Digital health systems to support pandemic response in **Angola**

Mapping digital health tools and matching deployment opportunities in response to COVID-19

May 2021

Introduction

Angola's Ministry of Health (MINSA) published a national assessment report of its health information system (HIS) in 2010, describing key principles and its long-term vision. Some of Angola's principles included ensuring that its HIS has strong country leadership, builds from what already exists, is developed using international standards and recommendations, is interoperable, and that the information flows from the different levels to foster a culture of using data for decision-making. It is important to help Angola work toward achieving this vision, especially with the stress that the COVID-19 pandemic has put on the health system. Leveraging digital health tools is a rapid, cost-effective strategy to accelerate Angola's COVID-19 response while at the same time reinforcing MINSA's vision.

Background

Digital Square conducted a landscape analysis of Angola's digital systems in the ten-year period from 2010–2020 with information validated by tool implementers and designers, digital health experts, and MINSA stakeholders as part of the USAID-funded Map and Match project. The purpose was to identify the existing digital tools utilized in Angola, map the tools already deployed for COVID-19 response to relevant uses cases, and highlight opportunities where existing tools can quickly be adapted and deployed to support COVID-19 response.

22 digital tools identified

7 tools scaled nationally

8 tools deployed for COVID-19

6 tools potentially adapted for COVID-19

Analysis overview

Map and Match's analysis found that Angola's health system uses 36 digital health tools with at least 13 already deployed for COVID-19 response. This brief identifies opportunities for existing digital tools to be adapted to pandemic use cases to respond to needs for the COVID-19 response and potential future epidemics. Mapping of the existing tools to the use cases revealed where there are strengths and opportunities in Angola's digital health system's response to COVID-19. For example, the analysis identified only one tool that currently supports points of entry, with additional tools ready for adaptation to further address this use case.

Strategic adaptation of existing digital health tools will accelerate the COVID-19 response, offering greater efficiency and more robust support to the government, health workers, clients, and other stakeholders.

Figure 1. Current number of digital health tool deployments mapped to pandemic use cases in Angola.

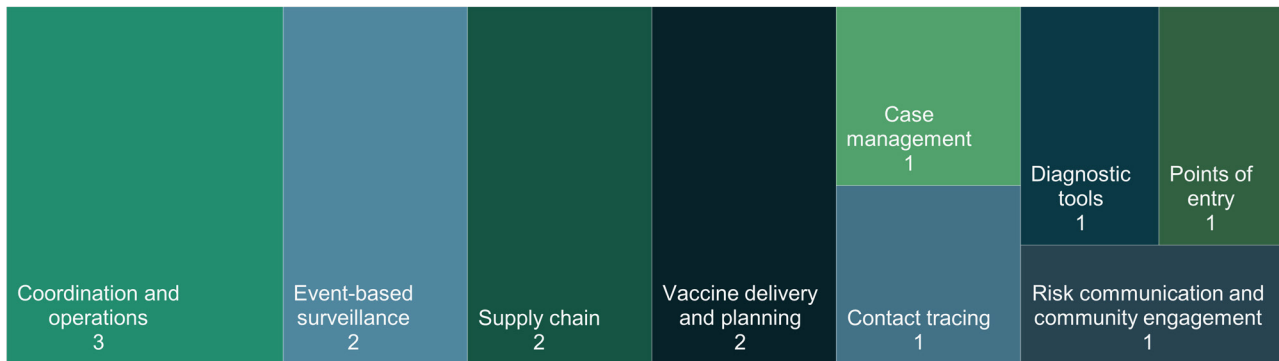| Coordination and operations 3 | Event-based surveillance 2 | Supply chain 2 | Vaccine delivery and planning 2 | Case management 1 | Diagnostic tools 1 | Points of entry 1 |
| Contact tracing 1 | Risk communication and community engagement 1 |

Figure 1 illustrates that many use cases are addressed using several tools in Angola's COVID-19 response while other use cases are filled by a sole tool.

