

Digital health systems to support pandemic response in Senegal

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

April 2021

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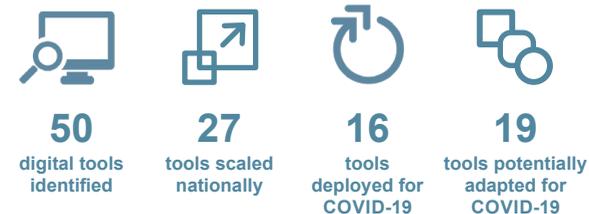
Introduction

Senegal's government prioritizes digital health. The Ministry of Health and Social Action (MSAS) developed the *Digital Health Strategic Plan: 2018–2023*, which is a roadmap outlining Senegal's priorities to transform its digital health systems from largely fragmented, partially paper-based systems to a robust, interoperable, digitized system.

Background

Digital Square conducted a landscape analysis of Senegal's digital systems in the ten-year period from 2010–2020 with information validated by tool implementers and designers, digital health experts, and MSAS stakeholders as part of the USAID-funded Map and Match project.

The purpose was to identify the existing digital tools utilized in Senegal, 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

Senegal's health system utilizes approximately 50 digital health tools with at least 16 that are 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 Senegal's digital health systems response to COVID-19.

Map and Match analysis revealed use case gaps in coordination and operations, diagnostic tools, laboratory systems, learning and training, One Health, supply chain, and vaccine delivery and planning. 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 Senegal.

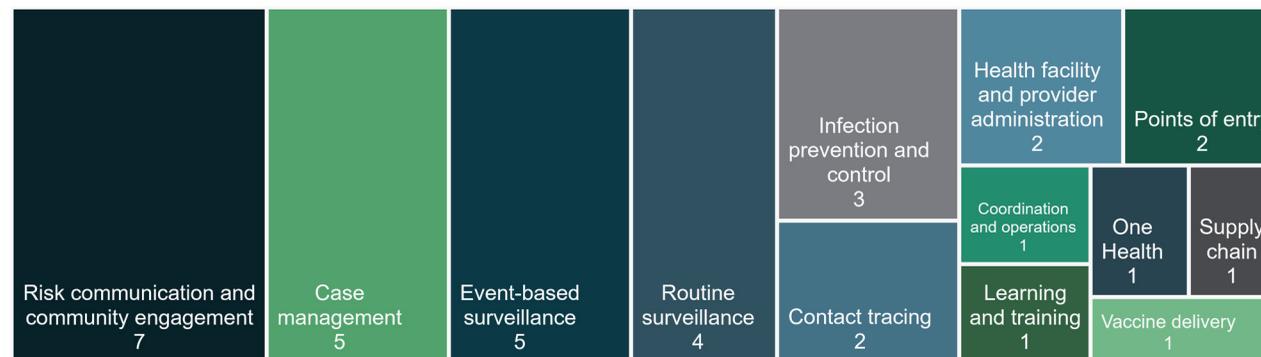


Figure 1 illustrates that many use cases are addressed using several tools in Senegal's COVID-19 response while other use cases are filled by a sole tool. Use case gaps are defined by those which have fewer than two tools addressing them.

Table 1. Mapping and matching digital health tools to strengthen Senegal’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 Senegal’s COVID-19 response. Digital Square matched opportunities for tool adaptations across the pandemic use cases in **green** to reveal places where Senegal 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	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	Arr Leen (CommCare)		Blue								Blue					
	Covid-19.gouv.sn platform					Blue						Blue				
	EYONE MEDICAL	Blue			Green		Blue		Green			Green		Green	Green	
	healthsites.io (ODK Collect)						Blue					Blue		Green		
	mHero (iHRIS, RapidPro)	Blue											Blue			
	Parsyl														Blue	Blue
	Plateforme de gestion des alertes communautaires "Daan-Covid" (Community alert management platform)	Blue		Blue		Blue		Blue				Blue	Blue	Blue		
	Plateforme Nyss		Green			Blue								Blue		
	RapidPro		Green	Green	Green			Blue	Green	Green	Blue	Green	Blue			
	Safe Delivery App									Blue						
	Senegal COVID-19 Dashboard (ESR)												Blue			
	Senegal HMIS (DHIS2 with Tracker)	Blue	Blue			Blue			Green			Green		Blue		
	UN Senegal COVID-19 Situation					Blue										
	U-Report (RapidPro)												Blue			
	Viamo					Green				Green			Blue			
	Wellvis COVID-19 Triage Tool	Blue						Blue								
	AfriDoctor	Green														Green
	CommCare	Green	Green		Green	Green	Green			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 Senegal’s COVID-19 response, continued.

