Kenyan Ministry of Health also uses Nexleaf Analytics' ColdTrace tools to monitor the temperature of COVID-19 vaccines in transit from the national storage site in Kitengela to regional facilities.



Temperature data of COVID-19 vaccines in transit.
© Nexleaf

See related use case on page 35

Citations: Nexleaf Analytics, Varo, and mSupply

CASE STUDY

Records (including immunization registries)

The Bahmni Covid-19 Starter Kit enables healthcare practitioners using Bahmni to capture COVID-19 specific data and report disease statistics, enabling the capture of vaccination details of patients. Implementers in the community have also built a tele-consulting module using Bahmni's appointment scheduling feature to reduce the strain on health systems due to patient inflow while maintaining continuity of care during the pandemic.

In Zambia, the Ministry of Health has worked with PATH and others under the Better Immunization Data (BID) Initiative since 2013 to improve the Expanded Programme on Immunisation (EPI) monitoring and data quality, visibility, and use by implementing the Zambia Electronic Immunization Registry (ZEIR), which is built on the Open Smart Register Platform (OpenSRP) — a facility-based app for improving rural immunization rates. The tool provides longitudinal tracking of client's health status and services, linked to a standardized electronic medical record (EMR) and is interoperable with DHIS2, OpenMRS, and RapidPro making it highly relevant, adaptable, and scalable for national health records and reporting. ZEIR fosters: automated report generation and visualization; barcodes / QR codes on child health cards and vaccine supplies to help uniquely identify patients and track vaccine stocks; electronic immunization registry (EIR) integrated with a supply chain information system; and dashboards to monitor facility and neighboring facility performance.

Globally, UNICEF is also using OpenSRP, in addition to other digital services, as part of their global digital health strategy.

A vaccinator holds a vial of the Moderna COVID-19 vaccine given to health workers as a booster shot. © UNICEF/UN0521517/Wilander

See related use case on page 41

Citations: Dimagi, Bahmni, Ona, and PATH

CASE STUDY

Records (including immunization registries)

Recent research indicates that adapting existing EIRs to support COVID-19 vaccination may be challenging due to time constraints, the expanded target groups (beyond infant population), and technical requirements.

Sri Lanka's health authorities worked with HISP Sri Lanka and the WHO country office to design and configure a system for COVID-19 vaccine delivery using DHIS2.

The system uses Tracker for an immunization registry based on individual-level data, aggregate data for vaccine stock management, and dashboards that combine data from both programs to facilitate better decision making.

The platform is also integrated with Digital Infrastructure for Verifiable Open Credentialing (DIVOC) for the provision of certificates.

An 60+ elder receiving the AstraZeneca vaccine from vaccine camp targeted for age 60+ population. © UNICEF/ UN0429183/UNICEF Sri Lanka

See related use case on page 41

Citation: Centre for Research on Health and Social Care Management at SDA Bocconi & MMGH and DHIS2

CASE STUDY

Decision support

The Ministry of Health (MOH) in Burkina Faso, in collaboration with the Swiss nonprofit Terre des hommes (Tdh), implemented the Integrated e-Diagnostic Approach (IeDA) to improve protocol adherence and quality of care at the primary health care (PHC) level. Built on Dimagi's CommCare platform, the tablet-based app provides health workers with enhanced decision support and serves as a digital job aid for the Integrated Management of Childhood Illnesses (IMCI) strategy to reduce child mortality, with 6,300 health workers at more than 1,700 rural PHC facilities using the app to deliver more than 250,000 IMCI consultations per month.

The CommCare app was already in the hands of health workers at 67 percent of the country's PHC facilities when COVID-19 hit. Because of existing widespread use and familiarity to health workers, the MOH and Tdh were able to rapidly adapt it for COVID-19. During a weekend workshop, three COVID-19 modules were designed and developed, and within three weeks the new content was deployed to health workers at PHC facilities across the country. The three modules are as follows:

Screening and triage for prioritization: Guides health workers through an algorithm to assess symptoms, map suspected cases, and trigger SMS text alerts to health authorities for testing and follow-up.

Counseling and community sensitization: Prompts health workers to share information, raise awareness, and coach caregivers on protective measures during IMCI consultations.

eLearning for health workers: Equips health workers with up-to-date information, guidance, and answers to frequently asked questions about COVID-19 in their communities.

