

Digital health systems to support pandemic response in Malawi

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

April 2021

IN THIS TECHNICAL BRIEF

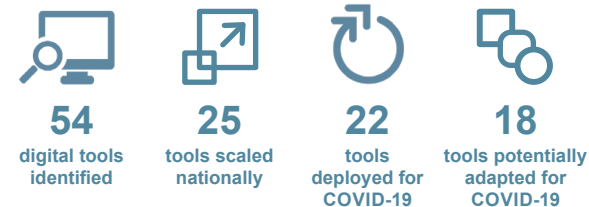
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Introduction

Malawi's Ministry of Health (MOH) outlines its priority for strengthening health information systems in its *Monitoring, Evaluation, and Health Information Systems Strategy (MEHIS): 2017–2022*. Its principal objectives are to have interoperable digital systems populated with high-quality data to support data use for decision-making. The COVID-19 pandemic brought a new level of urgency to this objective. Leveraging digital health tools is a rapid, cost-effective strategy to accelerate Malawi's COVID-19 response while at the same time reinforcing the MEHIS objectives.

Background

Digital Square conducted a landscape analysis of Malawi's digital systems in the ten-year period from 2010–2020 with information validated by tool implementers and designers, digital health experts, and MOH stakeholders as part of the USAID-funded Map and Match project. The purpose was to identify the existing digital tools utilized in Malawi, 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.



Analysis overview

Malawi's health system utilizes 54 digital health tools with at least 22 already deployed for COVID-19. This brief identifies opportunities for existing digital tools to be adapted to pandemic use case needs for the COVID-19 response and potential future epidemics. Mapping tools to the use cases revealed where there are strengths and gaps in Malawi's digital health systems response to COVID-19. For example, the analysis identified only one tool that currently supports health facility and provider administration 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, the 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 Malawi.

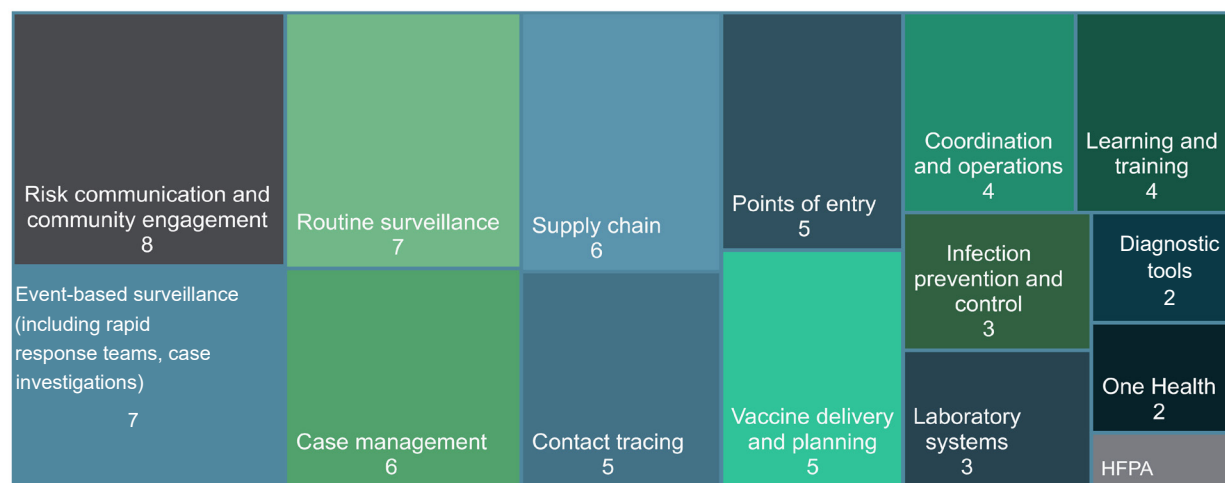


Figure 1 illustrates that many use cases are addressed using several tools in Malawi's COVID-19 response while other use cases are filled by few tools.

