

Digital health systems to support pandemic response in South Africa

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

June 2021

IN THIS TECHNICAL BRIEF

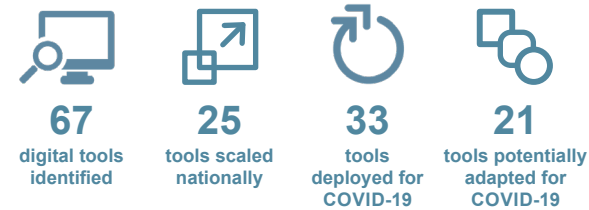
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Introduction

The National Department of Health (NDOH) outlines its mission “to establish an integrated digital health ecosystem of people, processes and technology that support health systems strengthening to enable the efficient service delivery, effective patient care and person empowerment necessary for achieving universal health coverage” in its National Digital Health Strategy for South Africa: 2019–2024. The COVID-19 pandemic brought a new level of urgency to this mission with the added strain to the health system. Leveraging digital health tools is a rapid, cost-effective strategy to accelerate South Africa's COVID-19 response while at the same time reinforcing the NDOH's mission to achieve universal health coverage.

Background

Digital Square conducted a landscape analysis of South Africa's digital systems in the ten-year period from 2010–2020 with information validated by tool implementers and designers, digital health experts, and NDOH stakeholders as part of the US Agency for International Development (USAID)–funded Map and Match project. The purpose was to identify the existing digital tools used in South Africa, 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



Analysis overview

Map and Match's analysis found that South Africa's health system uses 67 digital health tools, with at least 25 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 South Africa's digital health systems' response to COVID-19. The use cases of One Health, supply chain, points of entry, and vaccine delivery and planning are where gaps were identified with tools ready for adaptation to address them. 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.

Key definitions

Pandemic use case refers to the specific type of information collected, stored, tracked, analyzed, or visualized as it relates to the functional response to an epidemiological event, specifically COVID-19.

Digital health tool refers to a website, application, or other computer or mobile technology that supports data collection, storage, tracking, analysis, or visualization. The tool must have an electronic interface. One digital tool can address multiple use cases.

Application refers to components of digital tools that are primarily designed for use by clients of the health system or by health workers. Applications can be reused to address more than one use case, or applications can be uniquely used for only one use case.

Adaptation refers to making improvements to existing digital tools to improve their applicability and impact in the context of COVID-19.

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

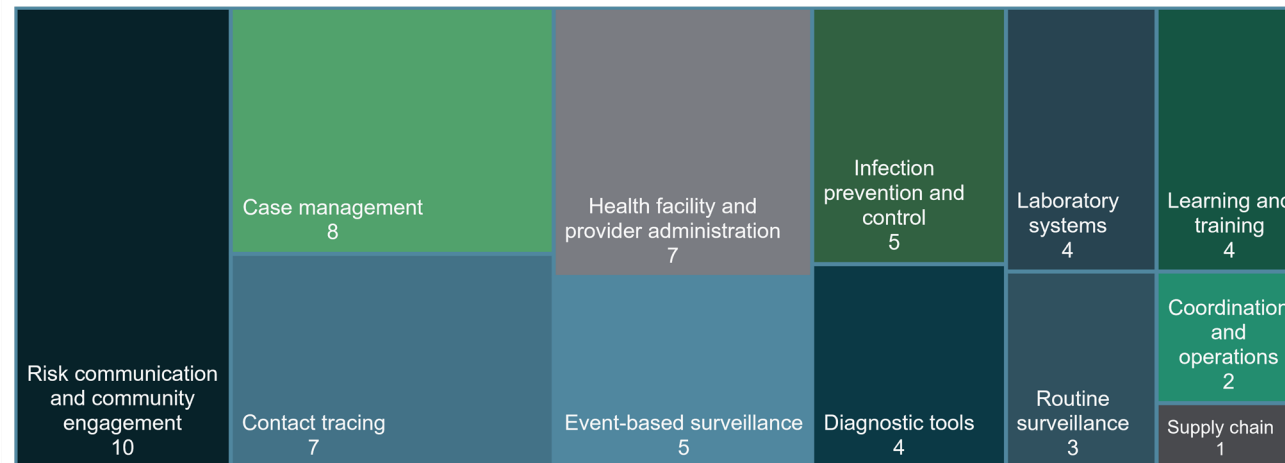


Figure 1 illustrates that many use cases are addressed using several tools in South Africa's COVID-19 response while other use cases are filled by few tools.

Table 1. Mapping and matching digital health tools to strengthen South Africa’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 South Africa’s COVID-19 response. Digital Square matched opportunities for tool adaptation across the pandemic use cases in **green** to reveal places where South Africa can reuse parts of its existing digital health systems to strengthen its COVID-19 response.

		PANDEMIC USE CASES														
		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
DIGITAL HEALTH TOOLS	Ada Health App				Blue											
	AitaHealth	Blue												Blue		
	askNivi												Blue			
	Aspect			Blue		Blue			Blue					Blue		
	CasePro	Blue			Blue								Blue			
	CommCare	Blue														
	Computer Aided Detection for COVID-19 (CAD4COVID)	Blue			Blue											
	CoronaFighter						Blue	Blue								
	Coronapp				Blue								Blue			
	COVID Alert South Africa (SA)		Blue					Blue								
	COVID-19 HealthAlert												Blue			
	COVID-19 HealthCheck		Blue		Blue	Blue										
	COVIDConnect		Blue													
	Covi-ID		Blue													
	DATCOV	Blue		Blue			Blue									
	DisaLab								Blue							
	DrConnect							Blue					Blue			
	eLabs								Blue							
	Health Systems Trust’s Project monitoring tool						Blue									
HealthWorkerAlert						Blue						Blue				

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

Table 1. Mapping and matching digital health tools to strengthen South Africa’s COVID-19 response, continued.