A woman is being vaccinated against COVID-19, in D'Accarville Health Center of Bobo-Dioulasso, Burkina Faso.
© UNICEF/UN0564326/Dejongh

See related use case on page 41

CASE STUDY

Vaccine certificates

In partnership with UNICEF, on behalf of the COVAX Global Facility, Jamaica's Ministry of Health and Wellness (MOHW) launched its COVID-19 vaccination system and Digital Infrastructure for Vaccination Open Credentialing (DIVOC)* for an interoperable solution customized to both local needs and international standards. DIVOC—an open-source platform that enables countries to digitally orchestrate large-scale health campaigns such as vaccination and certification programs—is compliant with WHO's Digital documentation of COVID-19 certificates (DDCC) system. The DDCC provides guidance for countries and implementing partners on the technical requirements for developing digital information systems for issuing standards-based interoperable digital certificates for COVID-19 vaccination status.

Together, the system is an end-to-end digital COVID-19 vaccine process to manage and record scheduling, patient screening, vaccine administrator checklists/documentation, and reporting. It allows the MOHW to access real-time data to analyze key issues, such as numbers of doses administered, reporting of adverse events following vaccination, and demographic and geographical uptake.

Jamaica Comunication for Development Consultant together with her mother Blossom holding her COVID-19 vaccination certificate. © UNICEF/2021/Hoad

* DIVOC has also provided over one billion electronic vaccine certificates in India, as the vaccination certificating component of India's CoWin.

See related use case on page 44

Citation: Digital Public Goods Alliance

CASE STUDY

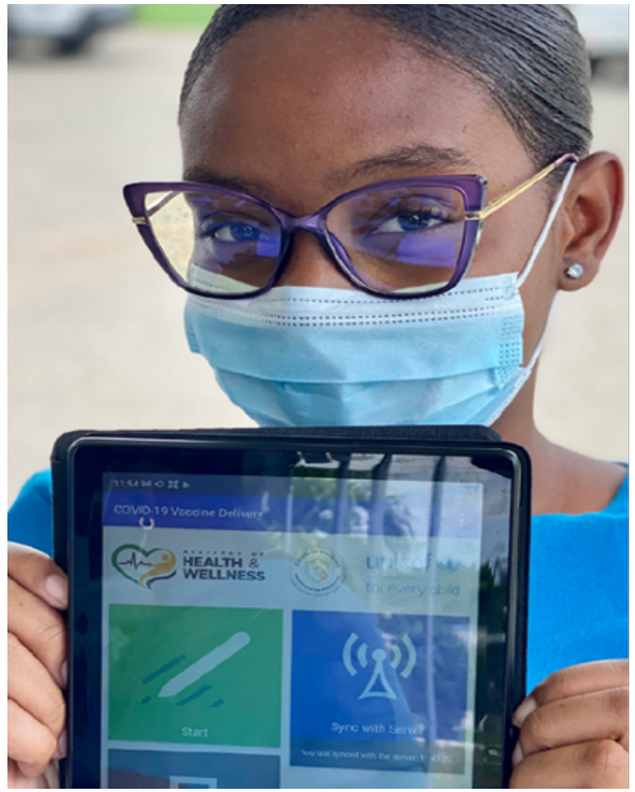
Pre-registration, records, and monitoring

The Government of Jamaica, with UNICEF and Dimagi support, rolled out a CommCare platform to provide an end-to-end digital COVID-19 vaccine process.

The platform manages and records scheduling, patient screening, vaccine administrator checklists/documentation, AEFI, and reporting.

In December 2021, further modules were added to the system to generate digital vaccine certificates following WHO Standards.

For more on this case study, see here.



Jamaican health worker holds tablet with CommCare platform. © UNICEF/2021/Sheil

See related use cases on Pre-registrations (page 39) Records (page 41) Monitoring (page 47)

CASE STUDY

Monitoring

At the start of the COVID-19 outbreak, the Ministry of Health in Sri Lanka was already using DHIS2 as its primary health information system to track and manage health data. As COVID-19 began to spread through Asia, partners from the Health Information Systems Programme (HISP) in Sri Lanka developed and implemented new DHIS2 modules specifically for COVID-19 surveillance. These modules have enabled Sri Lanka to monitor its borders by screening travelers for COVID-19 at ports of entry and maintaining active disease surveillance.