Abbreviation: HFGA: health facility and provider administration

Table 1. Mapping and matching digital health tools to strengthen Malawi’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 system is supporting Malawi’s COVID-19 response. Digital Square matched opportunities for tool adaptation across the pandemic use cases in **green** to reveal places where Malawi 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
AirConnect/Applet											Blue				
Chipatala cha pa Foni (Viamo's 3-2-1 Service)				Blue			Blue					Blue	Blue		
CommCare	Blue														
Community Health Toolkit	Blue	Blue	Blue		Blue	Blue	Blue		Blue	Blue	Blue	Blue	Blue	Blue	Blue
Digital Community Scorecard App												Blue			Blue
eDSR Case Based Surveillance App Malawi					Blue						Blue		Blue		
Emergency Operations Center Call Center Exchange		Blue	Blue		Blue							Blue	Blue		
HealthConnect												Blue			
Laboratory Information Management System								Blue							
Leap									Blue						
Malawi’s HMIS (DHIS2 with Tracker and Android)	Blue	Blue	Green	Green	Blue			Blue		Green	Green		Blue	Blue	Green
Ministry of Health COVID-19 Dashboard			Blue										Blue		
Ministry of Health WhatsApp Chatbot & USSD application (RapidPro)	Blue	Blue	Blue		Blue	Green		Green				Blue	Green	Blue	Green
One Health Surveillance Platform (DHIS2)	Blue	Blue	Green		Blue			Blue		Blue	Blue		Blue	Blue	Blue
OpenHIE															
OpenHIM															

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 Malawi'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	OpenLMIS					Opportunities to adapt tools for pandemic response									Digital tools deployed for COVID-19 response	Digital tools deployed for COVID-19 response	
	Organized Network Services for Everyone's Health (ONSE) (CommCare)	Digital tools deployed for COVID-19 response				Digital tools deployed for COVID-19 response		Digital tools deployed for COVID-19 response				Digital tools deployed for COVID-19 response	Digital tools deployed for COVID-19 response				
	Remote Training for Frontline Health Workers (through IVR)		Opportunities to adapt tools for pandemic response							Digital tools deployed for COVID-19 response						Opportunities to adapt tools for pandemic response	
	Swoop Aero				Digital tools deployed for COVID-19 response										Digital tools deployed for COVID-19 response	Digital tools deployed for COVID-19 response	
	U-Report												Digital tools deployed for COVID-19 response				
	World Continuing Education Alliance									Digital tools deployed for COVID-19 response							
	Abwenzi Pa Za Umoyo's Community Health Worker Program software (Community Health Toolkit and CommCare)	Opportunities to adapt tools for pandemic response								Opportunities to adapt tools for pandemic response				Opportunities to adapt tools for pandemic response			
	Abwenzi Pa Za Umoyo's EMR (OpenMRS)	Opportunities to adapt tools for pandemic response															
	Abwenzi Pa Za Umoyo's supply chain software (OpenBoxes)														Opportunities to adapt tools for pandemic response		
	CAD4TB				Opportunities to adapt tools for pandemic response												
	emmunize																Opportunities to adapt tools for pandemic response
	GxAlert				Opportunities to adapt tools for pandemic response												
	Health Network Quality Improvement System (HNQIS)					Opportunities to adapt tools for pandemic response											
	iHRIS							Opportunities to adapt tools for pandemic response									Opportunities to adapt tools for pandemic response
	Integrated Supportive Supervision (ISS) (ODK)	Opportunities to adapt tools for pandemic response															Opportunities to adapt tools for pandemic response
	Malawi Breakthrough ACTION for ending child early and forced marriage (DHIS2)													Opportunities to adapt tools for pandemic response			

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

Table 1. Mapping and matching digital health tools to strengthen Malawi’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	Malawi German Health Programme (MGHP) (DHIS2)	■	■	■	■	■			■		■	■		■	■	■
	Malawi HIS (eRegister) app (OpenSRP)	■	■		■	■	■			■				■	■	■
	MESH-QI (CommCare)								■							
	One Community (One C) (CommCare)	■														
	Sanitas	■														
	Surveda													■		
	VigiFlow								■							■
	WelTel Health Platform	■	■	■	■	■		■				■	■	■		■

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

“It is frustrating to have all these case management systems in the country and only focus on one disease case area (e.g., HIV). It is better to have only one system deployed to manage all the different disease cases in the facility.”

