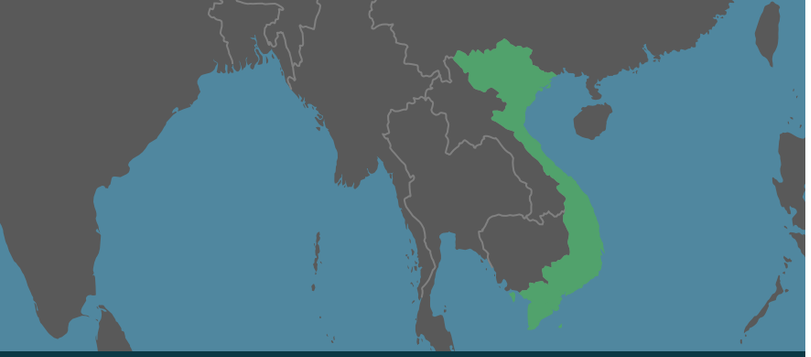

Digital health systems to support pandemic response in **Vietnam**

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

June 2021

IN THIS TECHNICAL BRIEF

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Introduction

Vietnam's Ministry of Health (MOH) states in its work plan on the application and development of intelligent digital health for 2019–2025 that the Vietnamese health system will use digital technology to contribute to Vietnam's health system modernization, improving quality, efficiency, and integration, so that people can easily access health information and use health services. The COVID-19 pandemic has strained the health system, bringing a new level of urgency to the government's target. Leveraging digital health tools is a rapid, cost-effective strategy to accelerate Vietnam's COVID-19 response while at the same time strengthening the health system at large.

Background

Digital Square conducted a landscape analysis of Vietnam'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 Vietnam, 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.

32 digital tools identified

10 tools scaled nationally

12 tools deployed for COVID-19

16 tools potentially adapted for COVID-19

Analysis overview

Map and Match's analysis found that Vietnam's health system uses 32 digital health tools with at least 12 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 Vietnam's digital health system's response to COVID-19. The analysis identified 11 use case gaps, such as diagnostic tools and supply chain, with tools ready for adaptation to fulfill these functions. Strategic adaptation of existing digital health tools will accelerate the COVID-19 response, offering greater efficiency and more robust support to the government, health workers, clients, and other stakeholders.

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

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

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.

Digital Square and USAID attempted outreach efforts to the MOH 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 Vietnam'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 Vietnam's COVID-19 response. Digital Square matched opportunities for tool adaptation across the pandemic use cases in **green** to reveal places where Vietnam can reuse parts of its existing digital health systems to strengthen its COVID-19 response.