		PANDEMIC USE CASES														
		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
DIGITAL HEALTH TOOLS	Mobenzi															
	mothers2mothers (m2m) Application (CommCare)															
	Mum & Baby															
	Safe Delivery App															
	Signapps															
	South Africa HMIS (DHIS2 + COVID-19 Surveillance + Tracker)															
	South Africa Rumor Monitoring System (SARMS) (DHIS2)															
	Stock Visibility Solution (SVS)															
	Telkom/BCX Track and Trace															
	TrakCare															
	Ubongo															
	Vantage															
	World Continuing Education Alliance (WCEA)															
	Bahmni															
	Bluebird															
	Cadasta platform															
	CommCare															
	Community Health Toolkit (CHT)															
	Everwell Hub															
	GxAlert															
Integrated Supportive Supervision (ISS) (ODK)																

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

PANDEMIC USE CASES

DIGITAL HEALTH TOOLS	PANDEMIC USE CASES														
	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
Keheala															
Lime Survey															
Med-Admin															
Open Health Information Mediator (OpenHIM)															
OpenCRVS															
OpenHIE															
OpenMRS															
Primary Health Care Information System (PHCIS)															
Pro-Clin															
Triggerise platform															
U-Report															
VigiFlow															
WelTel Health Platform															
Zenysis															

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

“COVID-19 has created stronger coordination between areas which were previously disparate. It necessitated systems being put in place, such as better use of the existing facility registries and harmonized data elements.

Even with so much investment, the reason that we don’t have a more coordinated response to COVID-19 is because there are a lot of digital health tools that work well alone, but they are very segmented.”

—From key informant interviews, South Africa’s National Department of Health

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

Map and Match’s 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. The analysis found existing digital tools ready for adaptation to fulfill the four use case gaps, namely One Health, points of entry, supply, and vaccine delivery and planning.

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.

One Health

South Africa HMIS (DHIS2 + COVID-19 Surveillance + Tracker)

Points of entry

Bahmni	CommCare
Community Health Toolkit	South Africa HMIS (DHIS2 + COVID-19 Surveillance + Tracker)
Vantage	WelTel Health Platform

Supply chain

Stock Visibility Solution (SVS)	Bahmni
Lime Survey	South Africa HMIS (DHIS2 + COVID-19 Surveillance + Tracker)
VigiFlow	Zenysis

Vaccine delivery and planning

Integrated Supportive Supervision	Med-Admin
OpenMRS	Pro-Clin
South Africa HMIS (DHIS2 + COVID-19 Surveillance + Tracker)	Stock Visibility Solution (SVS)
Vantage	Zenysis

Examples of global goods ready for adaptation for COVID-19 response in South Africa

Community Health Toolkit

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

CHT-powered tools are supporting COVID-19 response efforts in the Democratic Republic of the Congo, Kenya, Malawi, Mali, Nepal, and Niger among others. CHT supports adaptations to primary care in response to COVID-19. CHT provides a remote training on COVID-19 for community health workers. CHT delivers routine health checks for community health workers, including mental health, well-being, and regarding adequate protective equipment.

10 PANDEMIC USE CASES	Case management
0 USE CASES UTILIZED	Coordination and operations
10 ADAPTATION OPPORTUNITIES IDENTIFIED	Contact tracing
	Event-based surveillance
	Health facility and provider administration
	Infection prevention and control
	Learning and training
	Points of entry
	Risk communication and community engagement
	Routine surveillance

OpenMRS

OpenMRS is a software platform and a reference application that enables design of a customized medical records system. OpenMRS has adapted its software to make it easier for 5,500 existing implementations to screen, test, and manage patients (diagnostic tools) and to report data out efficiently to DHIS2 for public health surveillance. There are many countries using OpenMRS as a tool in their pandemic response. For example, Kenya is using OpenMRS for patient care and reporting on COVID-19. Nepal is utilizing OpenMRS to screen patients for COVID-19. OpenMRS is also adapted for COVID-19 response in Chile, Colombia, Guatemala, Haiti, Mexico, and Peru.

4 PANDEMIC USE CASES	Case management
0 USE CASES UTILIZED	Diagnostic tools
4 ADAPTATION OPPORTUNITIES IDENTIFIED	Event-based surveillance
	Vaccine delivery and planning

