



Digital health systems to support pandemic response in Cote d'Ivoire

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

May 2021

IN THIS TECHNICAL BRIEF

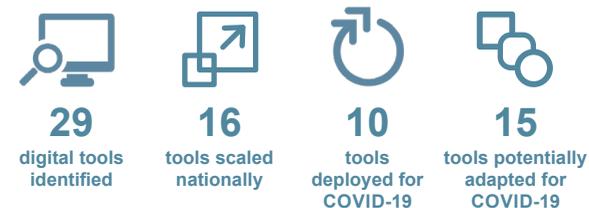
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Introduction

Cote d'Ivoire's government published an eHealth national strategic plan in 2011 describing disparities in access to health care between urban and rural areas. Its vision is to use information and communications technologies (ICTs) to ameliorate disparities so the health system can provide quality, efficient, fair, and affordable access to care for the entire population. The COVID-19 pandemic strained the health system, bringing a new level of urgency to the government's vision. Leveraging digital health tools is a rapid, cost-effective strategy to accelerate Cote d'Ivoire's COVID-19 response while at the same time strengthening the health system at large.

Background

Digital Square conducted a landscape analysis of Cote d'Ivoire's digital systems in the ten-year period from 2010–2020 with information validated by tool implementers and designers and digital health experts, 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 Cote d'Ivoire, map the tools already deployed for COVID-19 response to relevant uses cases, and highlight opportunities where existing tools can quickly be adapted and



Analysis overview

Map and Match's analysis found that Cote d'Ivoire's health system uses 29 digital health tools, with at least 10 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 Cote d'Ivoire's digital health system's response to COVID-19. The analysis identified five use cases without any tools supporting these functions, namely contact tracing, health facility and provider administration, learning and training, points of entry, and vaccine delivery and planning. Map and Match pinpointed tools that already exist in-country and are ready for adaptation to address these gaps. 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 Cote d'Ivoire.

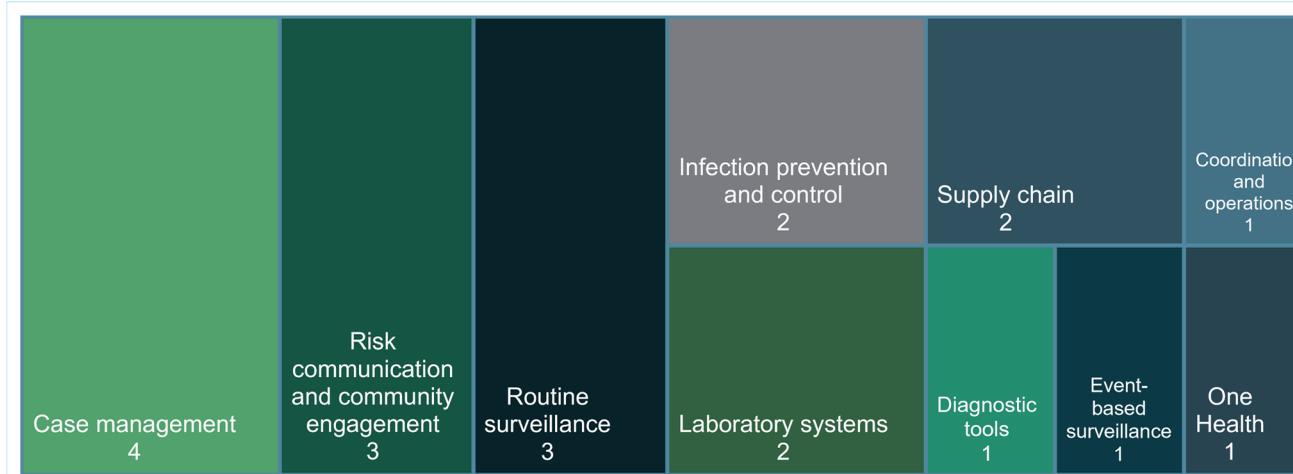


Figure 1 illustrates that many use cases are addressed using multiple tools in Cote d'Ivoire's COVID-19 response while other use cases are filled by a sole tool.

Digital Square and USAID attempted outreach efforts to the Ministry of Health and Public Hygiene (MSHP) to conduct a key informant interview to validate the data found in the Map and Match assessment, but were unsuccessful.