		PANDEMIC USE CASES														
		Case management	Contact tracing	Coordination and operations	Diagnostic tools	Event-based surveillance	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	Comptes nationaux des personnels de santé (CNPS)						■									
	DMPA-SC eLearning and videos for health workers								■							■
	iHRIS						■					■				
	ODK	■	■				■					■	■			
	ODK Collect												■			
	Plateforme d'apprentissage en ligne du MSAS (MSAS eLearning platform)											■				
	Reveal (OpenSRP)															■
	Senegal immunization supply chain (Logistimo)															■
	Tableau Server					■								■		
	The Challenge Initiative University (TCI-U)									■						
	VectorLink’s Dimagi CommCare						■									
	VectorLink’s ODK Aggregate									■						

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

"The purpose of using digital health tools is to collect data in real time that are complete and exhaustive for decision-making at the national level. Our current challenge is that we have a few tools being used in parallel but in a disconnected manner."

—Oumou Kalsom Diallo, National Health Information Service, MSAS, Planning, Research, and Statistics Department

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 use cases gaps below. Use case gaps are defined as those which have less 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.

Coordination and operations		Learning and training	
Plateforme de gestion des alertes communautaires "Daan-Covid"	RapidPro	Safe Delivery App	DMPA-SC eLearning and videos for health workers
Diagnostic tools		eLearning and videos for health workers	Plateforme d'apprentissage en ligne du MSAS
CommCare	Eyone Medical	RapidPro	The Challenge Initiative University (TCI-U)
RapidPro		Viamo	
Laboratory systems		Supply chain	
CommCare	Eyone Medical	Parsyl	CommCare
RapidPro	Senegal HMIS	Eyone Medical	healthsites.io
One Health		Vaccine delivery and planning	
RapidPro		Parsyl	AfriDoctor
		DMPA-SC eLearning and videos for health workers	Eyone Medical
		Reveal	Senegal immunization on supply chain

"COVID did not change our strategies or objectives for digital health. COVID just slowed down our programs and we had to move trainings to virtual online sessions instead of holding them in-person. We have worked on the weekends to train people on how to use digital tools based on their limited availability."

—Oumou Kalsom Diallo, National Health Information Service, MSAS, Planning, Research, and Statistics Department

Example of a global good adapted and deployed for COVID-19 response in Senegal

Senegal's HMIS (DHIS2 with Tracker)

Senegal's HMIS is built on DHIS2, which 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.

DHIS2 has several ready-to-install digital data packages to support COVID-19 surveillance and response based on WHO guidelines. DHIS2 has a COVID-19 Surveillance Event Program (i.e., an event-based surveillance program), which is a simplified line list to capture a subset of minimum critical data points to facilitate rapid analysis and response. DHIS2 strengthens contact tracing by enabling identification and follow-up of contacts of a suspected or confirmed COVID-19 case. COVID-19 case-based surveillance enrolls and tracks suspected cases; captures symptoms, demographics, risk factors, and exposures; creates lab requests and captures laboratory data about the case; links confirmed cases with contacts; and monitors patient outcomes.

MSAS adapted Tracker in DHIS2 for the surveillance of COVID-19 cases in March 2020. The early adaptations for Tracker included the enrollment and follow-up of suspected cases, capture of symptoms for suspected and confirmed cases, and the strengthening of active case detection through contact tracing activities. In March 2021, MSAS requested implementation of Tracker modules for the COVID-19 vaccine in all health facilities.