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
Ada Health App	The Ada Help App guides users to answer simple questions about their own or others' health and symptoms. Ada's AI assesses answers against its medical dictionary of thousands of disorders and conditions. Users receive a personalized assessment report that tells them what could be wrong and what to do next. This app is available in Swahili.	Diagnostic tools, risk communication and community engagement		Ada Health	Proprietary	
AitaHealth	AitaHealth is a mobile application used to register, screen, and identify at-risk individuals from their homes. The intuitive design assists community health workers to capture data from the households they visit on a daily basis and assists with decision-making during the assessment. A broad household "triage assessment" is also conducted to determine if any household members require assistance with key health issues.	Case management, routine surveillance		AitaHealth, Mezzanine, University of Pretoria, Vodacom	Proprietary	Subnational
askNivi	askNivi is a free sexual and reproductive digital health platform that makes use of AI, behavioral science, and the cloud to put health in the hands of every consumer globally. The core product is a digital contraceptive screening and referral service. Users can access information and referral information over Facebook, Instagram, WhatsApp, and SMS. For COVID-19, askNivi enhanced its chatbot capabilities to elicit early intelligence on COVID-19 information needs, create targeted messaging as a response to those needs, combat misinformation, and identify potential hotspots.	Risk communication and community engagement	GCC, Merck for Mothers	Harambee Youth Accelerator, Marie Stopes South Africa, Nivi Inc	Proprietary	National
Aspect	Aspect has been adapted to report on numerous infectious diseases, including Zika, Ebola, HIV, malaria, hepatitis C, and more, on a host of diagnostic devices. The platform has been adapted further to test and track COVID-19 cases, providing real-time dashboards to inform preparedness, response, and tracking of outcomes. Ministries of health can now use the platform to monitor spread of the disease in their countries.	Coordination and operations, event-based surveillance, laboratory systems, routine surveillance			Proprietary	
CasePro	CasePro is built on RapidPro, which is an open source platform that allows anyone to build interactive messaging systems using an easy visual interface. CasePro works on basic feature phones and smartphones. CasePro is a locally hosted SMS help desk service built on Python. SMSs are received from users of systems (e.g., FamilyConnect, MomConnect) and processed by the help desk operator through the CasePro interface. Operators can respond to queries using preapproved FAQ messages or freeform text and can also open a case to be followed up.	Case management, risk communication and community engagement		Prækelt	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, event-based surveillance, health facility and provider administration, infection prevention and control, laboratory systems, learning and training, points of entry, risk communication and community engagement	CDC	Aurum Health Institute	Open source	Subnational
Computer Aided Detection for COVID-19 (CAD4COVID)	CAD4COVID is an AI software that triages suspected COVID-19 cases on chest X-ray or CT images. CAD4COVID was developed to support triaging suspected COVID-19 cases, provide additional information to clinicians, and help with determining the next step in the patient's care, particularly in resource-constrained settings and high prevalence areas. Within 20 seconds, CAD4COVID produces three outputs: (1) a score between 0 and 100 indicating the extent of COVID-19-related abnormalities, (2) a display of lung abnormalities through a heatmap, and (3) percentage of visible lung tissue that is affected. Users (e.g., health facilities) can access the images and display the CAD4COVID results and color overlay on the browser of a connected device such as a laptop or tablet. CAD4COVID is CE certified and is the first AI software proven to perform at the same level as human expert readers to detect COVID-19-related abnormalities on chest X-ray images.	Case management, diagnostic tools	FMO, Philips Foundation, RVO	Delft Imaging	Freemium	Subnational
CoronaFighter	CoronaFighter is a turnkey employee health monitoring and access management solution with advanced compliance reporting capabilities.	Health facility and provider administration, infection prevention and control		CoronaFighter Initiative		Subnational