Table 1. Mapping and matching digital health tools to strengthen Cote d'Ivoire'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 Cote d'Ivoire's COVID-19 response. Digital Square matched opportunities for tool adaptation across the pandemic use cases in **green** to reveal places where Cote d'Ivoire 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	CommCare	Blue	Green			Green	Green	Green	Green		Green	Green				
	DataToCare	Blue				Blue								Blue		
	eSIGL (Système d'Information Electronique de Gestion Logistique [OpenLMIS])														Blue	
	Open Enterprise Laboratory Information System (OpenELIS)					Green			Blue			Green				
	QuickRes	Blue														
	RECOVR (ODK)			Blue												
	Rumor Management System (DHIS2)									Blue			Blue	Blue		
	Saved by Tech Foundation (local COVID-19 response drones)							Blue					Blue		Blue	
	Surveillance Outbreak Response Management and Analysis System (SORMAS)	Green	Green			Green			Green			Green		Blue		Green
	Wellvis COVID-19 Triage Tool	Blue			Blue								Blue			
	AfriDoctor						Green									Green
	Cote d'Ivoire HMIS (DHIS2 + Tracker)	Green	Green	Green	Green	Green	Green		Green		Green	Green	Green	Green	Green	Green
	iHRIS						Green									Green
	Integrated Supportive Supervision (ISS) (ODK)	Green														Green
	Magpi					Green								Green		
	mSupply														Green	Green

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 Cote d'Ivoire'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	M-Vaccin															
	OpenMRS															
	Platform WhatsApp															
	SAGE															
	Trace Tube															
	UGA (Supply Management Unit)															
	U-Report															
	Vantage															
	VigiFlow															

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

The analysis identified existing digital tools that can be adapted to support COVID-19 response for several use case gaps below. Use case gaps are defined as use cases that have fewer than two tools addressing them. Map and Match's analysis found existing digital tools ready for adaptation to fulfill the nine use case gaps specific to Cote d'Ivoire. Many of these tools also provide opportunities to streamline the COVID-19 response across a range of use cases.

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

Contact tracing

CommCare	Cote d'Ivoire HMIS (DHIS2 + Tracker)
SORMAS	

Coordination and operations

RECOVER (ODK)	Cote d'Ivoire HMIS (DHIS2 + Tracker)
SORMAS	Vantage

Diagnostic tools

Wellvis COVID-19 Triage Tool	Cote d'Ivoire HMIS (DHIS2 + Tracker)
Trace Tube	

Event-based surveillance`

DataToCare	CommCare
Cote d'Ivoire HMIS (DHIS2 + Tracker)	Magpi
OpenELIS	OpenMRS
SORMAS	

Health facility and provider administration

AfriDoctor	CommCare
Cote d'Ivoire HMIS (DHIS2 + Tracker)	iHRIS

Learning and training

CommCare

One Health

Rumor Management System (DHIS2)	Cote d'Ivoire HMIS (DHIS2 + Tracker)
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Points of entry

CommCare	Cote d'Ivoire HMIS (DHIS2 + Tracker)
OpenELIS	SORMAS

Vaccine delivery and planning

AfriDoctor	Cote d'Ivoire HMIS (DHIS2 + Tracker)
iHRIS	Integrated Supportive Supervision (ODK)
mSupply	M-Vaccin
OpenMRS	SORMAS

Examples of a global good adapted and deployed for COVID-19 response in Cote d'Ivoire

SORMAS

Surveillance Outbreak Response Management & Analysis System (SORMAS) is open source software that processes disease control and outbreak management procedures. SORMAS also provides real-time digital surveillance of peripheral health care facilities and laboratories, which facilitates early detection of outbreaks. SORMAS's ability to validate real-time surveillance data enables COVID-19 contact tracing while monitoring the potential for future cases. SORMAS offers easy-to-use, multifunctional mobile health (mHealth) and electronic health (eHealth) applications, which are compatible with standard surveillance systems.

Many countries, including Afghanistan, Burkina Faso, Cote d'Ivoire, Fiji, Ghana, Kenya, Nepal, Nigeria, Tanzania, and Togo, deployed SORMAS adaptations for COVID-19. For example, Ghana and Nigeria activated a module they are using at points of entry such as airports and harbors, covering a population of more than 85 million.