Case management

Contact tracing

Event-based surveillance

Laboratory systems

Points of entry

Routine surveillance

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
Arr Leen (CommCare)	Arr Leen is a platform used by community health workers and chief nurses (ICPs) to monitor pregnant women and children under the age of 18 via an mHealth application and dashboard modules. Arr Leen has been adapted by adding a COVID-19 component to detect, trace, and monitor cases at the community level.	Contact tracing, points of entry	Africare, Dimagi, Foundation Kempers	PanAfricare	Open source	Subnational
Covid-19.gouv.sn platform	Covid-19.gouv.sn is a platform that provides reliable information on COVID-19 (e.g., practical guidance, awareness videos) and statistics on the spread of the virus via an interactive dashboard showing data for each locality. Individuals can also report a case of infection via the covid19.gouv.sn platform.	Event-based surveillance, risk communication and community engagement		MSAS		National
EYONE MEDICAL	EYONE MEDICAL is an end-to-end hospital management application that allows patients to interact with health professionals and have their up-to-date digital medical records at any time and in any place. This application includes an adaptation by digitizing patient files related to COVID-19 (e.g., case investigation forms, Form A1, hospitalization data, care and treatment, follow-up, case statistics). It is used in the COVID-19 treatment centers of Diamniadio, Dalal Jam, and Hogip.	Case management, diagnostic tools, health facility and provider administration, laboratory systems, risk communication and community engagement, supply chain, vaccine delivery and planning		BMC Audit and Consulting, Ministry of Interior, Polyclinique Magori, UNACOIS	Commercial	National
healthsites.io (ODK Collect)	Healthsites.io is a digital application to assist when a natural disaster and/or disease outbreak occurs. These events trigger a rush to establish accurate health care location data that can be used to support people on the ground. Often, valuable time is wasted establishing accurate and accessible baseline data. Healthsites.io provides this outbreak data and the tools necessary to upload, manage, and make the data easily accessible.	Health facility and provider administration, risk communication and community engagement, supply chain	Digital Square, Gates Foundation, Humanitarian Open Street Map	eHealth Africa, government, Open Street Map Senegal, PATH	Open source	National
mHero (iHRIS, RapidPro)	mHero is a two-way, mobile phone-based communication platform that uses basic text messaging, or SMS, to connect ministries of health and health workers. mHero operates on simple talk-and-text mobile devices—no smartphone or tablet required. Messages can be customized for health workers based on cadre, location, or skill set. mHero has basic data collection capabilities, but it is not a structured data collection platform.	Case management, routine surveillance	Johnson & Johnson, UNICEF, USAID	COUS, IntraHealth, Jokkolabs, UNICEF	Open source	National
Parsyl	Parsyl is currently working in Senegal and Uganda. Vaccines require strict temperature control to remain potent and effective. Parsyl monitors vaccines to ensure they reach clients safely by providing insights from granular data about environmental conditions experienced during shipment and in storage to inform and encourage supply chain best practices. The deployment in Senegal tracks the transportation conditions for vaccines specifically.	Supply chain, vaccine delivery and planning		Freight In Time, MSAS, GAVI, PATH,	Commercial	Subnational
Plateforme de gestion des alertes communautaires "Daan-Covid" (Community alert management platform)	"Daan-Covid" is a digital platform that addresses many pandemic use cases. Community members and health workers (specifically from the National Service of Health Education and Information [SNEIPS] and the Medical Assistance and Emergency Service [SAMU]) can call the alert unit, which operates round-the-clock to report suspected COVID-19 cases. Teleoperators receive the calls and enter the information into the platform, tagging them as an event. Doctors, pharmacists, and dental surgeons validate the events by requesting additional information from the individual who reported the events. Once confirmed, the events become validated alerts. Validated alerts are sent to districts for investigation. If districts confirm the alerts, they become suspected cases that are entered into the platform. "Daan-Covid" is integrated with the Integrated Disease Surveillance and Response (SIMR) system.	Case management, coordination and operations, event-based surveillance, infection prevention and control, points of entry, risk communication and community engagement, routine surveillance	WHO	MSAS, UNICEF		National
Plateforme Nyss	Plateforme Nyss is a community-based surveillance software platform that allows for real-time detection, reporting, aggregation, and analysis of information on community health risks. It enables prevention, identification, and response to disease outbreaks through early warning and early response. Nyss has enabled Senegal to detect several cases of COVID-19 at an early stage.	Contact tracing, event-based surveillance, routine surveillance	Belgian Development Cooperation (DGD), Belgian Red Cross	Belgian Red Cross, Burkina Faso Red Cross, Senegal Red Cross	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