“We are interested in managing our digital health tools locally to increase sustainability.”

—Simeon Yosefe, Malawi Ministry of Health

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 the health facility and provider administration below. Use case gaps are defined as those which have fewer than two tools addressing them. 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.

Health facility and provider administration

Community Health Toolkit	Health Network Quality Improvement System (HNQIS)
iHRIS	Malawi HIS (eRegister) app (OpenSRP)
MOH WhatsApp Chatbot and USSD app (RapidPro)	

Examples of global goods adapted and deployed for COVID-19 in Malawi

iHRIS

iHRIS is a free and open source software solution that forms an integrated human resources information system, enabling countries to more easily collect, maintain, and analyze health workforce data and manage health workforce resources at the MOH, district health offices, and health care facilities.

iHRIS is built on a flexible framework that can be adapted to meet a wide variety of needs for managing health workforce information. iHRIS supports the MOH and other service delivery organizations to:

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

iHRIS can be adapted to support COVID-19 response to manage and track health workers' vaccinations and to conduct workforce planning for COVID-19 hotspots and staffing needs (e.g., personal protective equipment). The Kenya MOH has used iHRIS to identify potential workforce shortages and to plan for redeployment based on likely COVID-19 hotspots.



Health facility and provider administration

Vaccine delivery and planning

OpenLMIS

OpenLMIS is a powerful, open source, cloud-based electronic logistics management information system (LMIS) purpose-built to manage health commodity supply chains. OpenLMIS manages the electronic LMIS process at more than 11,000 health facilities in nine Africa 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 start-up tool to help countries manage COVID-19-related commodities based on the WHO product list.