 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
Coronapp	Coronapp is a centralized repository for relevant and accurate information regarding the COVID-19 virus in South Africa. Its purpose is to make reliable information highly accessible to South Africans to help people and prevent panic. It provides a quick self-assessment and links with emergency services and WhatsApp support.	Diagnostic tools, risk communication and community engagement				National
COVID Alert South Africa (SA)	COVID Alert SA is part of COVIDConnect, which is the NDH's digital COVID-19 response platform. The app is built on Apple and Google's exposure notification framework and designed to protect individual identity and security. The app makes contact tracing possible by proximity tracing via Bluetooth and blockchain.	Contact tracing, infection prevention and control		SA National DOH		
COVID-19 HealthAlert	This WhatsApp-based helpline disseminates accurate and timely information about COVID-19 from the NDH to the South African public. The platform uses WHO's up-to-the-minute information, coupled with localized news updates and information on prevention, symptoms, treatment, risks, traveling, and testing. It includes a help desk with automated response and triage to answer users queries and real-time data insights for national policy decisions.	Risk communication and community engagement	Elma Foundation, Gates Foundation, J&J, McGovern Foundation	CHAI, Praekelt, SA National DOH	Open source	National
COVID-19 HealthCheck	This HIGHER HEALTH tool helps assess risk, allows early detection, maps, and efficiently manages health cases and resources at school campuses in South Africa. Alongside the symptoms and risk questions, users supply their names, surnames, institutions, and location information. The tool will issue receipts after users complete their prescreening self-assessment, providing students and staff an endorsed declaration of their risk level that is valid for 24 hours.	Contact tracing, diagnostic tools, event-based surveillance	Elma Foundation, Gates Foundation, J&J, McGovern Foundation	CHAI, Higher Health, Praekelt, SA National DOH	Open source	National
COVIDConnect	COVIDConnect is the NDH's digital COVID-19 response platform. This is the government contact tracing mechanism, which anonymously notifies people who may have come in contact with someone positive for COVID-19.	Contact tracing		SA National DOH		National
Covi-ID	Covi-ID helps prevent the spread of COVID-19. It helps track down those who had contact with people infected with COVID-19. Users can sign up for a free web application where they are asked to enter their COVID-19 status. Users are then assigned a QR code, either on their smartphones or printed on paper. The QR code is the heart of the app. When people commute or run errands, their QR codes can be scanned as soon as they get on the bus, pass by a security guard, or enter the supermarket.	Contact tracing			Open source	
DATCOV	DATCOV is a daily hospital surveillance report that tracks hospitals' bed occupancy rates and patient admissions (including when health workers are admitted to hospitals).	Case management, coordination and operations, health facility and provider administration		National Institute for Communicable Diseases		National
DisaLab	DisaLab includes a basic laboratory module for test requisitions, provides workflow and workload management, and allows for result entry and review. Data entry staff use DisaLink systems operations to enter results into OpenMRS, making the results available to providers to properly inform and guide clinical care decisions for their patients. DisaLab is currently used by laboratories in 12 countries. It adapts easily to local requirements and has the ability for users to work and report in multiple languages.	Laboratory systems		National Health Laboratory Service	Proprietary	National
DrConnect	DrConnect allows self-screening risk assessment and virtual health care consultations to facilitate testing procedures, referrals, and advice. This platform provides easy access for all South Africans to a COVID-19 risk tool, and where needed, to immediately schedule consultations. Discovery's existing DrConnect platform was previously available only to Discovery clients, but the company partnered with Vodacom to make the tool accessible to all South Africans. The partnership also created a fund to pay doctors for approximately 100,000 consultations, making them free to any South African.	Case management, infection prevention and control, risk communication and community engagement		Discovery, Vodacom		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
eLABS	eLABS consists of mobile and web-based applications and analytics, provided as a managed service on behalf of Wits Health Consortium. Facility health care workers use eLABS mobile to submit samples for pickup and processing, couriers use it to track logistics and temperature in transit, and laboratories use it to transmit electronic results directly to health care workers. Information is linked to individual samples and patients using barcodes and efficient master data management. Existing laboratory information systems can be integrated with eLABS to reduce fragmentation and improve return on existing investments. Direct, targeted patient messaging is also available after patients are enrolled into programs.	Laboratory systems		Mezzanine, Wits Health Consortium	Proprietary	Subnational
Health Systems Trust's project monitoring tool	Health Systems Trust monitors staff movements by tracking their vehicles to provide support to facilities for COVID-19 response.	Health facility and provider administration	Health Systems Trust	Health Systems Trust	Proprietary	National
HealthWorkerAlert	HealthWorkerAlert provides psychosocial support and up-to-date information for frontline health workers.	Health facility and provider administration, risk communication and community engagement	Elma Foundation, Gates Foundation, J&J, McGovern Foundation	Praekelt, SA National DOH	Open source	National
Mobenzi	Mobenzi gives users the ability to monitor and supervise field activities centrally while communicating in real time, build sophisticated forms without any technical expertise, and capture data via web browser or offline for field workers. Users can review, clean, analyze, and export data from the field in real time. The COVID19 Workplace Medical Passport is a free screening tool for workplaces currently active at national and provincial levels in addressing workplace impacts of the epidemic. It has been designed to allow employees, visitors, or any other stakeholders needing to enter a workplace to be screened prior to gaining entry to the premises. Depending on their responses, the respondent is automatically directed to go for confirmatory testing (entry denied), undergo further assessment (entry denied), or to proceed into the premises.	Event-based surveillance, health facility and provider administration, infection prevention and control, routine surveillance		CIDER, CoCT, Mediclinic Southern Africa, Mobenzi, SU, TASK, UCT, UCTLI, UKZN, WCGH		Subnational
mothers2mothers (m2m) application (CommCare)	The peer-to-peer approach links clients of a health facility to Facility Mentor Mothers who help provide care in their communities, reducing the number of patients lost to follow-up and improving patient outcomes. To track and manage patient visits, m2m introduced a mobile application to digitize the patient diary used for client follow-up. m2m reminds Facility Mentor Mothers when a client is due for an appointment and helps them actively follow up with a client who misses an appointment. Community Mentor Mothers extend services outside a facility by providing health education and case management at the household level while also serving as a link between the facility and the community. They drive demand and service uptake through household interaction and use the mobile application for case management. To continue providing the services that Mentor Mothers typically delivered in person and door-to-door in the community pre-COVID-19 pandemic, and because some clients may experience challenges accessing health facilities during the pandemic, m2m introduced an eServices approach to the model. Mentor Mothers use technology to reach their clients when they cannot meet in person, including regular one-on-one follow-up calls and WhatsApp chats to continue identifying and supporting those living with HIV, who may be more at risk of complications from COVID-19. m2m released a WhatsApp-based interactive platform—the Virtual Mentor Mother—where new and existing clients can receive on-demand COVID-19 and health information and support in a local language through a chatbot.	Case management, risk communication and community engagement		Dimagi, m2m	Open source	Subnational
Mum & Baby	This tool provides subscribers with maternal, neonatal, and child health and well-being information. Vodacom added a COVID-19 assessment to Mum & Baby.	Risk communication and community engagement		Vodacom, Vodafone		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
Safe Delivery App	The Safe Delivery App supports skilled birth attendants to quickly diagnose issues in pregnancy and with newborns, offering step-by-step guidelines to perform a treatment. It is free to download and can be preinstalled so that providers can watch the animated instruction videos and read the action cards and drug lists whether or not they have Wi-Fi. The Safe Delivery App includes the adaptation of a COVID-19 content module that provides skilled birth attendants (e.g., midwives) with key information, animated video instructions, and checklists to support them to limit the spread of COVID-19 in the health facilities, including information on infection prevention, breastfeeding, and vertical transmission.	Learning and training	Gates Foundation, Maternity Foundation, Merck for Mothers, UNFPA	Laerdal Global Health, Maternity Foundation, Merck for Mothers, University of Copenhagen, University of Southern Denmark	Open source	
Signapps	Signapps is a mobile app used by health workers to communicate about patient care. Messaging among members of the health care teams (many are remote) enables a large number of experts to be involved in patient care without being on site. Signapps modules include secure messaging, reporting, predictive analytics, mobile forms, and secure data storage.	Case management, health facility and provider administration, infection prevention and control				
South Africa HMIS (DHIS2 + COVID-19 Surveillance + Tracker)	DHIS2 is an open source, web-based HMIS platform. DHIS2 supports the collection, analysis, visualization, and sharing of both aggregate and individual-level data, including mobile and offline data collection using the DHIS2 Android app. South Africa customized its DHIS2 system for COVID-19 surveillance with assistance from local partners. South Africa's HMIS has been customized with an integrated disease surveillance response system for COVID-19 reporting and monitoring.	Case management, contact tracing, coordination and operations, diagnostic tools, event-based surveillance, health facility and provider administration, laboratory systems, one health, points of entry, risk communication and community engagement, routine surveillance, supply chain, vaccine delivery and planning	CDC, Gates Foundation, Gavi, NDoH, Norad, PEPFAR, The Global Fund, UNICEF, University of Oslo, WHO	HISP South Africa, NDoH, University of Oslo	Open source	National
South Africa Rumor Monitoring System (SARMS) (DHIS2)	SARMS collects rumors reported from community-based contributors (e.g., radio hosts, community health workers) to a dedicated email and WhatsApp line. Data managers then enter the rumors, including those related to COVID-19, into a DHIS2-based database and code them topically and according to belief statements. Rumor submissions are summarized and visualized on dashboards for risk communication and community engagement action.	Risk communication and community engagement	USAID	DHIS2, HISP, Johns Hopkins Center for Communication Programs, NDoH	Open source	National
Stock Visibility Solution (SVS)	The SVS enables clients to migrate from a paper-based model to an informed push-based model to access near real-time supply chain information from service points. SVS includes mobile and web-based applications and analytics, provided as a managed service. Using barcodes and efficient master data management, this information is used to prompt informed push replenishment management and other centralized supply chain functions across last-mile service points. Existing logistics management systems can be integrated with SVS to reduce fragmentation and improve return on existing investments.	Supply chain, vaccine delivery and planning	SA National Department of Health, Vodacom Foundation	Mezzanine, SA National DOH, Vodacom, Wits Health Consortium	Proprietary	National
Telkom track-and-trace solution	South Africa's biggest telecom company, Telkom, partnered with Samsung to assist the government in the fight against COVID-19 through contact tracing. Samsung donated 1,500 handsets to be distributed in the provinces hardest hit by the pandemic. The trackers will be connected for free using Telkom's FreeMe packages, easing the burden of the current backlog and fast tracking their ability to track and trace cases around the country. Telkom works with the country's National Institute for Communicable Diseases and the Council for Scientific and Industrial Research to create a database that fetches information from a person's phone to gain insights about their past movements and whereabouts.	Contact tracing		CSIR, NICD, Samsung, Telkom		Subnational
TrakCare	TrakCare is the national laboratory system, which is linked with all surveillance systems. It has consistent, unique identifiers and mobile numbers for connecting results. In February 2020, TrakCare functionality was adapted to help clinicians screen patients for COVID-19. The functionality leveraged WHO guidance and a link to the Novel Coronavirus Global Cases tracking app provided by the Johns Hopkins Center for Systems Science and Engineering.	Laboratory systems		National Health Laboratory Service		National
Ubongo	Ubongo is an edutainment company that creates fun, localized, multiplatform educational media that reaches millions of families through accessible technologies.	Learning and training				