RapidPro	RapidPro is an open source platform that allows anyone to build interactive messaging systems using an easy visual interface. RapidPro helped Senegal explore the impact of COVID-19 on birth registration in 40 civil registry centers in the Kolda region where civil status agents observed a reduction in the inflow of users in their centers. Senegal is using RapidPro and mInfoSante in Saint-Louis and Tambacounda regions to conduct surveillance of priority human and zoonotic diseases at the community level.	Contact tracing, coordination and operations, diagnostic tools, infection prevention and control, laboratory systems, learning and training, One Health, points of entry, risk communication and community engagement	USAID	COUS, ICF, International, IntraHealth International, Johns Hopkins University, PATH	Open source	National
Safe Delivery App	The Safe Delivery App supports skilled birth attendants to quickly diagnose issues in pregnancy and with newborns, offering step-by-step guidelines to perform a treatment. It is free to download and can be preinstalled so that providers can watch the animated instruction videos and read the action cards and drug lists whether they have Wi-Fi or not. The Safe Delivery App includes the adaptation of a COVID-19 content module that provides skilled birth attendants (e.g., midwives) with key information, animated video instructions, and checklists to support them to limit the spread of COVID-19 in the health facilities, including information on infection prevention, breastfeeding, and vertical transmission.	Learning and training	Gates Foundation, Merck for Mothers	Denmark's Maternity Foundation, University of Copenhagen, University of Southern Denmark	Open source	
Senegal COVID-19 Dashboard (ESRI)	MSAS's website features the Senegal's COVID-19 Dashboard, which visualizes the national and subnational situation such as the number of confirmed, recovered, and fatal cases. The website also includes COVID-19 situational reports of the country.	Risk communication and community engagement		MSAS, Social Action of the Republic of Senegal	Open source	National
Senegal HMIS (DHIS2 with Tracker)	Senegal's HMIS uses DHIS2 as the reference platform for collecting health information in Senegal. It is deployed at the national level and is used by all the system providers. DHIS2 collects individual data on diseases such as HIV and COVID-19. DHIS2 is also used to manage laboratory data. Senegal has implemented the DHIS2 Tracker version, which includes the following packages used to collect aggregate data: data quality application, EPI data, HIV data, malaria data, and tuberculosis data. DHIS2 Tracker is used in Senegal to address COVID-19 and other prevalent diseases (e.g., meningitis, cholera, TB, malaria, HIV, polio myelitis, measles). DHIS2 has adapted a COVID-19 digital data package to accelerate case detection, situation reporting, active surveillance, and response in countries. The COVID-19 digital data package includes standard metadata aligned with the WHO's technical guidance on COVID-19 surveillance and has been adapted to local country context and language in this implementation.	Case management, contact tracing, event-based surveillance, laboratory systems, points of entry, routine surveillance	BID, DSME, NORAD, PATH, PNL	HISP West and Central Africa, MSAS, PATH/MACEPA	Open source	National
UN Senegal COVID-19 Situation	The UN Senegal COVID-19 Situation dashboard visualizes the national and subnational COVID-19 situation in Senegal.	Event-based surveillance, rapid response teams, case investigation	United Nations Senegal	United Nations Senegal	Open source	National
U-Report (RapidPro)	U-Report is an mHealth application developed to provide real-time mobile counseling and conducting of coordinated polls on HIV/AIDS among adolescents and young people. U-Report was used to survey the youth about their willingness to volunteer during the COVID-19 pandemic.	Risk communication and community engagement	UNICEF	Ministry of Youth, Employment and Citizen Construction, UNICEF	Open source	National
Viamo	Viamo leverages existing mobile infrastructure and local partnerships to provide mobile solutions that can be scaled nationally within weeks to effectively respond to rapidly evolving health emergencies such as COVID-19. Viamo exists to share critical information on prevention and treatment, curb panic, and correct rapidly spreading misinformation regarding the outbreak. Existing technology integrations in-country can be used to reach any mobile subscriber on any network to disseminate crucial information in targeted regions and to vulnerable populations. Viamo includes the following COVID-19 services: national and regional awareness campaigns, mobile surveys, social media chatbots, COVID-19 case reporting hotline, COVID-19 support call center, outbreak mapping and data visualizations, and remote training for health workers.	Learning and training, risk communication and community engagement	GIZ, USAID, World Bank		Commercial	