Table 1. Mapping and matching digital health tools to strengthen Angola's COVID-19 response.

Digital Square mapped the current state of tools' functionality across the pandemic use cases in **blue** to illustrate how the digital health systems are supporting Angola's COVID-19 response. Digital Square matched opportunities for tool adaptation across the pandemic use cases in **green** to reveal places where Angola can reuse parts of its existing digital health systems to strengthen its COVID-19 response.

PANDEMIC USE CASES

DIGITAL HEALTH TOOLS	Case management	Contact tracing	Coordination and operations	Diagnostic tools	Event-based surveillance (including rapid response teams, case investigation)	Health facility and provider administration	Infection prevention and control	Laboratory systems	Learning and training	One Health	Points of entry	Risk communication and community engagement	Routine surveillance	Supply chain	Vaccine delivery and planning
afrimapr			B												
Angola HMIS (DHIS2 + Tracker + Android)	B	B	G		B	G		G			B	G	G	G	G
Angola Immunization Supply Chain (Logistimo)														B	B
Appy Saúde			B												
COVID-19 AO				B										G	
COVID-19 Monitoring Dashboard			B		B										
HealthAlert											B				
SIGLOFA (Sistema Informática de Gestão de Logística Farmacêutica de Angola)					G									B	B
Alerta Saúde (OpenSRP-based childhood immunization and tracking platform)	G	G			G	G	G	G			G	G		G	
Canopy Discover					G			G					G		
CommCare	G	G			G	G		G	G			G		G	
KoBoCollect (ODK)	G				G							G			
Reveal (OpenSmart Register Platform (OpenSRP))														G	G
Vantage	G														

■ Digital tools deployed for COVID-19 response   ■ Opportunities to adapt tools for pandemic response

Matching digital health tools ready for adaptation to fill the pandemic use case gaps

The analysis identified existing digital tools that can be adapted to support COVID-19 response for several use case gaps below. Use case gaps are defined as use cases that have fewer than two tools addressing them. Map and Match's analysis found existing digital tools ready for adaptation to fulfill ten use case gaps while One Health is the only use case where no tools or adaptations were identified. Many of these tools also provide opportunities to streamline the COVID-19 response across a range of use cases.

To learn more about the tools in the matrix below, please see Table 2 for more details to facilitate adaptations. To find out more about all the Digital Square–approved global goods mapped across these pandemic use cases, please see this Map and Match resource, which can provide decision-makers with targeted information to deploy and adapt global goods to fulfill gaps in the COVID-19 response.

Case management

Angola HMIS (DHIS2 + Tracker + Android)	Alerta Saúde (OpenSRP-based childhood immunization and tracking platform)
CommCare	KoBoCollect (ODK)
Vantage	

Contract tracing

| Angola HMIS (DHIS2 + Tracker + Android) | CommCare |

Diagnostic tools

| COVID-19 AO | Alerta Saúde (OpenSRP) |
| Angola HMIS (DHIS2 + Tracker + Android) | CommCare |

Health facility and administration

| Alerta Saúde (OpenSRP) | Angola HMIS (DHIS2 + Tracker + Android) |
| CommCare | |

Infection prevention and control

| Alerta Saúde (OpenSRP) |

Laboratory systems

| Alerta Saúde (OpenSRP) | Angola HMIS (DHIS2 + Tracker + Android) |
| Canopy Discover | CommCare |

Learning and training

| CommCare |

One Health

| No tools or adaptations identified |

Points of entry

| Angola HMIS (DHIS2 + Tracker + Android) | Alerta Saúde (OpenSRP) |

Risk communication and community engagement

| HealthAlert | Alerta Saúde (OpenSRP) |
| Angola HMIS (DHIS2 + Tracker + Android) | CommCare |

Routine surveillance

| Alerta Saúde (OpenSRP) | Angola HMIS (DHIS2 + Tracker + Android) |
| Canopy Discover | KoBoCollect (ODK) |

Examples of global good ready for adaptation and deployment for COVID-19 response in Angola