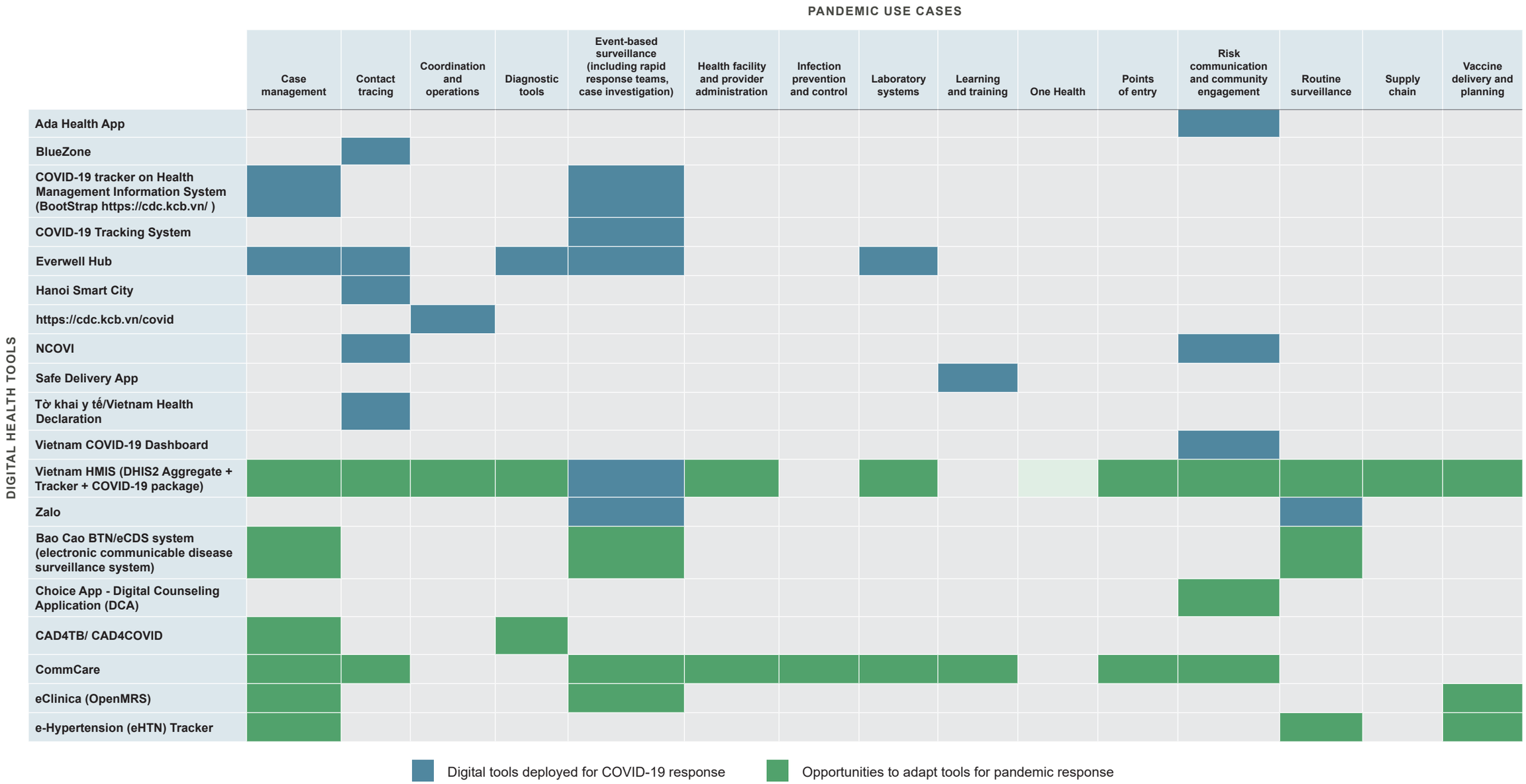
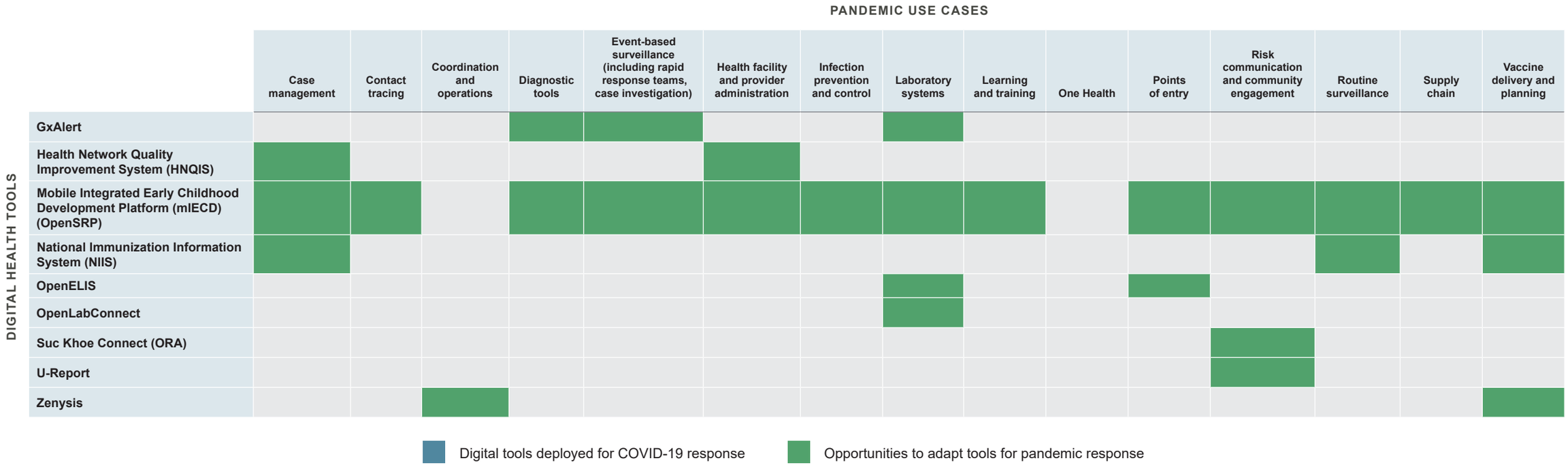


Table 1. Mapping and matching digital health tools to strengthen Vietnam's COVID-19 response, continued.