Event-based surveillance

Supply chain

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
AirConnect/Applet	This system strengthens border health security, enables screening, and facilitates follow-up with suspected infected persons at ports of entry and other border entry points.	Points of entry		MOH	Commercial	National
Chipatala cha pa Foni (Viamo's 3-2-1 Service)	Chipatala cha pa Foni (CCPF) or "Health Center by Phone" service uses Viamo's flagship product, the 3-2-1 Service, to enable callers to access prerecorded audio messages in local languages for free. When callers dial into the 3-2-1 Service and choose to listen to COVID-19 messages, they are presented with the option of using the symptom checker for self-triage. Based on the risk category the individual falls into, they are given targeted advice on the appropriate behavior to follow (such as social distancing or immediate visit to the health facility). Viamo has developed a custom dashboard to provide the MOH with a breakdown of the activities.	Diagnostic tools, infection prevention and control, risk communication and community engagement, routine surveillance	MOH, Surgo Ventures, USAID, VillageReach	Airtel, Viamo, VillageReach	Commercial	National
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, utilizes simple device deployment, and includes translation features.	Case management		CRS, PCI	Open source	National
Community Health Toolkit	The 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.	Case management, contact tracing, coordination and operations, event-based surveillance, health facility and provider administration, infection prevention and control, learning and training, One Health, points of entry, risk communication and community engagement, routine surveillance, supply chain, vaccine delivery and planning		PIH	Open source	Subnational
Digital Community Scorecard App	Community scorecards are widely used to build a trusted and constructive relationship between communities and health facility staff. The Digital Community Scorecard App helps staff or volunteers running community scorecards to digitize and analyze the data generated from this process. The app includes three related tools: a simplified data entry app that is designed to work offline, a program management app that includes real-time analysis tools, and a data hub to aggregate and visualize data.	Risk communication and community engagement, vaccine delivery and planning	FCDO, Saul Foundation	CARE, Kwantu, World Vision	Open source	Subnational
Emergency Operations Center Call Center Exchange	The EOC Call Center Exchange is a distributed call management system. It uses private automatic branch exchange (PABX) for a more effective way of communication. The system improves technical capacity to intelligently handle and manage calls, directing them to respective districts where they will be attended to by dedicated and trained district call center agents. This tool enhances the EOC to a modern solution that decentralizes the management of phone calls from the general public about COVID-19.	Contact tracing, coordination and operations (including emergency operations centers), event-based surveillance, risk communication and community engagement, routine surveillance	Gates Foundation, MOH	MOH	Commercial	Subnational
HealthConnect	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	UNICEF	Angle Dimension, DHD, HISP Malawi, ICT Association of Malawi, Kuunika, Praekelt	Open source	Subnational
Laboratory Information Management System	The LIMS tool is used to collect, store, and manage early infant diagnosis, viral load, and COVID-19 data at the molecular laboratory. It is used to manage the entire testing process and test result management.	Laboratory systems	MOH, UNICEF, Unitaid	CHAI, MOH	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
Leap	Leap is a health-related mobile platform that enables health departments to train community health care volunteers. Volunteers have access to a variety of content ranging from diagnosis trees to chat forums that share best practices and advice among the volunteers using Leap. Leap allows health departments to monitor and support their volunteer workforce and generates report data needed to ensure improved efficiency and positive health outcomes for communities who are reliant on these volunteers. Leap provides training to health workers on COVID-19 response and preparedness.	Learning and training		Amref, Mezzanine	Commercial	Subnational
eIDSR Case Based Surveillance App Malawi	This application extends the existing infrastructure of EMRs and implements an eIDSR system to facilitate real-time detection and reporting of notifiable disease cases. The application includes a border post health surveillance system, an eIDSR system management dashboard, and an integrated eIDSR system.	Event-based surveillance, rapid response, case investigation, points of entry, routine surveillance	World Bank	Baobab Health Trust, Luke International, MOH, NAC	Freemium	National
Malawi's HMIS (DHIS 2 with Tracker and Android)	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. The core DHIS2 software development is managed by the HISP at the University of Oslo. HISP is a global network composed of 11 in-country and regional organizations, providing day-in, day-out direct support to ministries of health and local implementers of DHIS2.	Case management, contact tracing, coordination and operations (including emergency operation centers), diagnostic tools, event-based surveillance, laboratory systems, One Health, routine surveillance, supply chain, vaccine delivery and planning	DHIS2, Gates Foundation, Gavi, Global Fund, MOH, Norad, UNICEF, USAID	DHIS2, HISP Malawi, MOH	Open source	National
Ministry of Health COVID-19 Dashboard	This tool is a publicly accessible MOH official website to support decision-making and to provide information using embedded Tableau dashboards. The dashboards display relevant COVID-19 statistics, including sums of all suspected cases, individuals tested, confirmed cases, deaths, and recoveries. The dashboards also show the geographic locations of all cases, outcomes, and daily case counts.	Coordination and operations (including emergency operations centers), routine surveillance	Gates Foundation, Tableau Foundation	Cooper/Smith, MOH	Commercial	Subnational
Ministry of Health WhatsApp Chatbot and USSD application (RapidPro)	This SMS-based application uses RapidPro to collect data on COVID-19 cases in Malawi. The app allows for self-registration, symptoms reporting for 14 days, national and global COVID-19 statistics, and contact reporting. The app is expanding its features to include health utilization and health facility capacity. This app improves syndromic surveillance to better understand where COVID-19 is probable, before diagnostics have caught up; improves risk models to more accurately identify highest risk areas and communicates accordingly; triages active case finding and intensifies tracking, tracing, and quarantine in highest risk areas; identifies where staff shortages or commodity gaps are likely to occur and manages accordingly; and improves precision in quantification and allocations for key commodities and equipment.	Case management, contact tracing, coordination and operations (including emergency operations centers), event-based surveillance, health facility and provider administration, laboratory systems, risk communication and community engagement, routine surveillance, supply chain, vaccine delivery and planning	Amazon Web Services, Baobab Health Trust, Gates Foundation, Good Citizens, UNICEF	Angle Dimension, Baobab Health Trust, Good Citizens, Malawi University of Science and Technology, MOH, UNDP, UNICEF	Open source	Subnational
One Health Surveillance Platform (OHSP) (DHIS2)	OHSP records and reports disease surveillance data in a holistic approach that involves human, animal (livestock and wild), and environmental aspects to disease surveillance. This web and mobile platform allows for patient screening, patient tracking and follow-up, contact tracing, case management, vaccine delivery and planning, and laboratory sample tracking.	Case management, contact tracing, coordination and operations (including emergency operations centers), event-based surveillance, laboratory systems, One Health, points of entry, routine surveillance, supply chain, vaccine delivery and planning	CHAI, DHIS2, Gates Foundation, Last Mile Health, Luke International, MOH, ONSE, UNICEF	MOH	Open source	Subnational
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.	Interoperability	Gates Foundation	Baobab Health Trust, I-TECH, Kuunika, Lighthouse Trust, Luke International Norway	Open source	National