 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
Vantage	Vantage is an AI-enabled cloud platform that gives health care workers data they can use to make decisions. The cloud-based platform can instantaneously analyze data, communicate findings, and direct meaningful actions through automatically generated dashboards and targeted push notifications. Dashboards can include programmatic, human resources, and financial results for district- and facility-level analytics. The demand or patient management side enables population-based screening and testing, contact tracing, and epidemiological surveillance. The supply or facility management side enables leaders and managers to assess and address facility readiness, stock management, and workforce wellness. Vantage currently operates as part of USAID's Accelerating Program Achievements to Control the Epidemic (APACE) program in South Africa.	Contact tracing, event-based surveillance, health facility and provider administration, learning and training, points of entry, routine surveillance, vaccine delivery and planning	BroadReach, PEPFAR, private equity, USAID	BroadReach, KZN DOH, Mpumalanga DOH, UNAIDS, Wits RHI	Proprietary	Subnational
World Continuing Education Alliance (WCEA)	This learning management system is a multifold eLearning and mHealth system that supports virtual and blended learning linked to certifications for professional development and lifelong learning. Examples of content includes modules about nursing and midwifery and COVID-19 (both clinical and nonclinical). The platform generates reports on study habits and data of users (i.e., age, gender, location, qualification, role, employment status).	Learning and training		Midwifery Association, WCEA	Proprietary	National
Bahmni	Bahmni is an open source EMR and hospital information system that is currently deployed in more than 50 countries. Bahmni is a distribution of the OpenMRS medical record platform that is designed to help health care providers to improve the efficiency and quality of patient care, reduce the margin of error in clinical diagnosis, and advocate for policies related to public health in rural areas. The system manages patient information in a flexible fashion throughout the care cycle, including registration, various points of care, investigations, laboratory orders and results management, picture archiving and communication systems, and billing. While it is not currently deployed in South Africa for COVID-19, Bahmni released a COVID-19 kit that uses an OpenMRS module initializer to install forms that capture travel history and contract tracing, enable patient screening, and track information on home quarantining.	Case management, diagnostic tools, health facility and provider administration, laboratory systems, points of entry, supply chain	PEPFAR, USAID	HIS, MSF, PIH	Open source	
Bluebird	Bluebird was developed in response to issues with reagents in TrakCare . Bluebird combines public and private laboratory data.	Coordination and operations, laboratory systems				
Cadasta Platform	Cadasta provides a common global platform and set of technology and training tools that allow local organizations, government entities, and communities to document and map land and its occupants in a more quick, efficient, and affordable way. The Cadasta Platform is an Esri-based suite of best-in-class tools and technologies that collects and manages land-related data and migration of data into government systems. It is supported by a range of applications, including mobile and web-based tools to help users easily and securely document, visualize, analyze, and share crucial community land and resource rights data. In addition, users define data models and workflows, assisting with the collection of imagery via satellites and drones. Cadasta has been used in other countries to provide consistent and cohesive community-level data concerning resources for COVID-19 response efforts, including medical clinics, pharmacies, hospitals, testing sites, and other treatment centers.	Coordination and operations, infection prevention and control, routine surveillance		Cadasta	Proprietary	
Community Health Toolkit (CHT)	CHT is a collection of open source technologies and open access design, technical, and implementer resources and is a community of practice for digitally supported care delivery. It is designed to support community health systems and teams delivering care in the hardest-to-reach communities. The CHT was adapted for COVID-19 response to better facilitate investigation of COVID-19 alerts, as well as to effectively triage to ensure that those most at risk can access appropriate care in a timely manner.	Case management, coordination and operations, contact tracing, event-based surveillance, health facility and administration, learning and training, points of entry, risk communication and community engagement, routine surveillance		The Aurum Institute, I-TECH	Open source	Subnational
Everwell Hub	The Everwell Hub platform covers the entire digital cascade of care and is the core digital infrastructure that officers, health workers, and patients use to support diagnosis, treatment success, and recovery from TB. The Everwell Hub supports a broad patient management ecosystem (i.e., mobile, web, SMS, IVR).	Case management, diagnostic tools, event-based surveillance, laboratory systems		Everwell, Government of South Africa	Open source	