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

Map and Match's analysis identified existing digital tools that can be adapted to support COVID-19 response for the 11 use case gaps below. Use case gaps are defined as use cases that have fewer than two tools addressing them.

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.

Coordination and operations

https://cdc.kcb.vn/covid	Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)
Zenysis	

Diagnostic tools

Everwell Hub	CAD4TB / CAD4COVID
GxAlert	mIECD (OpenSRP)
Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)	

Health facility and provider administration

CommCare	HNQIS
mIECD (OpenSRP)	Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)

Infection prevention and control

CommCare	mIECD (OpenSRP)

Laboratory systems

Everwell Hub	CommCare
GxAlert	mIECD (OpenSRP)
OpenELIS	OpenLabConnect
Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)	

Learning and training

Safe Delivery App	CommCare
mIECD (OpenSRP)	

One Health

Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)

Points of entry

CommCare	mIECD (OpenSRP)
OpenELIS	Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)

Routine surveillance

Zalo	Bao Cao BTN/eCDS system
eHTN.Tracker	mIECD (OpenSRP)
National Immunization Information System (NIIS)	Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)

Supply chain

mIECD (OpenSRP)	Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)

Vaccine delivery and planning

eClinica (OpenMRS)	CAD4TB / CAD4COVID
GxAlert	mIECD (OpenSRP)
National Immunization Information System (NIIS)	Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)

Examples of a global good ready for adapation for COVID-19 response in Vietnam

OpenMRS

eClinica is an OpenMRS deployment. 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 and to report data out efficiently to DHIS2 for public health surveillance. While OpenMRS is not deployed for COVID-19 in Vietnam yet, OpenMRS has deployed an active COVID-19 Response Squad that is working to identify existing work within the OpenMRS community that can be rapidly adapted by implementers and packaged as a suite of COVID-19 public health response tools.

There are many other countries using OpenMRS as a tool in their pandemic response. For example, Kenya is using OpenMRS for patient care and reporting on COVID-19. Nepal is using OpenMRS to screen patients for COVID-19. OpenMRS is also adapted for COVID-19 response in Chile, Colombia, Guatemala, Haiti, Mexico, and Peru.