HISP also worked closely with the Ministry of Health to adapt the DHIS2 tracker data model to support visualizations and dashboards which are used by the National COVID Centre to track progress of vaccination and advise district-level staff. Facility managers use the data to prepare presentations and reports from vaccination centers and individual healthcare facilities.

This innovative first instance provided the basis for work on the development of a global DHIS2 COVID-19 surveillance package, which has been adopted by more than 50 countries. In addition, the HISP Sri Lanka team directly supported Timor-Leste, Solomon Islands, and Vanuatu in configuring their DHIS2 for immunization registry for COVID-19 as well as supported Guinea in using the contact mapping application for the recent Ebola outbreak in 2021.

A public health inspector filling the injection with AstraZeneca vaccine. © UNICEF/UN0429182/ UNICEF Sri Lanka

See related use case on page 47

Citation: Exemplars in Global Health

CASE STUDY

Risk communication and engagement

UNICEF's RapidPro is perhaps the most widely adapted mass communication tool used in low- and middle-income countries (LMICs) for both mass and targeted communication. In Malawi, UNICEF worked with the Ministry of Health (MOH) and partners to build a scalable, SMS-based COVID-19 communications and management solution using RapidPro. It allows the MOH to reach those in quarantine, perform real-time tracking of symptoms, and align to infection prevention and control measures. The solution's interoperability with other components of Malawi's electronic disease surveillance system makes information available instantly to authorized users and facilitates straightforward data aggregation. It also integrates with social media messengers like WhatsApp and Viber. As of July 2020, 500 health care providers had been registered and nearly 3,900 people had benefited from this program.

Viamo has developed global digital outreach platforms and interactive voice response (IVR) technology to respond to COVID-19 that is embedded with mobile network operators and can be quickly leveraged to deliver remote digital engagement at a national scale or to targeted populations. For example, Viamo worked with UNICEF in Pakistan to conduct a multi-channel behaviour change campaign, reaching people in 60 districts with information about the COVID-19 outbreak. More than two million SMS texts were delivered to smartphone users in urban areas and 6.5 million people were engaged through robocalls. Insights from the findings have been used by the Ministry of Health Services for internal COVID-19 response discussions and external communication, equipping millions of vulnerable people with the information they need to protect themselves, their families, and their communities.

May 25, 2022. Chikwawa, MALAWI: vaccine for cholera is prepared at Misili Village.
© UNICEF/UN0655286

See related use case on page 50

CASE STUDY

Training and human resources for health

IntraHealth International's mHero application is a two-way, mobile phone-based communication system that connects ministries of health and health workers. Health workers can receive important messages about service delivery protocols and guidelines, reminders, links to eLearning courses, and training information. mHero was first implemented in Liberia in November 2014 during the Ebola epidemic to validate health worker and health facility data so health officials could update health worker records in the human resource information system and better understand which facilities were operational.

In the context of COVID-19, the Ministry of Health in Liberia has pivoted using mHero to collect data on the health of the health workforce. The DRC is using mHero to tackle the COVID-19 epidemic, by monitoring the health of its frontline health workers, speeding up communications between the Ministry of Health and the front lines, and boosting surveillance and response for COVID-19 and other disease threats. In Uganda, the Ministry of Health used mHERO Connector to cross check community health workers in FamilyConnect with those in the Community Health Worker Registry. In Kenya, as part of the USAID Human Resources for Health Kenya Mechanism, frontline health workers use mHero to communicate swiftly in response to COVID-19.

With funding from the Johnson & Johnson Foundation, IntraHealth International enhanced mHero's functionality so it can be used to automatically update health worker information in iHRIS — IntraHealth's free, open source software that helps countries track and manage their health workforce data — and to simplify sending messages to health workers via SMS text.

Beatrice Draru, a Registered Nurse, poses for a portrait in the PPE she wears all day while working at Komamboga Health Centre III in the suburbs of Kampala, Uganda. © PATH/Will Boase.

Citation: IntraHealth International

See related use case on page 53

Suggested citation: Amarynth Sichel, Heidi Good, Abby Minor, Abdul Basith Shaukath, Merrick Schaefer. "*Primer on Digital Solutions for COVID-19 Vaccination Service Delivery*." DICE, August 2022.

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