Alerta Saúde (Health Alert)

OpenSRP is an open source mobile health platform built to enable data-driven decision- making at all levels of the health system that can work offline. OpenSRP supports health workers to prioritize points-of-care tasks, track service delivery, and simplify reporting. Angola has used OpenSRP to build localized applications for reproductive, maternal, newborn, child, and adolescent health; immunization; early childhood development; malaria rapid diagnosis and management; and tuberculosis treatment management. MINSA uses the Alerta Saúde platform to help with childhood vaccine awareness and coverage. The tool is used primarily by health workers based in health facilities (e.g., nurses, midwives) to register mothers of newborn babies and small children to remind them of the importance of childhood vaccinations, and to send them reminders of upcoming immunizations. The tool is currently being piloted in two regions of Angola.

11 PANDEMIC USE CASES

0 USE CASES UTILIZED

11 ADAPTATION OPPORTUNITIES IDENTIFIED

Case management

Diagnostic tools

Event-based surveillance

Health facility and provider administration

Infection prevention and control

Laboratory systems

One Health

Points of entry

Risk communication and community engagement

Routine surveillance

Supply chain

Table 2. An in-depth look at digital health tools to support the COVID-19 response.

Digital health tool	Purpose	Use case(s)	Funder(s)	Implementer(s)	Licensing	Scale
afrimapr	This tool creates R building blocks to ease use of open health data in Africa, with a specific focus on health facility data.	Coordination and operations	Wellcome Data for Science and Health, Wellcome Open Research Fund	Afrimapr, Wellcome Open Research Fund	Open source	National
Angola HMIS (DHIS2 + Tracker + Android)	DHIS2 is an open source, web-based platform typically used as a national health information system for data management and analysis purposes, for health program monitoring and evaluation, facility registries and service availability mapping, logistics management, and mobile tracking of pregnant mothers in rural communities. 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. DHIS2 is deployed in more than 70 countries. In Angola, DHIS2 is the primary health management system. Angola is using DHIS2 for accelerated case detection, situation reporting, and active surveillance for COVID-19 response. The government is working with implementing partners to train CHWs to collect and manage COVID-19 data at the national level.	Case management, contact tracing, coordination and operations, event-based surveillance, health facility and provider administration, laboratory systems, points of entry, risk communication and community engagement, routine surveillance, supply chain, vaccine delivery and planning	CDC, DHIS2, Gavi, Global Fund, MINSA, Norad, PENUD, PEPFAR, UNICEF, USAID	DHIS2, HISP Saudigitus (Lusophone Africa), Jhpiego, ICAP, MINSA, PSI, University of Oslo, USAID, WHO	Open source	National
Angola Immunization Supply Chain (Logistimo)	Logistimo's supply chain management platform has been deployed in six provinces across ~500 health facilities to improve visibility, tracking, and availability of vaccines from the central level to the last mile. The deployment was localized by making it available in the Portuguese language.	Supply chain, vaccine delivery and planning	Gavi	Logistimo	Open source	National
Appy Saúde	This mobile health platform offers the biggest database of health care facilities in Angola, with more than 1,800 establishments listed. Users can access information such as services offered, medical specialties covered, insurance types accepted, as well as the contact details of the medical facilities.	Coordination and operations		Appy Saúde		
COVID-19 AO	COVID-19 AO is a platform used for self-diagnostic information and quarantine enforcement.	Diagnostic tools				
COVID-19 Monitoring Dashboard	The COVID-19 Monitoring Dashboard counts daily cases of COVID-19, showing the numbers in panels, tables, maps, and graphs for quick analysis. This dashboard can be integrated into a dashboard displaying wider information, correlating different demographic, socioeconomic, and infrastructure variables to identify vulnerable groups and higher risk areas and to improve targeting and response to the COVID-19 emergency in the southern part of the country, where 1.1 million people are severely affected by the impact of climate change.	Coordination and operations, event-based surveillance, rapid response, case investigation	EU, National Civil Protection Commission of the Ministry of Interior of Angola, UNDP	National Civil Protection Commission of the Ministry of Interior of Angola		Subnational
HealthAlert	HealthConnect enables effective health communication with patients, health providers, and the health system at large. HealthConnect has been adapted for COVID-19 to provide national messaging services on behalf of WHO and several other country governments on COVID-19-related information via individual modules such as HealthAlert, HealthCheck, and HealthWorkerAlert.	Risk communication and community engagement		Praekelt	Open source	
SIGLOFA (Sistema Informática de Gestão de Logística Farmacêutica de Angola) (OpenLMIS)	OpenLMIS is a powerful, open source, cloud-based electronic logistics management information system purpose-built to manage health commodity supply chains. OpenLMIS manages the electronic LMIS process at more than 11,000 health facilities in nine African countries across all major health programs, including vaccines and COVID-19. OpenLMIS adapted its tool so countries can optimize their use of the software to encourage good supply chain management of COVID-19 supplies. OpenLMIS launched a separate, simplified instance called OpenLMIS COVID-19 Edition, which is a lighter-weight and quicker startup tool to help countries manage COVID-19-related commodities based on the WHO product list.	Event-based surveillance, supply chain, vaccine delivery and planning	Gates Foundation, USAID	GHSC-PSM, MINSA, NA, VillageReach	Open source	National