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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
OpenHIM	The Open Health Information Mediator (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.	Interoperability	Gates Foundation	Baobab Health Trust, I-TECH, Kuunika, Lighthouse Trust, Luke International Norway	Open source	National
OpenLMIS	OpenLMIS is a powerful, open source, cloud-based electronic logistics management information system (LMIS) purpose-built to manage health commodity supply chains. OpenLMIS manages the electronic LMIS process at more than 11,000 health facilities in nine African countries across all major health programs, including vaccines and COVID-19.	Event-based surveillance, supply chain, vaccine delivery and planning	Gates Foundation, USAID	MOH, GHSC-PSM project, VillageReach	Open source	National
Organized Network Services for Everyone's Health (ONSE) (CommCare)	The ONSE project uses a CommCare-based app to address reproductive health/family planning; maternal, newborn, and child health (MNCH); malaria; and water, sanitation, and hygiene (WASH) at facility and community levels. The application supports case management, data collection, monthly consolidation of data, and supervision.	Case management, event-based surveillance, infection prevention and control, points of entry, risk communication and community engagement	USAID	Dimagi, MSH, VillageReach	Open source	National
Remote Training for Frontline Health Workers (through IVR)	The Remote Training for Frontline Health Workers tool is a free training that uses interactive voice recordings (IVR) to send training content to frontline health workers based in communities and facilities through Viamo's platform. The prerecorded training modules are sent to each learner. The learner listens to the messages, fills out an assessment after each module, receives a confirmation of completion followed by a SMS for the next module. The modules are sent to any type of phone to reduce access limitations. This tool has been adapted to send learners COVID-19 modules.	Contact tracing, learning and training, vaccine delivery and planning	Focusing Philanthropy	MOH, Viamo, VillageReach	Commercial	National
Swoop Aero	Swoop Aero delivers medicines and medical supplies by drone from health care centers to remote villages. Outbound deliveries include vaccines for malaria and tuberculosis, penicillin, antimalarial and antivenom medications, and HIV/AIDS testing kits. On the return trip, drones often carry tuberculosis tests and other blood samples. The Swoop Aero aircraft run simultaneous aerial mapping and data collection activities, with collected data used to optimize early warning and disaster preparedness procedures. Swoop Aero adapted to support the Malawi government to transport COVID-19 test kits to remote villages and fly the samples back for testing.	Diagnostic tools, supply chain, vaccine delivery		UK Aid, UNICEF, USAID Global Health Supply Chain	Commercial	Subnational
U-Report	U-Report is an mHealth application that provides real-time mobile counseling and conducts coordinated polls on HIV/AIDS among adolescents and young people.	Risk communication and community engagement	UNICEF	UNICEF	Open source	National
World Continuing Education Alliance	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		Medical Council of Malawi, regulatory bodies and professional associations	Commercial	National
Abwenzi Pa Za Umoyo's Community Health Worker Program software (Community Health Toolkit and CommCare)	Abwenzi Pa Za Umoyo (APZU) uses Medic Mobile's Community Health Toolkit in its Community Health Worker program and CommCare in its Linkage to Care and Clinical Mentorship program. APZU serves two areas of Neno District and transitioned from an outdated, paper-based data collection system to an electronic mHealth system in 2018. Known in local Chichewa as Yendanafe, the system enables community health workers and clinicians to collect and evaluate data electronically via tablets and smartphones.	Case management, learning and training, routine surveillance	CDC, PEPFAR	PIH, MOH	Open source	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