- Case management
- Coordination and operations
- Contact tracing
- Event-based surveillance
- Laboratory systems
- Points of entry
- Routine 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
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. CommCare is used in Cote d'Ivoire by frontline health workers to manage chronic care for people living with HIV. With the recent adoption of CommCare by MSHP, the system will be synchronized with the Ministry's SIGDEP facility-based electronic health record.	Case management, contact tracing, event-based surveillance, health facility and provider administration, infection prevention control, laboratory systems, learning and training, points of entry, risk communication and community engagement	PEPFAR	Jhipiego, MSHP	Open source	
DataToCare	DataToCare is a suite of integrated applications that collects and disseminates diagnostic and surveillance data from remote laboratories to regional and national stakeholders. It allows medical teams access to the data for decision-making. The DataToCare desktop is installed across Cote d'Ivoire in laboratories to collect and transfer diagnostic data and send via internet or SMS to the central server. The DataToCare server computes diagnostic or epidemiological data from points of care and remote laboratories. Data on the central server is used to create a dashboard that provides national/regional/provincial overviews of the data in real time. DataToCare also allows notification of the test results to clients via SMS as soon as the tests results are available and validated by the operator.	Case management, event-based surveillance, laboratory systems, routine surveillance	WHO	Savics, WHO	Proprietary	National
eSIGL (Système d'Information Electronique de Gestion Logistique [OpenLMIS])	eSIGL is a full-featured electronic LMIS deployed at scale using the OpenLMIS platform. OpenLMIS is a powerful, open source, cloud-based eLMIS 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 startup tool to help countries manage COVID-19-related commodities based on the WHO product list. Cote d'Ivoire adapted this tool for COVID-19 response.	Supply chain	Gates Foundation, USAID	JSI, MEASURE Evaluation, MSHP, VillageReach	Open source	National
Open Enterprise Laboratory Information System (OpenELIS)	OpenELIS is global open source software. It serves as a laboratory information system tailored for public health laboratories in resource-constrained settings to support best laboratory practices and accreditation. OpenELIS can work offline and is available in English and French. OpenELIS Global added COVID-19 metadata to support laboratory systems. It focuses on interoperability by including LOINC codes. Users can immediately use the adaptations in the software to add tests for SARS-CoV-2 to their laboratory test catalog to facilitate tracking of laboratory tests and results.	Event-based surveillance, laboratory systems, points of entry	CDC, Digital Square, MSHP, PEPFAR	EGPAF, Fondation Ariel Glaser Cote D'Ivoire, I-TECH, MSHP	Open source	National
QuickRes	QuickRes is an online application that allows any member of the public to easily make reservations for health services using a smartphone, tablet, or laptop. It builds on the existing Online Reservation App software.	Case management	PEPFAR, USAID	FHI 360	Open source	National
RECOVR (ODK)	Tracking how people's lives are affected by the COVID-19 pandemic can enable policymakers to better understand the situation in their countries and make data-driven policy decisions. To respond to this need, RECOVR survey can be deployed as a panel survey that will facilitate comparisons, document real-time trends of policy concern, and inform decision-makers about the communities that are hardest hit by the economic toll of the pandemic.	Coordination and operations	Gates Foundation, Northwestern University's Global Poverty Research Lab, UBS Optimus Foundation	IPA, SurveyCTO	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
Rumor Management System (DHIS2)	This DHIS2-based system collects rumors and misinformation from national hotlines. The data are entered into a standard rumor log and coded by district, date, source, topic, and "belief statements." Then, the data are organized onto dashboards for presentation to the national technical working group on risk communication. Though the Rumor Management System was originally developed for priority zoonotic diseases/One Health initiatives, it has been used almost exclusively for COVID-19 because it launched in February 2020. The Rumor Management System tracks COVID-19 rumors submitted to hotlines. Cote d'Ivoire also engaged community-based contributors as listeners to submit reportable rumors as part of a dynamic listening and rumor management process.	One Health, risk communication and community engagement, routine surveillance	USAID	Johns Hopkins Center for Communication Programs	Open source	National
Saved by Tech Foundation (local COVID-19 response drones)	Saved by Tech is an Ivorian foundation led by three local companies that specialize in drone design. The foundation developed three prototypes of drones for specific uses to tackle COVID-19. One can be used to measure temperature using a thermic camera, the second to transport 20 liters of liquid solution to sanitize more than 70 hectares of public spaces in one day, and the third is equipped with a megaphone to spread prerecorded/live messages in rural areas on how to prevent COVID-19.	Infection prevention and control, risk communication and community engagement, supply chain	Saved By Tech	Drone We Fly Agri, Investiv	Proprietary	
Surveillance Outbreak Response Management and Analysis System (SORMAS)	SORMAS is open source software that processes disease control and outbreak management procedures. SORMAS also provides real-time digital surveillance of peripheral health care facilities and laboratories, which facilitates early detection of outbreaks. SORMAS's ability to validate real-time surveillance data enables COVID-19 contact tracing while monitoring the potential for future cases. SORMAS offers easy-to-use, multifunctional mobile health (mHealth) and electronic health (eHealth) applications, which are compatible with standard surveillance systems.	Case management, coordinations and operations, contact tracing, event-based surveillance, laboratory systems, points of entry, routine surveillance, vaccine delivery and planning	EU	MSHP	Open source	Subnational