■ Digital tools deployed for COVID-19 response   ■ Opportunities to adapt tools for pandemic response

Table 2. An in-depth look at digital health tools to support the COVID-19 response, continued.

Digital health tool	Purpose	Use case(s)	Funder(s)	Implementer(s)	Licensing	Scale
Alerta Saúde (OpenSRP-based childhood immunization and tracking platform)	OpenSRP is an open source mobile health platform built to enable data-driven decision-making at all levels of the health system that can work offline. OpenSRP supports health workers to prioritize points-of-care tasks, track service delivery, and simplify reporting. Angola has used OpenSRP to build localized applications for reproductive, maternal, newborn, child, and adolescent health; immunization; early childhood development; malaria rapid diagnosis and management; and tuberculosis treatment management. MINSA uses the Alerta Saúde platform to help with childhood vaccine awareness and coverage. The tool is used primarily by health workers based in health facilities (e.g., nurses, midwives) to register mothers of newborn babies and small children to remind them of the importance of childhood vaccinations, and to send them reminders of upcoming immunizations. The tool is currently being piloted in two regions of Angola.	**Case management, diagnostic tools, event-based surveillance, health facility and provider administration, infection prevention and control,laboratory systems, points of entry, risk communication and community engagement, routine surveillance, supply chain**	UNICEF	Robobo, UNICEF	Open source	Subnational
Canopy Discover	Canopy is an enterprise data management solutions platform designed specifically to meet the demanding needs of social impact and international development organizations. Canopy Discover is part of the data solutions platform.	**Event-based surveillance, laboratory systems, routine surveillance**	Ona	Ona	Open source	Subnational
CommCare	CommCare is an offline-capable mobile data collection and service delivery platform used in more than 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, uses simple device deployment, and includes translation features.	**Case management, contact tracing, diagnostic tools, event-based surveillance, health facility and provider administration, laboratory systems, learning and training, risk communication and community engagement**				
KoBoCollect (ODK)	KoBoCollect is based on the open source Collect app by getODK and is used for primary data collection in humanitarian emergencies and other challenging field environments. This app allows online or offline data entry (e.g., from interviews). There are no limits on the number of forms, questions, or submissions (including photos and other media) that can be saved on a device.	**Case management, event-based surveillance, routine surviellance**	Gates Foundation, Global Fund, USAID, World Vision	Global Fund, PSI, The Mentor Initiative, UNCIEF, World Vision	Open source	Subnational
Reveal (OpenSmart Register Platform [OpenSRP])	Reveal is an open source platform that uses smart maps and technology appropriate for resource-constrained settings to monitor coverage of interventions in real time. It is designed to optimize available resources. Reveal supports decision-makers by guiding and tracking delivery of field activities with precision and holding field teams accountable for action. Reveal has a mobile application that spatially guides field teams to planned areas and households for service delivery. This mobile application allows offline data collection and captures indicators to inform critical field decisions. Reveal also includes web user interface real-time dashboards to provide program managers with impactful coverage data to inform current activities and program progress. It can be adapted for COVID-19 response for vaccine mapping and quantification, resource planning and prioritization, delivery, and monitoring to ensure high coverage.	**Supply chain, vaccine delivery and planning**	E8, Global Fund	Akros, government, The Mentor Initiative	Open source	Subnational
Vantage	Vantage is an AI-enabled cloud platform that empowers health care workers to make decisions. The cloud-based platform is able to instantaneously analyze data and communicate findings and direct meaningful actions through automatically generated dashboards and targeted push notifications.	**Case management**		BroadReach	Proprietary	