 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
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, infection prevention and control			Commercial	
AfriDoctor	AfriDoctor is an online platform that digitizes the patients' care paths and brings the health providers closer to their patients. The platform allows the patients to book online appointments with their providers and receive free SMS reminders. The platform provides providers with a calendar management tool, invoicing and medical records management tool, and visibility/referencing of health structures.	Case management, vaccine delivery and planning	eCare Group	eCare Group	Commercial	National
CommCare	The National Malaria Control Program (PNLP) uses the CommCare mobile application to carry out surveillance and track malaria cases. Providers send SMS messages from their mobile phones to monitor key indicators weekly at the health center level. The SMS messages sent from the field are compiled at the central level of the PNLN in Dakar and at the regional level where the agents can see, download, and process the data. The PNLN also uses a CommCare application to monitor the use and stock of antimalarial products by nurses at health centers in the Kolda region via weekly SMS messages. PNLN is exploring plans with Dimagi to extend this use to the Saint-Louis region and to integrate the data from the system into DHIS2.	Case management, contact tracing, diagnostic tools, event-based surveillance, health facility and provider administration, laboratory systems, supply chain	Grand Challenges International, PMI, PNLN	Abt Associates, Africare, Plan International, RTI International	Open source	Subnational
Comptes nationaux des personnels de santé (CNPS)	The National Health Workforce Accounts (CNPS) is a WHO-supported platform to make available all data on health human resources, ranging from training, labor market analysis, availability and distribution of health personnel to performance, health system information and management of this personnel, customer satisfaction, and exit from the labor market.	Health facility and provider administration	MSAS, USAID	MSAS	Open source	National
DMPA-SC eLearning and videos for health workers	DPMA-SC eLearning and videos for health workers are digital training resources for health workers and clients learning to administer the injectable contraceptive, subcutaneous DMPA (DMPA-SC). A ten-lesson DMPA-SC eLearning course for health workers is available in English and French and can be taken on a computer or mobile device with internet access. Content includes an emphasis on informed choice counseling, lessons on calculating the injection date and conducting follow-up visits, and information on training clients to self-inject. The content can be translated or adapted to fit in program contexts.	Learning and training, vaccine delivery and planning	Children's Investment Fund Foundation, Gates Foundation	MSAS		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 Senegal, it is used as the human resources for health mapping and management tool.	Health facility and provider administration, risk communication and community engagement	USAID	Adie, MSAS	Open source	National
ODK	Open Data Kit (ODK) is free and open source software that helps millions of people collect data quickly, accurately, offline, and at scale. Many organizations in Senegal use it for field surveys. ODK has two tool suites (ODK, ODK-X) and created a strong community of users, implementers, and developers. ODK's lead developer, Nafundi, is offering support to COVID-19 response efforts, specifically to address contact tracing, decision support, community education, strategic mapping, and case management.	Case management, contact tracing, health facility and provider administration, risk communication and community engagement, routine surveillance		ONG, PATH	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
ODK Collect	The Malaria Control and Elimination Partnership in Africa (MACEPA) project uses the ODK Collect tool for the electronic collection of data relating to the implementation of field activities. ODK Collect is used by enumerators who are trained community-level agents in each health district. The community-level agents fill in data about malaria cases into the forms. These enumerators have field supervisors who check and correct the secure data entered before sending it to a dedicated server to facilitate analysis through dashboards.	Routine surveillance		MSAS	Open source	Subnational
Plateforme d'apprentissage en ligne du MSAS (MSAS eLearning platform)	The MSAS eLearning platform is a portal with online courses available to facilitate health worker learning and training.	Learning and training	MSAS, WHO	IntraHealth	Commercial	National
Reveal (OpenSRP)	Reveal is an open source platform that uses smart maps and technology appropriate for resource-constrained settings to monitor coverage of interventions in real time. It is designed to optimize available resources. Reveal supports decision-makers by guiding and tracking delivery of field activities with precision and holding field teams accountable for action. Reveal has a mobile application that spatially guides field teams to planned areas and households for service delivery. This mobile application allows offline data collection and captures indicators to inform critical field decisions. Reveal also include web user interface real-time dashboards to provide program managers with impactful coverage data to inform current activities and program progress.	Vaccine delivery and planning	Gates Foundation	Akros, PATH, Senegalese government	Open source	Subnational
Senegal immunization supply chain (Logistimo)	Logistimo's supply chain management platform has been deployed in two regions across approximately 100 health facilities in Senegal to improve visibility, tracking, and availability of vaccines from the central level to the last mile. The Senegal deployment was adapted to the local context, including French language.	Vaccine delivery and planning	Empower School of Public Health, Gavi, MSAS	Logistimo	Open source	National
Tableau Server	Tableau is a visual analytics platform that displays health information in Senegal by combing data from MSAS DHIS2, MACEPA DHIS2, and ODK aggregate.	Event-based surveillance, routine surveillance		MSAS	Commercial	National
The Challenge Initiative University (TCI-U)	TCI-U offers opportunities for blended learning by providing in-person as well as virtual coaching; access to curated, practical information and tools; and engagement with fellow coaches and implementers of the proven interventions. TCI-U's primary audiences are TCI coaches and local government counterparts—decision-makers and health system staff—who are interested in adapting and implementing the evidence-based family planning and adolescent and youth sexual and reproductive health (AYSRH) interventions. TCI-U is an online platform as well as an application that includes three main components: toolkits, coaching, and a community of practice.	Learning and training	Gates Foundation	Bill and Melinda Gates Institute for Population and Reproductive Health, Jhpiego, Johns Hopkins Center for Communication Programs, IntraHealth, PSI	Commercial	Subnational
VectorLink's Dimagi CommCare	Dimagi CommCare launched in Senegal under the PMI's VectorLink Project to track indoor residual spraying campaigns. With Dimagi CommCare, in addition to IRS data collection, it is also possible to communicate and send activity reminders (e.g., SMS drop aids) to collaborators, as well as taking GPS coordinates.	Health facility and provider administration		MSAS	Open source	National
VectorLink's ODK Aggregate	ODK Aggregate is deployed and used by VectorLink to supervise activities run by VectorLink such as insecticide preparation and environmental inspections (e.g., product storage, respect of norms). ODK sends its data toward an ONA server that synchronizes the data with VectorLink's ODK Aggregate.	Learning and training	CDC, PMI	MSAS	Open source	National