■ 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
GxAlert	GxAlert is a digital platform that facilitates country-level surveillance of viral load laboratory testing results by allowing data to flow across the health system. GxAlert can connect to other electronic tuberculosis managers or M&E systems. GxAlert can also send targeted SMS alerts to facility managers, health officers, and suppliers. GxAlert enabled a solution to address the following gaps: (1) device management, monitoring, and reporting; (2) calibration, maintenance, and procurement planning; (3) lab technologists' capacity, availability, and training; (4) real-time results notifications to respective stakeholders including rapid case notifications for all positive results to all relevant health care officers; and (5) inventory management and notifications to reduce stockouts and expires. Countries can leverage GxAlert to quickly enable real-time reporting and notification of COVID-19 diagnostic data. SystemOne has already connected more than 3,000 GeneXperts across 40 countries. For countries with these existing GxAlert networks, a remote COVID-19 module and support model can be quickly deployed without travel into countries. An associated Aspect Reporter app is also available on the Google Play store to allow COVID-19 results to be delivered directly to frontline health workers in real-time, improving timeliness of response.	Diagnostic tools, laboratory systems		StopTB Partnership, SystemOne	Proprietary	National
Integrated Supportive Supervision (ISS) (ODK)	ISS is an electronic checklist used for supervision during active case search and routine immunization.	Case management, vaccine delivery and planning			Open source	National
Keheala	Keheala is a digital health platform that delivers behavioral interventions across basic feature phones and smartphones to improve health care access and treatment outcomes for patients in low-resource settings. Keheala addresses the nonmedical drivers of disease (e.g., stigma and a lack of information, motivation, and support) with demonstrated behavioral strategies from the social sciences (i.e., behavioral economics and psychology).	Risk communication and community engagement	GCC	Keheala		Subnational
LimeSurvey	LimeSurvey uses online surveys to help understand people better by finding out more about opinions, interests, and the reasons behind decisions. LimeSurvey is used in South Africa to coordinate data and indicators on a daily, weekly, and monthly basis.	Coordination and operations, supply chain		NDoH	Open source	
Med-Admin	The Med-Admin Medical Scheme Administration system assists service providers, scheme users, and different medical plans of medical schemes with health care management. It also performs risk management. Med-Admin is a self-contained, online system that functions in a multiuser environment with a central server located at the medical scheme.	Case management, contact tracing, event-based surveillance, health facility and provider administration, laboratory systems, risk communication and community engagement, routine surveillance, vaccine delivery and planning		Read & Associates	Proprietary	
Open Health Information Mediator (OpenHIM)	OpenHIM is a middleware component designed to ease interoperability between disparate information systems. It provides secure communications and data governance, as well as support for routing, orchestrating, and translating requests as they flow between systems. OpenHIM is intended as an extensible tool to support interoperability workflows across a wide range of information systems, metadata services and HIE components, and data standards. The packaged version also has a published set of workflows available and is preconfigured to a particular use case, such as HIV case-based surveillance, to allow implementers to engage with the solutions and test their applicability.	Interoperability	CDC, Digital Square	IntraHealth, Jembi Health Systems	Open source	National
OpenCRVS	OpenCRVS is an open source software product that supports civil registration (CR) and vital statistics (VS) services in low-resource settings. OpenCRVS is interoperable with other systems.	Coordination and operations, routine surveillance		Jembi Health Systems, Plan International	Open source	
OpenHIE	The OpenHIE architecture supports interoperability by creating a framework that leverages health information standards, enables flexible implementation by country partners, and supports interchangeability of individual components. Implementing an interoperability layer improves public health reporting by facilitating tool integration. The purpose of HIE is to promote the appropriate and secure access and retrieval of a patient's health information to improve the cost, quality, safety, and speed of patient care, and to inform planning and policymaking.	Interoperability		Jembi Health Systems	Open source	