■ Digital tools deployed for COVID-19 response   ■ Opportunities to adapt tools for pandemic response

At a glance

Figures 2 shows that Angola's digital health tools rely on different software licensing types for sustainability with open source being the most common. Figure 3 demonstrates that Angola has 7 digital health tools deployed on a national scale while 8 operate on a subnational scale. These figures are not specific to COVID-19 response, but they provide an overall picture of Angola's digital health infrastructure.
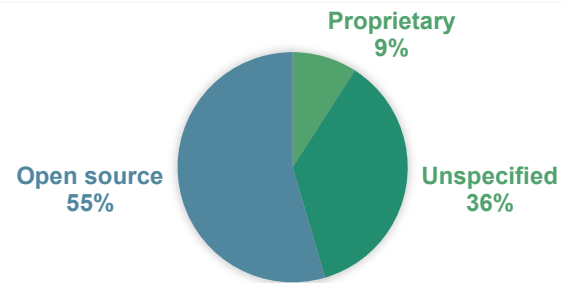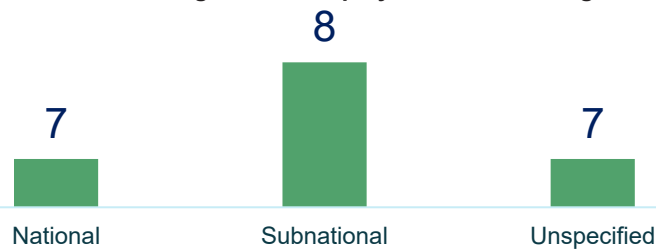
Figure 2. Software licensing types of Angola's digital health tools.

Proprietary 9%
Open source 55%
Unspecified 36%

Figure 3. Number of digital tools deployed at scale in Angola.

National	Subnational	Unspecified
7	8	7

Conclusion

Digital Square mapped 36 existing, adaptable digital health tools in Angola and matched them to help target investments to accelerate the country's COVID-19 response and simultaneously strengthen its health system. This brief underpins how critical it is to align funding to Angola's existing digital health infrastructure to bolster its capacity to mitigate the effects of the current pandemic and prepare the country to respond to future outbreaks.

Take action

☑ **Coordinate with all digital systems stakeholders** to create a unified, robust digital health system that can strategically and rapidly be part of the ongoing COVID-19 response. It is paramount to support the government's lead and support its national digital health strategies and the tools it approves. Visit the Digital Health Atlas to see a complete, regularly updated snapshot of Angola's digital health system. If you know of a digital system that is not identified in this brief, please add it to the Digital Health Atlas.

☑ **Reuse existing tools when possible.** Do not invest in new systems if there are existing systems the government endorses that can effectively approach each of the pandemic use cases.

☑ **Learn more about Angola's digital health systems** and their role in the COVID-19 response by reviewing Angola's full Map and Match dataset.

☑ **Apply GIZ's Assessment Tool for Digital Pandemic Preparedness** to better understand the strengths and gaps in the country's COVID-19 response and to be well prepared for future disease outbreaks.