3 PANDEMIC USE CASES

0 USE CASES UTILIZED

3 ADAPTATION OPPORTUNITIES IDENTIFIED

- Case management
- Event-based surveillance
- Vaccine delivery and planning

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

Digital health tool	Purpose	Use case(s)	Funder(s)	Implementer(s)	Licensing	Scale
Ada Health App	The Ada Health App guides users to answer simple questions about their own or others' health and symptoms. Ada's AI as-sesses answers against its medical dictionary of thousands of disorders and conditions. Users receive a personalized assess-ment report that tells them what could be wrong and what to do next.	Risk communication and community engagement		Ada Health	Proprietary	
BlueZone	BlueZone is a mobile app released by the MOH that leverages Bluetooth Low Energy to alert users if they were in close contact with someone who tested positive for COVID-19.	Contact tracing	MOH	BKAV, MOH, Ministry of Information and Communications of Vietnam	Open source	Subnational
COVID-19 tracker on Health Management Information System (BootStrap https://cdc.kcb.vn/)	This tracker tool is built to support health workers as a COVID-19 case reporting tool. It also supports doctors and professors to treat COVID-19 patients.	Case management, event-based surveillance	CDC	Government, PATH	Open source	National
COVID-19 Tracking System	This system is a tracking tool to manage patient data and to track the COVID-19 situation in Vietnam. The system has helped Vietnam to develop the quarantine strategy, which uses data to analyze case clusters and levels of contact. It enables the trac-ing of contacts to determine appropriate quarantine and isolation measures.	Event-based surveillance	CDC	General Department of Preventative Medicine, PATH		National
Everwell Hub	The Everwell Hub platform covers the entire digital cascade of care and is the core digital infrastructure that officers, health workers, and patients use to support diagnosis, treatment success, and recovery from TB. The Everwell Hub supports a broad patient management ecosystem (i.e., mobile, web, SMS, IVR). In 2020, Everwell launched new adaptations for HIV, mental health, and COVID-19.	Case management, contact tracing, diagnostic tools, event-based surveillance, laboratory systems		Everwell, Government of Vietnam	Open source	
Hanoi Smart City	Hanoi Smart City helps authorities track and monitor people who have been infected and quarantined, sending a notification to the heads of districts if the patient moves more than 98 feet (30 meters) from the designated quarantine area.	Contact tracing				Subnational
https://cdc.kcb.vn/covid	This is a COVID-19 dashboard that monitors the number of COVID-19 cases and deaths by province.	Coordination and operations		PATH, MOH		National
NCOVI	NCOVI is the official mobile application of the MOH and the Ministry of Information and Communications to assist people na-tionwide to make voluntary medical declarations, contributing to the prevention and fight against acute pneumonia caused by new strains of the coronavirus. NCOVI is an official channel for state agencies to send recommendations to people about dis-ease situations. NCOVI facilitates contact tracing and enables the public to update their health status daily. It also shares "hotspots" of new cases and gives its users best practices for staying healthy.	Contact tracing, risk communication and community engagement		MIC, MOH, VNPT		
Safe Delivery App	The Safe Delivery App supports skilled birth attendants to quickly diagnose issues in pregnancy and with newborns, offering step-by-step guidelines to perform a treatment. It is free to download and can be preinstalled so that providers can watch the animated instruction videos and read the action cards and drug lists whether or not they have Wi-Fi. The Safe Delivery App includes the adaptation of a COVID-19 content module that provides skilled birth attendants (e.g., midwives) with key infor-mation, animated video instructions, and checklists to support them to limit the spread of COVID-19 in the health facilities, including information on infection prevention, breastfeeding, and vertical transmission.	Learning and training	Gates Foundation, Maternity Foundation, Merck for Mothers, UNFPA	ICM, Laerdal Global Health, Maternity Foundation, Merck for Mothers, UNFPA, University of Copenhagen, University of Southern Denmark	Open source	
Tờ khai y tế/Vietnam Health Declaration	Vietnam Health Declaration is a mandatory multilingual tracking and tracing app designed for domestic and international trav-elers entering Vietnam.	Contact tracing		MOH		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
Vietnam COVID-19 Dashboard	This dashboard visualizes the COVID-19 situation in the country by displaying information such as the number of confirmed and recovered cases.	Risk communication and community engagement		Kompa Group	Open source	National
Vietnam HMIS (DHIS2 Aggregate + Tracker + COVID-19 package)	Vietnam's HMIS is the MOH's implementation 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 evalua-tion, facility registries and service availability mapping, logistics management, and mobile tracking of pregnant mothers in rural communities. DHIS2 supports the collection, analysis, visualization, and sharing of both aggregate and individual-level data, including mobile and offline data collection using the DHIS2 Android app. DHIS2 is deployed in more than 70 countries. In Vietnam, the COVID-19 Surveillance Package using aggregate is deployed.	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	DHIS2, MOH	Open source	National
Zalo	Zalo is a social media disease surveillance chatbot connected to DHIS2 that facilitates reporting of RDT-confirmed malaria cases and other diseases by private-sector providers (e.g., pharmacies and private clinics). Zalo is used to complement tradi-tional indicator-based surveillance of notifiable diseases, which typically do not capture private-sector data. Information report-ed through the chatbots are events (case-based data) that are sent to a DHIS2 instance, which can be shared with the national HMIS. Originally designed for malaria case reporting from the private sector, the team adapted the Zalo chatbot to include a symptoms-based approach to provide pharmacies and private clinics an easy way to report fever cases. Combined with a list of symptoms (e.g., cough, difficulties breathing), Zalo can be used for COVID-19 surveillance.	Event-based surveillance, routine surveillance	DFAT, FCDO, Gates Foundation, Unilever	PSI	Open source	Subnational