■ Digital tools deployed for COVID-19 response
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At-a-Glance

Figure 2 shows that Senegal'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 ecosystem.

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

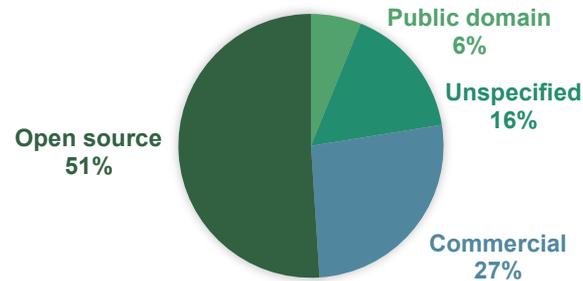


Figure 3. Number of digital health tools deployed at scale in Senegal.



Conclusion

Digital Square mapped 50 existing, adaptable digital health tools in Senegal and matched them to help target investments to accelerate the country's COVID-19 and simultaneously strengthen its health system. This brief underpins how critical it is to align funding to Senegal'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 Senegal'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 Senegal's digital health systems and their role in the COVID-19 response by reviewing Senegal's full Map & 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 includes additional information about global goods deployment for COVID-19.

Map and Match has many resources on its [project landing page](#) 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
Adie	Youth Business International
BID	Better Immunization Data
CDC	US Centers for Disease Control and Prevention
COUS	Health Emergency Operations Center
DMSE	Digital Solutions for Malaria Elimination Community of Practice
EMR	Electronic medical record
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HISP	The Health Information Systems Programme
HMIS	health management information system
ICM	International Confederation of Midwives
JSI	John Snow, Inc.
MSAS	Ministry of Health and Social Action
Norad	Norwegian Agency for Development Cooperation
ODK	Open Data Kit
PMI	US President's Malaria Initiative
PNLP	National Malaria Control Program
SMS	short message service
UNFPA	United Nations Population Fund
UNACOIS	National Union of Traders and Industrialists of Senegal
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.