Abwenzi Pa Za Umoyo's EMR (OpenMRS)	APZU supports the MOH's service delivery provision in the rural district of Neno. APZU's EMR uses the OpenMRS platform at two hospitals (district and community) and 12 health centers to serve 165,000 people. Clinical data is collected and reported for HIV, early infant HIV diagnosis, noncommunicable diseases, palliative care, etc. OpenMRS is a software platform and a reference application that enables design of a customized medical records system. OpenMRS adapted its software to make it easier to screen, test, and manage patients (diagnostic tools) and to report data out efficiently to DHIS2 for public health surveillance.	Case management, event-based surveillance	CDC, PEPFAR	OpenMRS community, PIH	Open source	Subnational
Abwenzi Pa Za Umoyo's supply chain software (OpenBoxes)	APZU uses OpenBoxes, a supply chain and logistics software, to link finance and purchasing systems. OpenBoxes tracks international shipments, receives confirmations, handles inventory management and adjustments; tracks outgoing shipments from APZU's central warehouse to health facilities; and tracks requests from health facilities. The system provides data visibility that helps plan orders and the distribution of medications, consumables, and equipment.	Supply chain	CDC, PEPFAR	PIH	Open source	Subnational
CAD4TB	Computer-Aided Detection for Tuberculosis (CAD4TB) is software designed to help non-experts detect and diagnose tuberculosis more accurately and cost-effectively using digital X-rays, machine learning, and remote expertise. This solution has been adapted in other countries to triage COVID-19 suspected cases and is able to use artificial intelligence on chest X-rays. The CAD4COVID is a free solution that supports triaging in resource-constrained settings and high-prevalence areas.	Diagnostic tools	Global Fund	Delft Imaging	Commercial	National
emmunize	Emmunize is a pilot project that provides a digital vaccination record for each child. Emmunize enables health workers to keep records and plan for follow-up. It also includes temperature sensors to monitor the cold chain and ensure that tainted vaccines are not used.	Vaccine delivery and planning	GIZ, Green Cooling Initiative, SolarChill	emmunize	Open source	
GxAlert	GxAlert is a digital platform that facilitates country-level surveillance of viral loads by allowing data to flow across the health system. In Malawi, SystemOne's Aspect platform is used to transmit HIV viral load results from the central laboratory directly to the referring clinics in real-time.	Diagnostic tools	PEPFAR	SystemOne	Commercial	National
Health Network Quality Improvement System (HNQIS)	The HNQIS app efficiently allocates resources dedicated to supervision visits within health care networks where and when they are needed most. HNQIS is an interactive tool composed of four modules designed to help quality assurance officers by 1) planning their supervision visits to providers, 2) assessing providers' performance in service provision, 3) improving providers' knowledge and skills, and 4) monitoring providers' performance over time.	Health facility and provider administration	FCDO, USAID	PSI	Open source	Subnational
iHRIS	iHRIS is free, open source software that helps countries around the world track and manage their health workforce data to improve access to services. Countries use it to capture and maintain high-quality information for health workforce planning, management, regulation, and training. In Malawi, iHRIS is used by the MOH to manage the health workforce and the MOGCSW to manage the social service workforce.	Health facility and provider administration, vaccine delivery and planning	USAID	Abt Associates, MOH, MSH	Open source	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	USAID	Abt Associates	Open source	National
Malawi Breakthrough ACTION for ending child early and forced marriage (DHIS2)	Malawi Breakthrough ACTION is using DHIS2 as a routine M&E database with mobile implementation using tablets through the off-the-shelf DHIS2 Android Capture app to document community-based activities related to child early and forced marriage.	Risk communication and community engagement	USAID	CRECCOM, GENET, JHU Center for Communication Programs, Save the Children	Open source	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