Bao Cao BTN/eCDS system (electronic communicable disease surveillance system)	Bao Cao BTN/eCDS is a sentinel system that allows patient management at the provincial and subnational levels and is cur-rently used for 34 infectious diseases (in accordance with MOH Circular 54/2015/TT-BYT). The system generates reports of, manages, and provides surveillance of cases and outbreaks of infectious diseases. The system helps to monitor infectious diseases right from the time of suspected cases to the completion of the outbreak closure, provides timely and accurate report-ing data, and enables statistical work and disease analysis. It helps reduce disease risk and health workers' manual workload (e.g., paperwork).	Case management, event-based surveillance, routine surveillance		MOH, PATH, Viettel	Proprietary	
Choice App—Digital Counseling Applica-tion (DCA)	The Choice App is a tablet- or computer-based DCA that prompts structured, supportive, client-specific, and unbiased family planning counseling. The app gathers basic information on clients, their medical eligibility, and their lifestyle. At the end of the process, the Choice App provides a list of recommended methods based on the information provided, with those best fitting the clients' responses listed at the top. The Choice App is deployed in MSI clinics.	Risk communication and community engagement		MSI		Subnational
CommCare	CommCare is an offline-capable mobile data collection and service delivery platform used in more than 80 countries. CommCare is popular for its offline case management capabilities proven to be effective at scale. It is designed for everything from simple surveys to comprehensive longitudinal data tracking. It allows for easy digitization of surveys, has forms that are intuitive for end users, uses simple device deployment, and includes translation features.	Case management, contact tracing, event-based surveillance, health facility and provider administration, infection prevention control, laboratory systems, learning and training, points of entry, risk communication and community engagement			Open source	
Computer-Aided De-tection for Tuberculo-sis (CAD4TB)/ Com-puter-Aided Detection for COVID-19 (CAD4COVID)	CAD4TB is software designed to help nonexperts detect and diagnose tuberculosis more accurately and cost-effectively using digital X-rays, machine learning, and remote expertise. This solution has been adapted in other countries to triage COVID-19 suspected cases and is able to use artificial intelligence on chest X-rays. The CAD4COVID is a free solution that supports triaging in resource-constrained settings and high-prevalence areas.	Case management, diagnostic tools		Delft Imaging	Proprietary	
eClinica (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 and to report data out efficiently to DHIS2 for public health surveillance. In Vietnam, eClinica has been used as a full electron-ic medical record system to maintain a master index of patients on treatment, including names, national ID numbers, and fin-gerprints for the HIV program. OpenMRS has deployed an active COVID-19 Response Squad that is working to identify exist-ing work within the OpenMRS community that can be rapidly adapted by implementers and packaged as a suite of COVID-19 Public Health Response Tools.	Case management, event-based surveillance, vaccine delivery and planning	CDC	UW I-TECH, Vietnam Provincial AIDS Committee	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
e-Hypertension (eHTN) Tracker	The eHTN Tracker is a digital patient tracker for noncommunicable disease management in Vietnam, including hypertension screening and care. The tracker enables health workers at all levels to follow patients throughout their hypertension journey, and it also links to an SMS reminder service that supports patients to adhere to treatment and live healthier lives. The eHTN Tracker creates an online searchable database to log data of hypertension service delivery, including blood pressure checks, diagnosis, treatment, and ongoing risk factors, enabling primary health care workers to better enable their clients to care for their own health.	**Case management, routine surveillance**	Novartis Foundation	Ho Chi Minh City Provincial Health Department, Novartis Foundation, PATH		Subnational
GxAlert	GxAlert is a digital platform that facilitates country-level surveillance of viral load laboratory testing results by allowing data to flow across the health system. GxAlert can connect to other electronic tuberculosis managers or M&E systems. GxAlert can also send targeted SMS alerts to facility managers, health officers, and suppliers. GxAlert enabled a solution to address the following gaps: (1) device management, monitoring, and reporting; (2) calibration, maintenance, and procurement planning; (3) lab technologists' capacity, availability, and training; (4) real-time results notifications to respective stakeholders including rapid case notifications for all positive results to all relevant health care officers; and (5) inventory management and notifications to reduce stockouts and expires. Countries can leverage GxAlert to quickly enable real-time reporting and notification of COVID-19 diagnostic data. SystemOne has already connected more than 3,000 GeneXperts across 40 countries. For countries with these existing GxAlert networks, a remote COVID-19 module and support model can be quickly deployed without travel into countries. An associated Aspect Reporter app is also available on the Google Play store to allow COVID-19 results to be deliv-ered directly to frontline health workers in real time, improving timeliness of response.	**Diagnostic tools, event-based surveillance, laboratory systems**	StopTB Partnership	SystemOne	Proprietary	National
Health Network Quality Improvement System (HNQIS)	The HNQIS is an electronic tablet-based application used to improve quality of health services and effectively achieve health impact at scale. The HNQIS app efficiently allocates resources dedicated to supervision visits within health care networks where and when they are needed most. HNQIS is an interactive tool composed of four modules designed to help quality as-surance officers by (1) planning their supervision visits to providers, (2) assessing providers' performance in service provision, (3) improving providers' knowledge and skills, and (4) monitoring providers' performance over time.	**Case management, health facility and provider administration**	FCDO, USAID	PSI	Open source	Subnational