☑ **Connect with additional relevant resources, including:**

Digital Square continues to update its wiki with adaptations of Digital Square Global Goods and has a COVID-19 resource page that features hosted webinars that provide demos of tool adaptations.

The recently released Global Goods Guidebook (version 2.0) includes additional information about global goods deployment for COVID-19.

Map and Match's project landing page has many resources, including the Digital Applications and Tools Across an Epidemiological Curve, Global Goods Adaptations Across Use Cases, and other country briefs.

Digital Solutions for COVID-19 Response, published by Johns Hopkins University, features digital platforms that have been adapted for COVID-19 case management and contact tracing needs. The assessment includes a review of nine tools that 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.

Annex 1. Abbreviations

Acronym	Definition
CDC	US Centers for Disease Control and Prevention
EMR	electronic medical record
EU	European Union
GHSC-PSM Management	USAID Global Health Supply Chain Program-Procurement and Supply
HISP	Health Information Systems Programme
JSI	John Snow Internation
JSON	JavaScript Object Notation
MINSA	Ministry of Health
Norad	Norwegian Agency for Development Cooperation
ODK	Open Data Kit
OMS/WHO	Organização Mundial da Saúde/ World Health Organization
PENUD	United Nations Development Programme Angola
PEPFAR	US President's Emergency Plan for AIDS Relief
PSI	Population Services International
SIAPS	System for Improved Access to Pharmaceuticals and Services
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Fund
USAID	United States Agency for International Development

Annex 2. Use case definitions

Category	Objective	Functional description
Case management	Systematic processing of suspected infected persons	Systems for documenting patient details and clinical interactions
Contact tracing	Reduction of epidemic reproduction rate	Identification and follow-up with people who have had high-risk interactions with infected persons
Coordination and operations (including emergency operations centers)	Preparedness and response plans, support for multisectoral responses	Systems to support cross-coordination for multisectoral response, emergency operations centers, and executing response plans
Data analytics, visualizations, and use	Efficient and effective response to validated outbreaks	Systems for enabling data-driven decision-making and communications to field teams
Diagnostic tools	Improve efficiency in clinical diagnosis and collection of data from diagnostic tools	Diagnostic tools with digital connectivity to support monitoring, documentation, and reporting of diagnoses
Event-based surveillance (including rapid response teams, case investigations)	Early detection of outbreaks and epidemics, case detection and investigation, national and subnational emergency operations to ensure rapid management of infectious disease	Systems with functionality or ability to monitor patterns indicative of infectious disease epidemic outbreak; systems to detect and document cases of emerging disease threats, investigate those threats, identify cases, and manage the response
Health facility and provider administration	Robust organizational underpinning for response	Systems for managing facility accounting and HR
Infection prevention and control	Prevent infection among patients and health workers	Systems that support triage, isolation, WASH, waste management to prevent transmission to staff, other patients, and the community
Interoperability	Improve effectiveness of tools	Provision of standardized interfaces to other software modules
Laboratory systems	Validation of infectious disease incidence	Systems with functionality to order lab tests, follow progress of patient sample, receive test results (confirm suspected case)
Learning and training	Support health worker readiness, including improve patient data collection and sample testing	Localized E-learning solutions for health workers and others
One Health	Prevent zoonotic disease outbreaks	Monitoring of potential vectors to humans by tracking infectious diseases in local wildlife and livestock
Points of entry	Detect and manage international spread of disease by identifying suspected infected persons at border entry points	Systems to strengthen border health security, screen, and follow-up with suspected infected persons at ports of entry and other border entry points
Risk communication and community engagement	Improved public awareness of facts and best practices for disease prevention	Systems for channeling messaging and communication to public to promote public awareness, counter misinformation, encourage treatment seeking behaviors, and encourage citizens to take appropriate actions to promote health
Routine surveillance	Routine health data monitoring to identify trends	Systems to manage health data and track trends on an ongoing basis, regardless of whether there is an outbreak or epidemic; systems usually include aggregate data
Supply chain	Support allocation of resources to aid in response	Systems for monitoring facility readiness and stock levels
Vaccine delivery and planning	Systematic monitoring of vaccinations in the population	Systems for documenting vaccinations for patients