Malawi German Health Programme (MGHP) (DHIS2)	The MGHP has several digital interventions with a focus on reproductive health, including an eRegister platform in 10 health facilities and implementation of infrastructure to enable data capture from health centers directly into DHIS2 in the 40 MGHP health facilities. MGHP also facilitates the Quality of Care and Performance Index of MOHP, extends the Government Wide Area Network (GWAN) to select health facilities, and promotes data use for decision support through the quality improvement and work improvement support teams in health facilities. The MGHP strengthens digital governance and digital leadership at national level, including contribution to the drafting of the digital health strategy, defining of national health indicators, and drafting of standard operating procedures for HIS.	Case management, contact tracing, coordination and operations (including emergency operations centers), diagnostic tools, event-based surveillance, laboratory systems, One Health, points-of-entry, routine surveillance, supply chain, vaccine delivery and planning	Gates Foundation	GIZ, GOPA Worldwide Consultants	Open source	Subnational
Malawi HIS (eRegister) app (OpenSRP)	OpenSRP is an mHealth platform built to enable data-driven decision-making at all levels of the health system that can work offline. OpenSRP supports the health worker to prioritize point-of-care tasks, track service delivery, and simplify reporting. The Malawi eRegister platform is an OpenSRP-based application used primarily by health workers based in facilities (e.g., nurses, midwives) to register and track patients through the health system and as they access services at the health facility.	Case management, contact tracing, diagnostic tools, event-based surveillance, health facility and provider administration, learning and training, routine surveillance, supply chain, vaccine delivery and planning	GIZ	HISP Malawi, Jembi	Open source	Subnational
MESH-QI (Commcare)	MESH-QI is an enhanced supervision approach with a focus on the training of clinical officers and nurses employed by the MOH. MESH-QI has a series of checklists incorporated into CommCare-based applications for antenatal care, malaria, and other clinical areas to improve training outcomes.	Learning and training	Doris Duke Charitable Foundation	MOH, PIH	Open source	Subnational
One Community (One C) (CommCare)	One C is an integrated HIV activity that aims to mitigate the impact of HIV and prevent new infections among targeted Malawian priority populations. One C uses a comprehensive community platform to deliver targeted and integrated HIV care and support, impact mitigation, prevention services, and capacity building/ system strengthening activities.	Learning and training	PEPFAR	Global AIDS Interfaith Alliance, JHU Center for Communication Programs, One C, Plan International, Project HOPE	Open source	Subnational
Sanitas	Sanitas is an HMIS that provides automation for hospital administration and patient care processes to streamline day-to-day activities at health facilities. Its benefits include timesaving operations, enhanced administration and control, superior patient care, strict cost control, and improved profitability, while maintaining compliance with regulatory bodies and quality processes.	Case management		Fortis Innovations, PSI	Commercial	Subnational
Surveda	Surveda allows for the collection of survey data from populations via mobile phone (i.e., SMS, voice call) and web. In Malawi, Surveda has been used for national surveys for noncommunicable disease risk factors using multimodal (i.e., SMS, IVR, chatbot) data collection.	Routine surveillance	Bloomberg Philanthropies	CDC, CDC Foundation, InSTEDD, RTI International	Open source	Subnational
VigiFlow	VigiFlow is a management system for recording, processing, and sharing reports of adverse effects for medical products. Malawi became a member of the WHO's Program for International Drug Monitoring when it began using VigiFlow in 2019.	Laboratory systems, vaccine delivery and planning		Uppsala Monitoring Centre, WHO		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, MNCH, tuberculosis, HIV, pre-exposure prophylaxis (PrEP), etc. The tool has been validated to impact positive behavior change to improve health outcomes and save lives.	Case management, contact tracing, coordination and operations (including emergency operations centers), diagnostic tools, event-based surveillance, infection prevention and control, points of entry, risk communication and community engagement, routine surveillance, vaccine delivery and planning	CDC, CIHR, Grand Challenges Canada, IRAP, NIH, PEPFAR	FHI 360	Commercial	Subnational