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
OpenMRS	OpenMRS is a software platform and a reference application that enables design of a customized medical records system (MRS). OpenMRS adapted its software to make it easier for 5,500 existing implementations to screen, test, and manage patients using diagnostic tools and to report data out efficiently to DHIS2 for public health surveillance.	Case management, diagnostic tools, event-based surveillance, vaccine delivery and planning		OpenMRS	Open source	
Primary Health Care Information System (PHCIS)	The Western Cape's PHCIS is an administrative system that manages patient throughput in primary care clinics through electronically drawing information from past clinic visits, creating electronic appointments, and providing patient and facility management tools for reporting purposes.	Case management		Western Cape Provincial DOH		Subnational
Pro-Clin	Pro-Clin is a comprehensive health care management operating system. It manages patient records (e.g., integration with patient administration systems) and clinical trials (e.g., data collection). While Pro-Clin has not been deployed in South Africa for COVID-19, DigiData systems have extensive data gathering capabilities that are easily configured and adapted. Pro-Clin can be adapted to manage a vaccine rollout with data gathering or COVID-19 clinical trials for treatment or prevention control.	Case management, contact tracing, event-based surveillance, health facility and provider administration, laboratory systems, risk communication and community engagement, routine surveillance, vaccine delivery and planning		Read & Associates	Proprietary	
Triggerise platform	Triggerise platform delivers information on demand through an application available on mobile devices (e.g., feature phones, smartphones, tablets) and web browsers. The platform targets young women and uses reminders, discounts, and reward points to encourage users to access and use healthy products and services about MCH and reproductive and sexual health (including HIV). Triggerise can be adapted to promote behaviors to prevent and spread awareness about COVID-19.	Risk communication and community engagement	CIFF, Cordaid, KfW, Ministry of Foreign Affairs Netherlands, Rutgers University	Triggerise		
U-Report	U-Report has been used as a focused mHealth application, specifically providing real-time mobile counseling and conducting coordinated polls on HIV/AIDS among adolescents and young people. U-Report has been adapted to support COVID-19 in other countries, like in Mozambique where an information chatbot is supporting COVID-19 risk communication and community engagement.	Risk communication and community engagement	UNICEF	UNICEF	Open source	National
VigiFlow	VigiFlow is a management system for recording, processing, and sharing reports of adverse effects for medical products. VigiFlow enables maximum local control and provides an effective means for management review and analysis of national data. VigiFlow has a medicine track and trace system that will ensure that all medical products and health technologies in the market have a tracing number.	Supply chain	WHO		Open source	Subnational
WelTel Health Platform	WelTel is an evidence-based text messaging solution for improving patient adherence. The tool is used in many countries to support evidence-based integrated patient engagement, virtual care, communication outreach and data collection for COVID-19 and many other health areas (e.g., MNCH, TB, HIV, PrEP). The tool has been validated to impact positive behavior change to improve health outcomes and save lives. WelTel's system supports appointment scheduling and reminders, and it broadcasts videos of public health information on a secure patient portal. WelTel is currently deployed for COVID-19 response in Rwanda, Uganda, Tanzania, and the United Kingdom.	Case management, contact tracing, event-based surveillance, laboratory systems, points of entry	CDC, CIHR, GCC, NIH, NRC IRAP, PEPFAR	FHI 360	Proprietary	

We want consistent use of master facility registries and patient registries.”

—From key informant interviews, South Africa’s National Department of Health

 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
<p>Zenysis</p>	<p>The Zenysis Analytics Platform is a commercial off-the-shelf data integration and advanced analytics platform used by national and state public health entities to enable data-driven emergency response activities, as well as routine program and resource management. Zenysis software can be used to integrate structured data from every available and relevant source, both within and beyond the health sector, into a single unified workspace for decision-makers. These workspaces, or “Virtual Control Rooms,” can help significantly enhance situational awareness and disease surveillance and provide decision-makers with analytics they need to coordinate containment efforts in a data-driven way. Using the Zenysis platform, emergency managers can view inventory levels and make quick decisions to move lifesaving health commodities and medical equipment from low-burden to high-burden facilities and geographies. To manage stockouts, alerts are created to flag when health facilities start reporting low stock. The Zenysis cohort tool enables public health professionals to conduct both cohort and cascade analyses on groups of patients by various dimensions over time. These types of analyses are key to understanding the key risk factors for transmission and the medical outcomes of subsets of the affected population. Geospatial tracking can be used to monitor outbreak hotspots, map gaps in availability of key services, and plan the location of new services. Zenysis is able to rapidly integrate and harmonize different versions of master facility registries to create a single source of truth for decision-makers. Using this data, Zenysis can calculate composite “COVID-19 readiness” scores that reflect the relative preparedness of a given facility and visualize these on private and/or public dashboards. The Zenysis platform can integrate patient-level testing data with immigration and customs data to identify contacts who traveled on planes or who transited through immigration arrival halls with people who have positive for COVID-19. It can also integrate patient-level testing data with ride-hailing app data to identify which drivers transported riders who tested positive for COVID-19. Zenysis can also integrate flight and ride-hailing app data into third-party contact tracing applications to avoid the need for slow, error-prone, and non-scalable data entry. For each patient or individual record, Zenysis platform users can visualize whom they were in contact with (derived from integrated sources), centralize information on each case (e.g., confirmed/ suspected/exposed), and track each person’s journey through diagnosis, isolation and/or care, and treatment to monitor compliance and the need for follow-up.</p>	<p>Case management, contact tracing, coordination and operations, event-based surveillance, supply chain, vaccine delivery and planning</p>	<p>The Global Fund</p>	<p>Zenysis</p>	<p>Proprietary</p>	<p>National</p>

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

At a glance

Figure 2 shows that South Africa's digital health tools rely on different software licensing types for sustainability with open source and proprietary being the most common. Figure 3 demonstrates that South Africa has 24 digital health tools deployed on a national scale while 18 operate on a subnational scale. A limitation of the Map and Match analysis was the inability to find complete information about licensing type and scale of these tools in South Africa. These figures are not specific to COVID-19 response, but they provide an overall picture of South Africa's digital health infrastructure.