Annex 3. Digital tools supporting vaccine deployment

Digital technologies can act as accelerators for the introduction, deployment, and scale-up of vaccines in countries to assist health workers, communities, and other stakeholders. The use of digital tools and the data they enable facilitate rapid, iterative, and scalable approaches to ensure vaccines are safely delivered to health facilities, that health workers are equipped to administer them, and that communities are informed and confident in their efficacy.

Through the Map and Match project, Digital Square mapped the existing functionality of approved global goods to COVID-19 use cases, including those supporting planning, delivery, administration, and monitoring of COVID-19 vaccines. These adaptations and supporting resources are listed on Digital Square's wiki.

Table 3 illustrates how digital tools can support activities aligned to five use cases focused on vaccines. Digital Square has information about its approved global goods and how they align to these use cases currently as well as potential adaptations on its website. This list does not include all digital public goods in the digital health ecosystem. Other tools like RapidPro and WelTel, which are not supported through Digital Square, can be included in these use cases.

Table 3. Global goods tools to support vaccine deployment use cases.

Description of vaccine deployment use cases	Digital Square approved global goods use cases
Plan for vaccine introduction in country Digital tools can be used for planning and "microplanning" to inform how many vaccines are needed, where vaccines can be stored and monitored, who the most vulnerable populations are and where they are located, and other information essential to planning. Assessing the tools and data available throughout the health system, including patient data and health worker data, will inform this planning. As part of a vaccine introduction, governments need to build awareness of the vaccine and its benefits, and combat misinformation. Digital tools can be used for planning purposes to send messages to both health workers and communities about the vaccine. Training health workers is essential before introducing a new vaccine. Governments need to provide information to health workers on vaccine administration, possible side effects, and how to treat patients showing adverse reactions. Digital tools can be leveraged to rapidly share this information and offer virtual training.	**Messaging** **Microplanning** **Training**
Support vaccine introduction Digital tools can enhance the launching of a vaccination campaign. Communication tools like SMS and social media can support rapid information sharing with communities as the vaccine is made available. Pharmacies, hospitals, clinics, and other facilities use robust digital systems to ensure vaccines are stocked at facilities by tracking inventory and shelf life and ordering additional supplies when needed. Digital tools can manage the transactional movements of vaccines within multilevel supply chains. Supply chain systems can also ensure that syringes, diluents, and other materials needed for vaccine delivery are stocked. Digital tools can support temperature monitoring during transport and where vaccines are stored. Remote temperature monitoring can improve cold chain performance, giving health workers assurance that vaccines are safe and effective. Digital tools can track when clients receive vaccines as well as other data fields (e.g., vaccine type, immediate negative reactions, and longer-term potential adverse events). Countries can adapt existing electronic immunization registries (EIRs) for vaccine monitoring and follow-up.	**Patient monitoring** **Supply chain** **Vaccine management**

Table 3. Global goods tools to support vaccine deployment use cases, continued.