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

At a glance

Figure 2 shows that Malawi's digital health tools rely on different software licensing types for sustainability with open source being the most common. Figure 3 demonstrates that Senegal has 27 digital health tools deployed on a national scale while 15 operate on a subnational scale. These figures are not specific to COVID-19 response, but provide an overall picture of Senegal's digital health infrastructure.

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

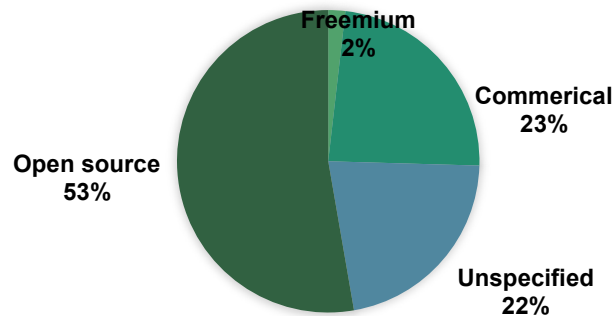
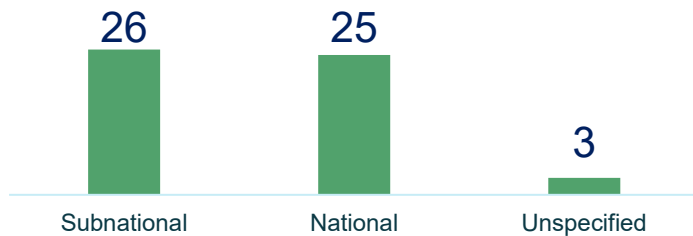






Figure 3. Number of digital tools deployed at scale in Malawi.



Conclusion

Digital Square mapped 54 existing, adaptable digital health tools in Malawi 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 Malawi'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 Malawi'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 Malawi's digital health systems and their role in the COVID-19 response by reviewing Malawi'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
Amref	African Medical and Research Foundation
CAD4TB	Computer-Aided Detection for Tuberculosis
CDC	Centers for Disease Control and Prevention
CHAI	Clinton Health Access Initiative
CIHR	Center for International Human Rights
CRECCOM	Creative Centre for Community Mobilization
CRS	Catholic Relief Services
DHD	District Health Department
DHIS2	District Health Information Software 2
eIDSR	Electronic Infectious Disease Surveillance and Response
EMR	electronic medical record
GENET	Girls Empowerment Network
GHSC-PSM	USAID Global Health Supply Chain–Procurement and Supply Management
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HIMS	health Information Management System
HIS	health information system
HISP	Health Information Systems Programme
HMIS	health management information system
HNQIS	Health Network Quality Improvement System
InSTEDD	Innovative Support to Emergencies Diseases and Disasters
IRAP	International Refugee Assistance Project
I-TECH	International Training and Education Center for Health
IVR	interactive voice response
JHU	Johns Hopkins University
M&E	monitoring and evaluation
MESH-QI	Mentorship and Enhanced Supervision for Health Care and Quality Improvement
MGHP	Malawi German Health Programme

Acronym	Definition
MNCH	maternal, newborn, and child health
MOGCSW	Ministry of Gender, Children and Social Welfare
MOH	Ministry of Health
MOHP	Ministry of Health and Population
MSH	Management Sciences for Health
NAC	National AIDS Commission
NIH	National Institutes of Health
Norad	Norwegian Agency for Development Cooperation
ODK	Open Data Kit
One C	One Community
ONSE	Organized Network of Services for Everyone's Health
OpenHIE	Open Health Information Exchange
OpenHIM	Open Health Information Mediator
OpenLMIS	Open Logistics Management Information System
OpenMRS	Open Medical Record System
OpenSRP	Open Smart Register Platform
PCI	Project Concern International
PEPFAR	US President's Emergency Plan for AIDS Relief
PIH	Partners in Health
PrEP	Pre-exposure prophylaxis
PSI	Population Services International
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WASH	water, sanitation, and hygiene
WHO	World Health Organization

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.