Mobile Integrated Early Childhood Develop-ment Platform (mIECD) (OpenSRP)	Open Smart Register Platform (OpenSRP) is an offline-capable open source mobile health platform built to enable data-driven decision-making at all levels of the health system. OpenSRP supports health workers to prioritize point-of-care tasks, track service delivery, and simplify reporting. OpenSRP has been used to build localized applications for reproductive, maternal, newborn, child, and adolescent health; immunization; ECD; malaria rapid diagnosis and management; tuberculosis treatment management; and COVID-19 testing and screening. mIECD is an OpenSRP and RapidPro-based ECD tracking and monitor-ing tool, which includes other health domains like RMNCH. The system allows for real-time data collection of vital information about mothers and children, ranging from the total number of parents and caregivers enrolling in parenting programs to chil-dren being exclusively breastfed in their first six months. For COVID-19, mIECD can be used for microplanning and for auto-reporting completed health workers' tasks (e.g., vaccinations administered, household risk-screening completed).	**Case management, contact tracing, diagnostic tools, event-based surveillance, health facility and provider administration, infection prevention and control, laboratory systems, learning and training, points of entry, risk communication and community engagement, routine surveillance, supply chain, vaccine delivery and planning**	UNICEF	MOH, UNICEF	Open source	Subnational
National Immunization Information System (NIIS)	NIIS is an integration of two different applications of ImmReg (electronic immunization registry) and VaxTrak (vaccine tracking) into one comprehensive system. NIIS is a sustainably planned, government-run, nationwide system. NIIS officially launched with national mandates on system use for all facilities, including fee-based immunization facilities. The NIIS can track all vac-cinations, including those outside of the National Expanded Program on Immunization (NEPI) age range (0 through 3 years old), and is available to a broader variety of health center providers. The aim is to track immunization records for all individuals in Vietnam from birth until the end of their lives. NIIS can be adapted to add on the COVID-19 vaccine module to track vaccine in stock, track administration, and certify on the e-Immunization Card.	**Case management, routine surveillance, vaccine delivery and planning**	Gates Foundation, Gavi, MOH, UNF	MOH, NEPI, PATH	Proprietary	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
OpenELIS	The Open Enterprise Laboratory Information System (OpenELIS) is a global offline-capable open source software. It serves as a laboratory information system tailored for public health laboratories in resource-constrained settings to support best laborato-ry practices and accreditation. OpenELIS Global added COVID-19 metadata to support laboratory systems. It focuses on in-teroperability by including Logical Observation Identifiers Names and Codes (LOINC) codes. Users can immediately use the adaptations in the software to add tests for SARS-CoV-2 to their laboratory test catalogs to facilitate tracking of laboratory tests and results. OpenELIS has also been used with a portal for airport point-of-entry testing.	**Laboratory systems, points of entry**	PEPFAR	Association of Public Health Laboratories, CDC Vietnam, MOH	Open source	Subnational
OpenLabConnect	OpenLabConnect is a decoupled mediator that transports and transforms data and commands between laboratory test instru-ments and laboratory information systems. Collecting data from laboratory analyzer instruments can be time-consuming and subject to error due to manual transcription between the order, the machine, and the results report. Additionally, precise algo-rithms and rules for quality assurance and validation are sometimes haphazardly followed by staff. Historically, much of the digital interfacing with instruments has been custom and tightly coupled to its software through point-to-point programming. OpenLabConnect can be used as a generalized solution to bridge the LIS and the laboratory analyzer exchange to mitigate these issues.	**Laboratory systems**		UW	Open source	
Suc Khoe Connect (ORA)	ORA is a web application that provides the public with a convenient way to make appointments for sexual health services, including testing and treatment for HIV and sexually transmitted infections, pre-exposure prophylaxis, post-exposure prophy-laxis, sexual health counseling, and general health checkups. ORA also serves as a single, unified system through which HIV programs can attract new clients from an unlimited number of online outreach and marketing approaches and acquire detailed measurements of the effectiveness of these methods at bringing different populations to physical services. People reached online are directed to an ORA website that takes them through an optional risk assessment to determine their sexual health service needs and then offers clinic reservation options in order of proximity or grouped by city.	**Risk communication and community engagement**	PEPFAR/USAID	FHI 360	Open source	National
U-Report	U-Report is a messaging tool that empowers young people around the world to engage with and speak out on issues that mat-ter to them. It works by gathering opinions and information from youth on topics they care about—ranging from employment to discrimination to 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 adapted to support COVID-19 risk communication and community engagement, including surveying youth about their willingness to volunteer during the COVID-19 pandemic in other countries.	**Risk communication and community engagement**		UNICEF	Open source	National
Zenysis	Zenysis users can analyze millions of data points at sub-second speed and effortlessly combine data from across systems to inform data for decision-making to continuously improve the delivery of health care and other vital public services. Zenysis's software platform offers analytical training and IT skills development. For example, countries can use the platform's capabilities to integrate data from fragmented information systems and help decision-makers see where children are not receiving vac-cines. Advanced analytics can help countries decide how to target their limited resources for maximum impact.	**Coordination and operations, vaccine delivery and planning**		Gavi, Zenysis	Open source	

