

Forging the Path to Recovery



State CIO Office Special Recognition California Department of Technology

Digital COVID-19 Vaccine Record Project Dates: May 2021

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Executive Summary

For many years, health departments nationwide have considered providing residents access to their digital vaccine records. But the resources required for such a project made it a distant dream.

COVID-19 created an imperative for quick action and became an opportunity for California to innovate and forge a path for others.

In mid-June 2021, California had 3.7 million confirmed cases, 63,000 deaths, and 40 million vaccinations administered. The focus was on increasing vaccination rates and kickstarting sustained economic activity.

The project

In June 2021, under direction of the State CIO, the California Digital COVID-19 Vaccine Record (DCVR) was implemented by the California Department of Technology, (CDT) and the California Department of Public Health (CDPH). The solution includes the online portal and supporting backend solutions. This portal provided the means for California residents to obtain a secure, easily verifiable record of their COVID-19 vaccinations.

The reaction

Within six months of the initial implementation, 6.3 million California residents—20% of the vaccinated population—logged in to the DCVR portal (<https://myvaccinerecord.cdph.ca.gov>) to download their SMART Health Cards.

In August 2021, CDT released the front-end code into the public domain, so other states could use it to implement systems for their own residents. Two months later, the state of Washington did just that, releasing their WAVerify digital record portal.

As of April 2022, the number of California residents who have downloaded their SMART Health Cards has climbed to almost 8 million. They can present the digital health cards at restaurants and other venues. The cards also work with iPhone and Android apps residents use to purchase event tickets and track their health.

The future

California supported six other states to implement their solution, sharing its [playbook](#) of lessons learned. This unprecedented collaboration is expected to result in many more use cases and innovations. CDPH is looking forward to innovating with other organizations in California and beyond to continue transforming public health technology.

Providing access to vaccination records:

As of mid-April 2022:

- **Nearly 16 million DCVR downloads** by 8 million people
- CDPH processes 99% of requests for **remediation within 5 days**
- CDT shared source code and together with CDPH **supported several states** with their implementations



It was a privilege to work on this project with our colleagues at CDPH, and we look forward to working on similarly impactful projects in 2022 that will benefit all Californians.



Rick Klau, State Chief Technology Innovation Office, California Department of Technology

An unprecedented partnership to meet a universal need

For the first time, as of June 18, 2021, Californians could readily access their vaccination record at <https://myvaccinerecord.cdph.ca.gov> in eight languages. The solution is elegant in its simplicity and returns results within seconds, allowing a user to easily retrieve their record when needed for travel, at restaurants, or other venues.

Every state in the US maintains an immunization registry (also known as an “immunization information system,” or IIS) where all COVID-19 vaccinations are required by federal law to be reported. California built an easy-to-use web-based application that taps into the IIS data and delivers a DCVR with a scannable QR code using the SMART Health Card framework. When information entered matches information already in the state IIS, a confirmation is sent by SMS or email to the resident with a link to retrieve their DCVR. Android users can save their DCVR to Google Pay; Apple users can share their DCVR with Apple Health and Apple Wallet. Alternatively, users can save a screenshot of their DCVR to their camera roll or print it out.

Deploying the DCVR was one thing, but then there would be overcoming known data quality issues. CDT and CDPH knew from the beginning that the work embarked upon would be wrought with immediate challenges requiring all hands on deck. California had already shown the agility and rapid pace with which solutions could be deployed and would organize quickly for a coordinated response, pulling vendors, providers, and state staff to meet the challenge. The primary goal was to help California residents quickly and easily obtain and provide proof of their vaccination records.



This continues to be such a tremendous achievement for California, and a huge public service win well beyond California's borders. I'm grateful to everyone ...who encouraged the original project, supported the initial launch, and played such an important role in the increasing success of the effort.



Rick Klau, State Chief Technology Innovation Office, California Department of Technology



The implementation ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

No one expected this project to be easy. But CDT and CDPH were fortunate to pull together a crew of tireless experts from a wide variety of organizations, all dedicated to the common good. By accomplishing so much, so quickly to serve Californians' wellbeing, this implementation demonstrated government at its very best.

Laying out the roadmap

Like most initiatives designed to combat the pandemic's effect, the DCVR did not follow the state's standard enterprise planning approach. CDT quickly developed a proof of concept, explained the idea to stakeholders, obtained buy-in, and established high level governance.

This project represented a major collaboration effort between CDT's Office of Enterprise Technology and CDPH, with cross-organizational governance. The portal was managed by CDT. The backend data and remediations, needed to support the solution, were quickly stood up and enhanced by CDPH. The solution's development was supported by several vendors already engaged on other COVID-19 initiatives.

A project director was designated, and the work was organized under six teams. They brought together experts from several service providers and projects, who collaborated in an iterative process based on Agile best practices. With no time for pilots or proofs of concept, the team's success would have to be gauged by the public's response to the quickly built solution and be refined iteratively with new learnings.