Wellvis COVID-19 Triage Tool	Wellvis COVID-19 Triage Tool is an application that allows users to self-assess their COVID-19 risk category based on their symptoms and exposure history. It is free to users. The application also allows digital health care appointments that can be paid online.	Case management, diagnostic tools, infection prevention and control, risk communication and community engagement	Lagos Innovates, Vouchery	Wellvis Health	Open source	
AfriDoctor	AfriDoctor is an online platform that digitizes patients' care paths and brings health providers closer to their patients. The platform allows patients to book online appointments with their providers and receive free SMS reminders. The platform gives providers a calendar management tool, invoicing and medical records management tool, and visibility/referencing of health structures.	Health facility and provider administration, vaccine delivery and planning	Ecare Group, Investisseurs Privé	Aucun, Ecare Groupe	Proprietary	National
Cote d'Ivoire HMIS (DHIS2 + Tracker)	Cote d'Ivoire's HMIS is a deployment of DHIS2. DHIS2 is an open source, web-based platform, typically used as a national health information system for data management and analysis purposes, for health program monitoring and evaluation, facility registries and service availability mapping, logistics management, and mobile tracking of pregnant mothers in rural communities. DHIS2 supports the collection, analysis, visualization, and sharing of both aggregate and individual-level data, including mobile and offline data collection using the DHIS2 Android app. DHIS2 is deployed in more than 70 countries.	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	DHIS2, Gavi, Global Fund, Norad	HISP West Central Africa, MEASURE Evaluation, MSHP	Open source	National
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.	Health facility and provider administration, vaccine delivery and planning	USAID	JSI	Open source	National
Integrated Supportive Supervision (ISS) (ODK)	ISS is an electronic checklist used for supervision during the active case search and routine immunization.	Case management, vaccine delivery and planning			Open source	National
Magpi	Magpi is a web-enabled mobile phone application used by volunteers to conduct house visits with a uniform approach and package of messages. Volunteers document the house visits in Magpi so that information is relayed to all campaign management levels. MSHP implemented a robust system of community-based disease surveillance incorporating both Magpi mobile data collection as well as SMS-based reporting using Frontline SMS. The epidemiologic surveillance officers enter suspected cases of diseases into the Magpi website server, which operates as a private, cloud-based mobile application.	Event-based surveillance, routine surveillance	CDC	CDC, MSHP	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
mSupply	mSupply can be used for any combination of inventory management, displaying aggregated data on dashboards, patient recording of dispensing of vaccines (including calculating vaccination rates and producing a list of people to send SMS reminders), cold chain equipment monitoring using Bluetooth sensors, adverse drug reaction recording, and more.	Supply chain, vaccine delivery and planning	Global Fund, World Bank	MSHP, mSupply Foundation	Open source	National
M-Vaccin	The M-Vaccin Côte d'Ivoire project uses Orange's mobile technology to inform parents about the importance of vaccination by sending text and voice messages in local languages. Targeted messages also help ensure parents do not miss immunization sessions by reminding them of their children's schedule and dates.	Vaccine delivery and planning	Gavi, Orange	Gavi, MSHP, Orange, VillageReach	Proprietary	National
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.	Case management, event-based surveillance, vaccine delivery and planning	USAID	JSI, MEASURE Evaluation	Open source	National
Platform WhatsApp	WhatsApp Messenger, or simply WhatsApp, is a US-based freeware, cross-platform centralized messaging and voice-over-IP service owned by Facebook, Inc. It allows users to send text messages and voice messages, make voice and video calls, and share images, documents, user locations, and other content.	Risk communication and community engagement	USAID		Open source	National
SAGE	SAGE is an enterprise resource planning system to locate product stocks and record stock movements. SAGE distributes health products to 82 health districts and ~200 of the largest health facilities on a monthly or biweekly basis.	Supply chain		NPSP		National
Trace Tube	Trace Tube ensures the traceability of collection tubes to speed up the process of processing and obtaining the results of the tests.	Case management, diagnostic tools, laboratory systems, routine surveillance		MSHP		
UGA (Supply Management Unit)	This digital tool had limited information available in the analysis, but it addresses the supply chain.	Supply chain		Pasteur Institute of Cote d'Ivoire		
U-Report	U-Report is a messaging tool that empowers young people around the world to engage with and speak out on issues that matter to them. It works by gathering opinions and information from young people on topics they care about—ranging from employment to discrimination and child marriage. U-Reporters respond to polls, report issues, and support child rights. The data and insights are shared back with communities and connected to policymakers who make decisions that affect young people. 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.	Risk communication and community engagement	UNICEF	UNICEF	Open source	Subnational
Vantage	Vantage is an AI-enabled cloud platform that empowers health care workers to make decisions. The cloud-based platform is able to instantaneously analyze data and communicate findings and direct meaningful actions through automatically generated dashboards and targeted push notifications.	Coordination and operations		BroadReach	Proprietary	
VigiFlow	VigiFlow is a management system for recording, processing, and sharing individual case safety 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 facilitates effective data analysis and is used by national pharmacovigilance centers of the WHO Programme for International Drug Monitoring.	Laboratory systems	WHO	UMC	Open source	Subnational