Digital tools deployed for COVID-19 response

Opportunities to adapt tools for pandemic response

At a glance

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

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

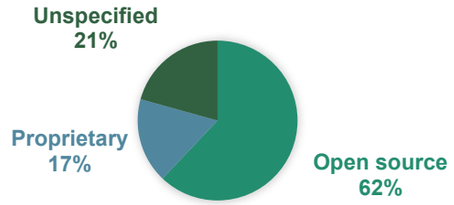
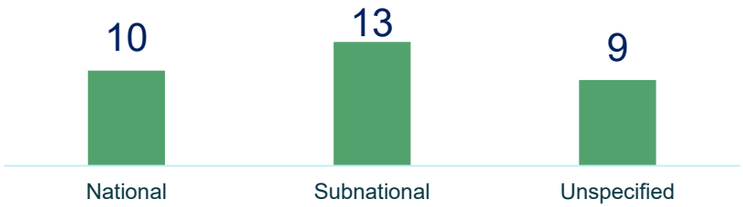


Figure 3. Number of digital tools deployed at scale in Vietnam.



Conclusion

Digital Square mapped 32 existing, adaptable digital health tools in Vietnam 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 Vietnam'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 Vietnam'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 Vietnam's digital health systems** and their role in the COVID-19 response by reviewing Vietnam'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
CAD4COVID	Computer-Aided Detection for COVID-19
CDC	United States Centers for Disease Control and Prevention
DFAT	Indo-Pacific Center for Health Security
DHIS2	District Health Information Software 2
ECD	early childhood development
FCDO	UK Foreign, Commonwealth & Development Office
Gavi	Gavi, the Vaccine Alliance
HMIS	Health Management Information System(s)
ICM	International Confederation of Midwives
ID	identification
I-TECH	University of Washington International Training and Education Center for Health
IVR	interactive voice response
LIS	laboratory information system
M&E	monitoring and evaluation
MIC	Ministry of Information and Communications
mIECD	Mobile Integrated Early Childhood Development Platform
MOH	Ministry of Health
MSI	Marie Stopes International
NEPI	National Expanded Program on Immunization
OpenELIS	Open Enterprise Laboratory Information System
OpenMRS	open source Medical Record System
OpenSRP	open source Smart Register Platform
ORA	Online Reservation Application
PEPFAR	United States President's Emergency Plan for AIDS Relief
PSI	Population Services International
RDT	rapid diagnostic test
RMNCH	reproductive, maternal, newborn, and child health

Acronym	Definition
SMS	short message service
TB	tuberculosis
UNF	United Nations Foundation
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Fund
USAID	United States Agency for International Development
UW	University of Washington
VNPT	Vietnam Posts and Telecommunications Group

Annex 2. Use case definitions

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

Annex 3. Digital tools supporting vaccine deployment

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

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

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

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

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

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

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

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

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

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

Areas the COVID-19 DICE covers include:

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