Government at its best

CDPH and CDT convened a team of experts for rapid results:

- Increased number of recipients with email or phone from 72% to >95%
- Increased raw match rate by 72% (from 43% to 74%)
- Processed more than 858,000 remediation requests in 10 months
- Responded to 90% of remediation requests within 5 days

A combined team with all hands on deck

This combined team worked closely with healthcare providers and state government operations staff. They demonstrated true passion for the project, choosing to work nights and weekends to ensure the project's success and remediate requests from the public. The team was also highly flexible, with many members stepping into new roles to quickly fix what needed fixing without regard to vendor affiliations. While most CDPH projects are characterized by cross-team collaboration, the DCVR solution development put that into high gear due to the critical need for the solution.

How the solution was built

The development team very quickly stood up the DCVR portal on June 18, 2021. It features:

- Online and mobile interfaces in eight languages
- Fields for residents to enter their name, date of birth, and the phone number or email address associated with their vaccine record
- Integration with the state Immunization Registry to retrieve the record
- Frequently asked questions and answers
- The Verifiable Clinical Information coalition's SMART Health Card as the digital vehicle for receiving vaccine information

The solution is built on a three-tier architecture, including a frontend web application using the React JavaScript Library, middle tier APIs written in Microsoft .NET Core and Node.js, and a backend data tier using Snowflake. Requestors receive a link to their DCVR by their preferred contact method (SMS or email) via AWS Pinpoint. Once the immunization registry backend delivers a JSON payload to the API, the API generates QRCode with the SMART Health Card framework. From there, the requestor can save it to their computer or to Android or Apple applications on a smartphone.

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- The remediation process leverages two tools with backend integrations: a Virtual Assistant Tool (VAT) which allows the public to submit a request for record access or correction, and a Staff Remediation Tool (SRT) which is the ticketing solution for remediations. The VAT uses Amazon cloud services, such as, AWS LEX, Elastic Kubernetes Service (EKS), EC2, and S3 to run the existing architecture and data collection components. Within the VAT flow, user authentication is completed through a third-party service called ID.me. The VAT architecture is designed to protect personal data.
- The SRT is a custom application hosted by Microsoft Azure Cloud service allowing the remediation teams to process requests swiftly and securely. The VAT data flowing to the SRT are stored in the Snowflake database, the database used by CDPH with high-security configuration through Azure AD and hosted on CDPH services. The SRT is only accessible on the CDPH network. The tool's architecture has allowed regular and agile enhancements to improve business processes as well as integration of data from multiple sources. Utilizing AWS services, the SRT has also enabled automated communications to the request submitters triggered by ticket status.
- The DCVR Integration system is the hub of the solution architecture. It consists of a data warehouse that extracts, transforms and loads (ETL) data for all COVID vaccinations in California. The system runs in Snowflake data warehouses hosted in the Microsoft Azure Cloud. DCVR Integration provides data on-demand to the DCVR portal and to SRT. DCVR Integration also matches requests from the public via the VAT against vaccination data in the warehouse for classification, delivery to SRT, and auto-remediation of contact information in the registry. Lastly, DCVR

State of California English Español 简体字 MORE

Digital COVID-19 Vaccine Record

Digital COVID-19 Vaccine Record

Welcome to the Digital COVID-19 Vaccine Record portal. Just enter a few details below to get a link to a QR code and digital copy of your COVID-19 vaccination record. If you want to share your proof of vaccination, you can use either the electronic version you'll get from the portal or the card you were given at time of vaccination.

If you are a parent or guardian and have multiple vaccine records associated with a single mobile phone number or email address, enter each digital vaccine record request separately.

The portal provides only a digital copy of your vaccine record. If you received your vaccinations from a federal agency (e.g., Department of Defense, Indian Health Services, or Veterans Affairs), you will need to reach out to those agencies for assistance with your vaccination record.

If you have questions about your Digital COVID-19 Vaccine Record, [visit our FAQ](#).

Please fill out the required fields to receive a link to a QR code and digital copy of your COVID-19 vaccination record:

Required fields marked with *

First name *

Last name *

Date of birth *

Provide a mobile phone or email that may be associated with your vaccine record. If you fail to get a match using your mobile phone, try again using your email address.

Mobile Phone Email

Mobile Phone *

Integration delivers matched results for display in SRT to confirm record remediations (per requests from VAT) have been effective and are reflected in the registry.

Stakeholder support and engagement

Given the importance of the project to California residents and the economy, State leadership quickly provided approvals and support needed to bring the portal to fruition. Their engagement with project leadership continued beyond deployment and highlighted the value of the solution to California's leaders.

Post deployment of the portal, CDPH collaborated with local health jurisdictions (LHJs), who also served as advocates, providing feedback and collaborating on data remediation efforts. Together, CDPH and the LHJs worked to develop communications and to educate the public about the DCVR. CDPH also worked with California business organizations to help educate businesses on leveraging the technology as they verify customer vaccination status.

