

EXPLAINER

# Vaccinating the World against COVID-19: What Digital Technologies Can Do



To end the pandemic, countries need to achieve population immunity through vaccination. Photo credit: ADB.

*Digital tools may be used to overcome challenges in planning, logistics management, vaccination administration, and immunization monitoring.*

**Published:** 11 March 2021

## Introduction

The world has struggled to contain the coronavirus disease (COVID-19) and cope with the social and economic disruptions caused by the pandemic. Now that vaccines are available, the next hurdle is to inoculate as many people as possible until herd immunity is achieved.

Countries bear the burden of this massive undertaking, which involve securing millions of vaccine doses for their population; mobilizing the required resources (e.g., financing, logistics, cold chain storage, manpower); informing and educating the public; vaccination registration and scheduling; tracking supply, distribution, and implementation; and monitoring adverse effects.

Digital technologies can play a crucial role in mass vaccinations by providing tools for planning and management of immunization programs.

Digital tools have proven useful in the fight against COVID-19 by making it more effective and efficient to control and prevent the spread of the disease, such as through contact-tracing and self-quarantine monitoring apps and contactless transactions. Artificial intelligence and big data analytics support decision-making and targeting of the most vulnerable households during the pandemic.

Solutions driven by digital technologies are also available to address the challenges of vaccine deployment.

This explainer is based on presentations by Ernst & Young, IBM, Microsoft, and PricewaterhouseCoopers, and discussions at a webinar organized by the Asian Development Bank.

## How can technology help?

With COVID-19 vaccines still in short supply, digital tools can be used to ensure that vaccines are transported safely, reach those most at risk first, and that there is no or minimal wastage. Countries need to be ready to receive the delivery of vaccines as doses become available and to coordinate the administration of different vaccines, which have varying handling, storage, and dosing guidelines.

Digital tools can help systematically identify targeted groups for vaccination, which is critical in countries with no national identification scheme in place.

The digitalization of the whole (or even part of) the process can improve vaccination efficiency, safety, and effectivity. It can also build public trust in the vaccination program and overcome vaccine hesitancy by providing transparency, data security, and good governance.

In India, for example, an open-source platform, called Digital Infrastructure for Vaccination and Open Certification or DIVOC, was developed locally to support the country's vaccine rollout. It focuses on last-mile vaccine administration and can maintain different registries, such as for multiple vaccination programs across a country, approved vaccines and vaccination facilities, and trained vaccinators. DIVOC's core module is to issue digital vaccination certificates, which are linked to the national ID to ensure data quality. Those without smartphones may print the certificates with their QR code. The platform has a data analytics module that provides real-time reporting and can help control the rollout rate based on vaccine supply, but it does not manage vaccine supply and logistics.

Before the pandemic, a project supported by the United Nations Development Program and the Government of India created the Electronic Vaccine Intelligence Network (eVIN) for a data-driven vaccine supply chain management system to improve the efficiency of distribution. It enables real-time monitoring of inventory and temperatures at 28,000 vaccine storage centers. eVIN is being tapped for COVID-19 vaccination in the country.

Technology providers are offering both short- and long-term solutions to facilitate vaccine rollout. An end-

to-end solution would cover demand forecasting, supply chain management, vaccine safety, and immunization monitoring.

For example, Microsoft and PricewaterhouseCoopers have designed a “vaccine to vaccination” platform that meets the needs of citizens, providers, the government, and private sector. It comprises a supply chain app, front-line worker app, a portal for citizens, and a management app.

IBM’s ecosystem approach uses blockchain technology that links different vaccine suppliers in its [Digital Health Pass platform](#) for data sharing and tracking across the supply chain to identify potential problems. It enables citizens to access their vaccination certification easily and securely through a smartphone app and share it with, say, airport authorities or their employer. The platform may be used also for COVID-19 test and contact tracing results and other health records.

## What are the key considerations in digital deployment?

Digital solutions for vaccine rollout should be secure, scalable, customizable, and responsive to changes. Look for interoperable, open-source applications that leverage existing data systems for rapid and least-cost deployment. In general, open-source software may be downloaded, used, and modified for free.

Given the urgency of the situation, consider implementing a system with basic functionality first.

Enable real-time analytics and reporting on vaccine inventory and other critical information through mobile and web-based applications for informed and rapid decision-making. Offline modes for vaccine administration, however, may also be necessary for remote areas with poor internet connectivity.

Data collection, use, and processing should follow data protection and privacy principles.

Interoperability is important in integrating data from different vaccine manufacturers and in enabling immunization information systems of countries to share information and verify vaccination data across borders. Data should also be verifiable and immutable to ensure authenticity, particularly of vaccination certificates. Blockchain technology offers an immutable, decentralized database managed and shared by multiple parties. Collaboration among stakeholders—citizens, providers, government, and private sector—and international cooperation are key to make possible the sharing of critical data according to agreed standards.

Vaccination registration and certification must be available in online and offline modes in areas where there is lack of digital access and connectivity. Make registration simple and integrate into the system an easy way to report vaccine side-effects. A good user experience will help ensure the success of the vaccination program.

Some aspects of the system may be handled by service providers, such as logistics companies for supply chain solutions and telecommunication companies for information dissemination or notification (e.g., vaccination appointment schedule and reminder).

Investing in digital tools should look at improving immunization programs beyond COVID-19. It can even be a starting point for digital health and accelerating progress toward attaining Sustainable Development Goal No. 3.

## Resources

eGov Foundation. [Digital Infrastructure for Vaccination and Open Certification \(DIVOC\) FAQs](#).

IBM. [Digital Health Pass](#).

UNDP India. [Improving the Efficiency of Vaccinations Systems in Multiple States](#).



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Eduardo champions universal healthcare and has long provided technical support to countries in Asia and the Pacific in their pursuit of this goal. Before joining ADB, he was president and CEO of the Philippine Health Insurance Corporation, WHO regional adviser for health financing, World Bank senior health specialist, and a faculty member of the University of the Philippines’ College of Medicine and the Ateneo University Graduate School of Business.

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