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

At a glance

Figure 2 shows that Cote d'Ivoire's digital health tools rely on different software licensing types for sustainability with open source being the most common. Figure 3 demonstrates that Cote d'Ivoire has 16 digital health tools deployed on a national scale while 4 operate on a subnational scale. These figures are not specific to COVID-19 response, but they provide an overall picture of Cote d'Ivoire's digital health infrastructure.

Figure 2. Software licensing types of Cote d'Ivoire's digital health tools.

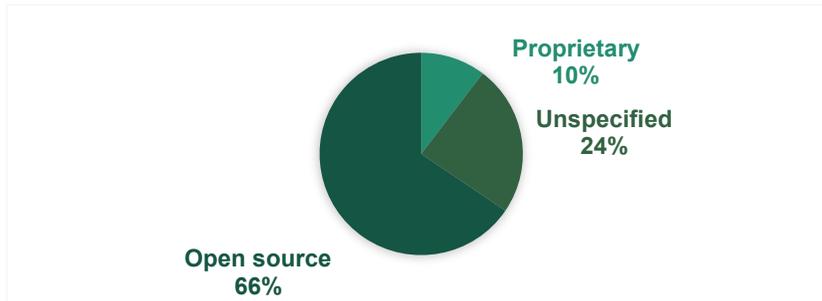
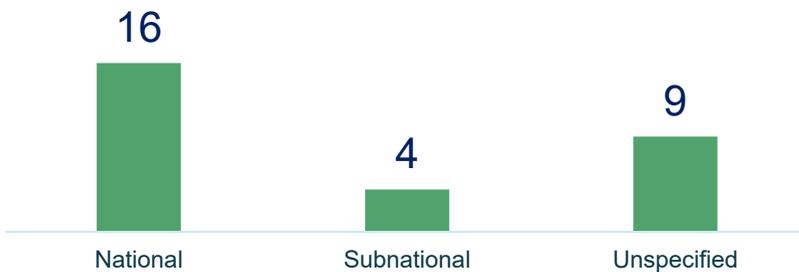


Figure 3. Number of digital tools deployed at scale in Cote d'Ivoire.



Conclusion

Digital Square mapped 29 existing, adaptable digital health tools in Cote d'Ivoire 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 Cote d'Ivoire'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 Cote d'Ivoire'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 Cote d'Ivoire's digital health systems and their role in the COVID-19 response by reviewing Cote d'Ivoire'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
CDC	US Centers for Disease Control and Prevention
DHIS2	District Health Information Software 2
EGPAF	Elizabeth Glaser Pediatric AIDS Foundation
EU	European Union
Gavi	Gavi, the Vaccine Alliance
HISP	Health Information Systems Programme
ICT	information and communications technology
IPA	Innovations for Poverty Action
JSI	John Snow, Inc.
LOINC	Logical Observation Identifiers Names and Codes
MSHP Hygiene	Ministere de la Sante et de l'Hygiene Publique / Ministry of Health and Public
Norad	Norwegian Agency for Development Cooperation
NPSP	Nouvelle Pharmacie de la Santé Publique / Public Health Pharmacy
PEPFAR	US President's Emergency Plan for AIDS Relief
SORMAS	Surveillance Outbreak Response Management and Analysis System
UMC	Uppsala Monitoring Centre
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
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.