The data quality issues were addressed through outreach and collaboration with providers to ensure complete and accurate vaccination data is submitted to the registry on a timely basis. The need was emphasized through the [Order of the State Public Health Officer Requirement that COVID-19 immunization providers request patients' email addresses and mobile phone numbers for the State's Immunization Registry \(ca.gov\)](#). Public Health Officer memos shared [Vaccine Record Guidelines & Standards \(ca.gov\)](#) to educate the public about the role of the DCVR.

Failing fast yet fixing fast

One of the historic deterrents to providing consumer digital health records is data quality. Anticipating these issues after deployment, CDPH quickly ramped up teams to focus on improving data quality and addressing expected calls and remediation requests.

As expected, the initial DCVR portal rollout saw data quality problems surface quickly, with around 43% of requests through the portal obtaining a match with the IIS. This resulted in high volumes of remediation tickets. The development and data quality teams worked in parallel to improve matching, taking this three-pronged approach:

- Improve the backend lookup and matching logic with IIS
- Clean up IIS data to address the sources of the matching issues
- Conduct focused outreach and collaboration with healthcare providers to improve their reporting in accordance with the State Public Health Order on collecting and submitting vaccination contact information

CDPH also rapidly deployed a series of solutions to support the DCVR portal with remediation request processing:

July 2: The Virtual Assistant Tool for public request submission; **August 9:** The Staff Remediation Tool to track record remediation tickets; **November 9:** Identity verification via ID.me added to the Virtual Assistant to avoid the need to collect identity documents from requesters.



Every time I've had to pull up my vaccine record in the iOS Wallet app, it brings a smile to my face. It truly adds value to my digital wallet. As a California resident and Apple employee I want to thank you for your efforts. Great work!



Mel Sampat, Software Engineer, Apple

 **The impact** ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

As of April 2022, approximately 16 million DCVR responses have been delivered to nearly 8 million people. For many Californians, an organization they might have known little about was associated with providing a much-needed service during difficult and challenging times, increasing their faith in government and the CDPH. Residents who previously knew nothing about CDPH now associate it with providing a much-needed service during difficult times.

Improving experiences for residents of California

The DCVR portal has become an increasingly popular service for California residents. They can access their own vaccination records in under two minutes and save them on their phone or computer for retrieval at any time. The only requirements are name, date of birth, and email or mobile number, combined with a PIN created by the user. The DCVR is available in eight languages and provides an easily accessible FAQ.

The hard work post deployment paid off. By the end of April 2022:

- Record request matches increased from 43% at deployment to 74% and the unique recipient match rate is holding at about 89%.
- CDPH processed nearly 858,000 remediation requests from the public. At peak, the team had ramped to process over 10,000 tickets per day. Today, 99% of all requests are addressed within five days, and automated SMS and email communications keep residents informed of their request status.
- Whereas at launch, for 28% of COVID-19 vaccine recipients, there was neither an email nor mobile number attached to their record, today the gap is 5% - thanks to CDPH's collaboration with providers.

With close to 8 million digital vaccine record downloads to date, California has become the largest issuer of SMART Health Cards in the United States and was one of the first of 24 states and territories to use them. Now that smartphone manufacturers like Apple, Google, and Samsung all support SMART Health Cards, the DCVR has become even more useful. It can be stored securely in smartphone apps, making it easier to find and present when requested.

Improving experiences for residents of the US and beyond

In August 2021, CDT released the DCVR portal code to the public domain to be used by other states to implement systems for their residents. CDPH and CDT created a [playbook](#) documenting best practices and lessons learned as they shared the DCVR portal to help other states implement and innovate faster. The state of Washington was the first to do so, releasing their WAVerify application two months later. With their path to implementation made easier, Washington took the solution further and enhanced the code, including adding dozens of additional languages to the original eight.

Since then, Washington, DC, and Oregon deployed their own DCVR-based solutions, increasing its benefits to 9.7 million U.S. residents beyond California. CDPH and CDT are working with three other states to leverage the code. Internationally, several jurisdictions worked directly with California to accept its DCVRs as proof of vaccination for travelers from the U.S. (New Zealand, Australia, Israel, United Kingdom, and the EU).

Now that they've realized their long-time digital vaccine record dream, CDPH looks forward to exploring more ways to use the DCVR. This project has provided new avenues for innovating with other organizations to continue transforming public health technology.

Enabling modern health tech

Californians can add their DCVR results to smart phone apps for a variety of uses and benefits:

- Apple Health
- Apple Wallet
- Google Pay
- Samsung Pay

“ Especially hard hit by the COVID-19 pandemic has been the travel and tourism sector. The widespread requirement of COVID-19 health credentials... for international travel means open standards are key to interoperability and participation as individuals get back to doing the things they love. **”**

Sandra Beattie, Senior Public Sector Executive, NYS Budget + Performance Leader