Figure 2. Software licensing types of South Africa's digital health tools.

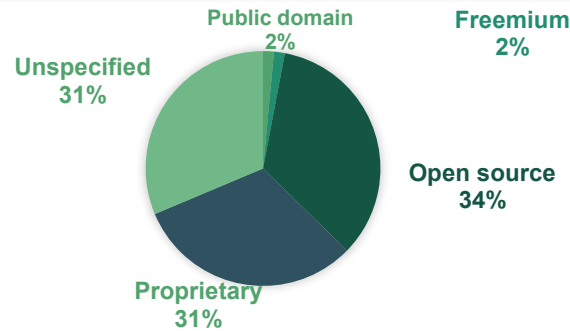
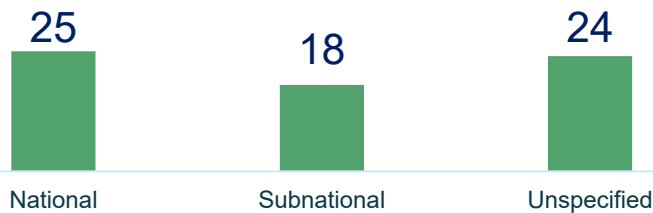


Figure 3. Number of digital tools deployed at scale in South Africa.



Conclusion

Digital Square mapped 67 existing, adaptable digital health tools in South Africa 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 South Africa'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 South Africa'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 South Africa's digital health systems and their role in the COVID-19 response by reviewing South Africa'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.



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Annex 1. Abbreviations

Acronym	Definition
AI	artificial intelligence
APACE	Accelerating Program Achievements to Control the Epidemic
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CHT	Community Health Toolkit
CIDER	Centre for Infectious Disease Epidemiology and Research
CIFF	Children's Investment Fund Foundation
CIHR	Canadian Institutes of Health Research
CoCT	City of Cape Town
CSIR	Council for Scientific and Industrial Research
CT	computerized tomography
DHIS2	District Health Information Software 2
DOH	Department of Health
EMR	electronic medical records
FAQ	frequently asked questions
FMO	Dutch entrepreneurial development bank
Gavi	Gavi, the Vaccine Alliance
GCC	Grand Challenges Canada
HIE	health information exchange
HIS	Health Information System
HISP	Health Information Systems Programme
HMIS	health management information system
HR	human resources
IRAP	International Road Assessment Programme
I-TECH	International Training and Education Center for Health
IVR	interactive voice response
J&J	Johnson & Johnson
KfW	KfW Development Bank
KZN	KwaZulu-Natal
M&E	monitoring and evaluation
m2m	mothers2mothers

Acronym	Definition
MCH	maternal and child health
McGovern Foundation	Patrick J. McGovern Foundation
MNCH	maternal, newborn, and child health
MSF	Médecins Sans Frontières
NDoH	National Department of Health
NICD	National Institute for Communicable Diseases
NIH	National Institutes of Health
Norad	Norwegian Agency for Development Cooperation
NRC IRAP	National Research Council of Canada Industrial Research Assistance Program
OpenMRS	Open Medical Record System
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PIH	Partners In Health
PrEP	pre-exposure prophylaxis
QR	quick response
RVO	Rijksdienst voor Ondernemend Nederland/Netherlands Enterprise Agency
SA	South Africa
SMS	short message service
SU	Stellenbosch University
SVS	Stock Visibility Solution
TB	tuberculosis
UCT	University of Cape Town
UCTLI	University of Cape Town Lung Institute
UKZN	University of KwaZulu-Natal
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WCEA	World Continuing Education Alliance
WCGH	Western Cape Government: Health
WHO	World Health Organization
Wits RHI	Wits Reproductive Health and HIV Institute

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
<p>Plan for vaccine introduction in country</p> <p>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.</p> <p>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.</p> <p>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.</p>	<p> Messaging</p> <p> Microplanning</p> <p> Training</p>
<p>Support vaccine introduction</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>	<p> Patient monitoring</p> <p> Supply chain</p> <p> Vaccine management</p>

Digital Square approved global goods use cases



Electronic immunization registries

DHIS2 Tracker, OpenSRP, OpenMRS, Tamanu



Messaging

CommCare, Community Health Toolkit, mHero, OpenSRP



Microplanning

Healthsites, OpenSRP, Reveal



Patient monitoring

CommCare, DHIS2 Tracker, OpenSRP, SORMAS



Supply chain

DHIS2, OpenLMIS, Logistimo, OpenBoxes, Product Catalogue Management Tool



Training












CommCare, Community Health Toolkit, mHero, OpenSRP, SORMAS



Vaccine management

CommCare, Community Health Toolkit, DHIS2, DHIS2 Tracker, Logistimo, OpenBoxes, OpenLMIS, OpenSRP, Tamanu

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
<p>Enhance roll-out of vaccine, support ongoing vaccine monitoring</p> <p>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.</p> <p>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.</p> <p>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.</p>	<ul style="list-style-type: none">  EIRs  Supply chain  Patient monitoring  Vaccine management
<p>Enhance communication to sustain vaccine demand</p> <p>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.</p> <p>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.</p>	<ul style="list-style-type: none">  EIRs  Messaging  Patient monitoring
<p>Use data to inform vaccine-related decisions</p> <p>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.</p> <p>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.</p>	<ul style="list-style-type: none">  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.