Description of vaccine deployment use cases	Digital Square approved global goods use cases
Enhance roll-out of vaccine, support ongoing vaccine monitoring In this phase, scaling to vaccinate large portions of the population is a priority. Vaccine roll-outs can be enhanced by adapting digital tools to add workflows and functionality as vaccine coverage expands. Governments need to consider additional information communications technology (ICT) needs like larger cloud-hosting services and use of tools that are operational offline for areas that have limited mobile network coverage. Supply chain is critical as vaccines are transported to more sites across the country. Digital supply chain tools, especially when paired with vaccine delivery data (e.g., from electronic medical records/EIRs), can help forecast supply needs and include decision support to prompt vaccine orders when supply falls below a defined threshold. EIRs and other tools can help prevent overcrowding in clinics by scheduling specific clinic times for vaccines. This ensures more equitable distribution of health services.	📇 **EIRs** 🌐 **Supply chain** 📱 **Patient monitoring** 💉 **Vaccine management**
Enhance communication to sustain vaccine demand Many COVID-19 vaccines are multi-dose shots. To ensure clients receive boosters, now and in the future, enhancing communication to sustain demand for the vaccine is important. Digital tools can be used to send messages to both health workers and communities about the vaccine. Communication tools can be linked with patient monitoring tools to automatically trigger direct communication to clients. Digital tools can continue to be used to increase vaccine demand and address misinformation, dispelling rumors and misinformation that cause vaccine hesitancy. Many EIRs include contact information and messaging features for patients' caregivers, allowing for direct communication to caregivers. These messaging features have historically been used to notify caregivers about upcoming immunization sessions or overdue vaccines. As the global community develops a greater understanding of COVID-19—including its transmission patterns, full range of symptoms, and treatment options—health workers also have the ability to share health promotion messages with patients.	📇 **EIRs** 💬 **Messaging** 📱 **Patient monitoring**
Use data to inform vaccine-related decisions Patient monitoring and tracking tools as well as EIRs can help generate meaningful insights for future vaccination efforts and encourage data-driven decisions when countries are able to plan for catch-up campaigns. For example, some EIRs can quantify the number of missed vaccines and determine which areas have been under-vaccinated. This individual-level data will enable decision-makers to target immunization services and allocate funding to those areas most in need. For more information, this publication explains how Gavi and UNICEF are working to scale up use of digital tools for vaccination campaign performance monitoring. Interoperability is critical. As governments review the portfolio of tools and systems that are in place to support vaccine management, it is crucial that there is strong consideration given to the movement of data between systems to ensure a harmonized set of records for the population. This ensures that no individual is missed or counted twice.	📇 **EIRs** 📱 **Patient monitoring** 🌐 **Supply chain** 💉 **Vaccine management**

Digital Health Center of Excellence (DICE) to support the COVID-19 pandemic response

As countries operationalize their COVID-19 vaccine rollout plans, there is an opportunity to identify areas where digital health interventions can amplify these efforts, while improving service delivery and strengthening health systems more broadly.

The success of digital health solutions often correlates with the strength of the enabling environment for these technologies, such as ICT infrastructure readiness, workforce capacity, data standards, interoperability, and the policy and regulatory environment. Poorly designed or inappropriate digital interventions, as well as vertical approaches geared only toward COVID-19, risk undermining and ultimately weakening national systems.

To more effectively organize support to countries for COVID-19 response, a multiagency COVID-19 DICE, with a UNICEF-WHO cohosted secretariat, will launch in April 2021. The DICE will provide coordinated technical assistance to low- and middle-income countries to support sustainable and scalable deployment of carefully chosen digital health solutions that support COVID-19 pandemic response plans.

Areas the COVID-19 DICE covers include:

- Support countries to conduct a structural readiness assessment of their enabling environment, define business requirements, conduct platform analysis, and map partnerships, existing tools, and gaps. Along with support to countries, this will require standardizing approaches and tools across development partners.
- Coordinate surge support to countries to assist in their development of a rapid strategic approach to meet the imminent needs of the vaccine delivery and transition to a sustainable strengthened and digitally enabled health system.
- Foster capacity and partnership with regional and national digital health experts toward the development of capacity that can provide long-term technical support to the region.
- Strategically support developers and product owners to modify and optimize software products relevant for pandemic response and vaccine delivery toward interoperability, standardization, and vaccine-specific functionalities.
- Complement and operationalize WHO and UNICEF guidelines developed in the context of the Access to COVID-19 Tools Accelerator (ACT-A) to further clarify and identify mature options open to countries building health infrastructure.
- Support the transition, alignment, and integration of COVID-19-related digital health investments through a systems strengthening lens.
- Pilot and assess transformative approaches to digital health deployments, monitor global developments and opportunities for standardized approaches, increase south-south knowledge transfer, and compile lessons learned.