

Managing COVID-19

with Innovative Tech Solutions

CATEGORY

Cross-Boundary Collaboration & Partnerships

START DATE

March 2020

END DATE

October 2020



COLORADO
Governor's Office of
Information Technology

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Executive Summary

Residents' health and safety is at the heart of every government decision. That's why when the COVID-19 pandemic upended every facet of Coloradans's lives, state and local officials scrambled to find solutions that could save lives and livelihoods—while also knowing that a budget crunch awaited.

As the enterprise provider of information technology services and support to executive branch agencies and approximately 31,000 state employees, the Governor's Office of Information Technology (OIT) was called upon to deliver solutions that would help the state track, respond to and inform its strategies in the fight against the pandemic. OIT leadership then tasked the Colorado Digital Service, a cross-functional team formed in October 2020 who work within OIT and serve limited "tours of civic service" in government, with engaging state agencies, local public health agencies (LPHAs), the private sector and civic organizations to collaboratively create those solutions.

The team quickly focused their efforts on what would help the most Coloradans while understanding every dollar would be scrutinized as the state prepared for the worst. One such effort was in collaboration with the Colorado Department of Public Health and Environment (CDPHE) and LPHAs to identify and vet a vendor for a contact tracing system. The team was able to strike the right balance of efficiency and effectiveness, and using a "demos not memos" process, a vendor was selected in just 19 days and \$15 million under budget.

While that was in motion, the cross-agency and cross-sector team evaluated how to more quickly inform Coloradans and provide insights to LPHAs so that they could set guidance for their communities by exploring options for exposure notifications (EN). Prioritizing security, privacy, build and maintenance burdens, and data storage, the team navigated uncertainty to be one of the leading state government collaborators on a white-label application with Apple, Google, the Association of Public Health Laboratories, the U.S. Digital Service and the U.S. Digital Response. By waiting until the right solution was ready, and being prepared for the moment, the state was able to clearly articulate the value of signing up for the application to residents. To date, more than 39% of Coloradans have signed up, helping to anonymously alert hundreds of thousands of their fellow Coloradans of possible COVID-10 exposure.

It's impossible to know the exact impact the team has made by ramping up a contract tracing solution, and then an EN application, but a study by Google and Oxford University found that even if only 15% of the population uses an EN app, it could lead to a drop in COVID-19 infections and deaths. Every life saved matters, and we're thankful to have had fast-thinking collaborators who came together amid a crisis.



Idea

Before the global pandemic, most public health agencies depended on spreadsheets or homegrown solutions for contact tracing efforts, which made data sharing for infectious diseases nearly impossible. The sudden upheaval COVID-19 brought upon every facet of life drove Colorado public health agencies and local public health officials to quickly come together and create reliable solutions to help contain the spread of the virus through digital awareness.

The newly formed Colorado Digital Service (CDS), a team working within the Governor's Office of Information Technology (OIT), was tapped by OIT leadership to partner with technical experts from private companies and public forces to bring every critical resource to the table. This collaborative team was able to streamline COVID-19 vaccine information and improve public health communications, but the major pillars needed to get there involved coordinating exposure notifications and contact tracing.

Contact tracing and a corresponding exposure notification system were the focus as they are effective public health tools for containing the spread of a virus or other communicable diseases. As COVID-19 exhausted existing technology systems with high volumes of data, a single source of truth or ability to share data with one another was needed for public health entities to effectively manage COVID-19.

Most importantly, given that public health is state supervised and county administered in Colorado, the Colorado Department of Public Health and Environment (CDPHE) wanted to offer a free contact tracing solution for local public health agencies to opt in to using so that everyone could collaborate to contain the spread of COVID-19.

Implementation

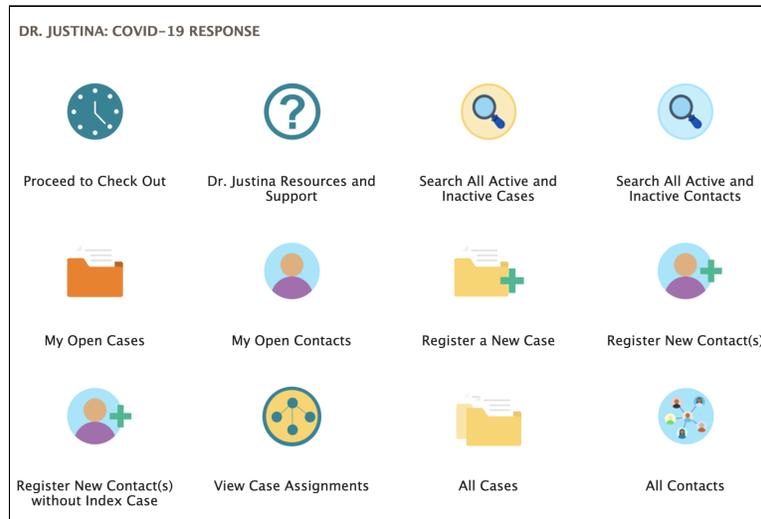
To leverage every available resource and data point quickly and securely, the CDS team worked closely with Google, Apple, CDPHE, LPHAs and U.S. Digital Response for access to top technologists and health policy experts. To combat an invisible and highly contagious enemy, it was important to develop a virtual vendor selection process for contact tracing and an exposure notification system that all Coloradans could access.

Case Investigation and Contact Tracing

The State of Colorado needed a comprehensive digital solution for case investigation and contact tracing that would be used by state and local public health agencies. In June 2020, the state implemented an innovative, human-centered and entirely virtual vendor selection process to evaluate solutions under CDS's direction.



Vendors were invited to provide a test environment where their solution could be assessed based on functionality, user experience and technical fit. Stakeholders across the state participated directly in an interactive evaluation and selection process, which provided opportunities to assess vendors’ work style and culture, center evaluation on user needs and generate buy-in from users. A human-centered approach was essential to ensure widespread use of the solution and to provide robust data for state-level decision-making on its case-investigation and contact-tracing efforts. Using this “demos not memos” process, a vendor was selected in just 19 days and \$15 million under budget.



User interface for the Dr. Justina case investigation and contact tracing system

The process involved case investigators, contact tracers and team leads from local public health agencies (LPHA) and CDPHE. They tried out potential solutions in a fully-functional test environment and participated directly in the evaluation through user interviews, which increased county-level buy-in and set the stage for statewide scaling.

In addition to interviews, each vendor was evaluated based on the following parameters:

1. A review of technical documentation, such as data dictionaries and sample security audit reports, which allowed staff to evaluate technical feasibility. Fifty eight documents were collected and evaluated by CDPHE and OIT staff.
2. Tests of each solution’s application programming interfaces (APIs) to assess their ability to integrate with the state’s existing systems.
3. Tests of the solution using simulated, low-bandwidth environments given the application would be used in many rural areas via limited wireless networks.

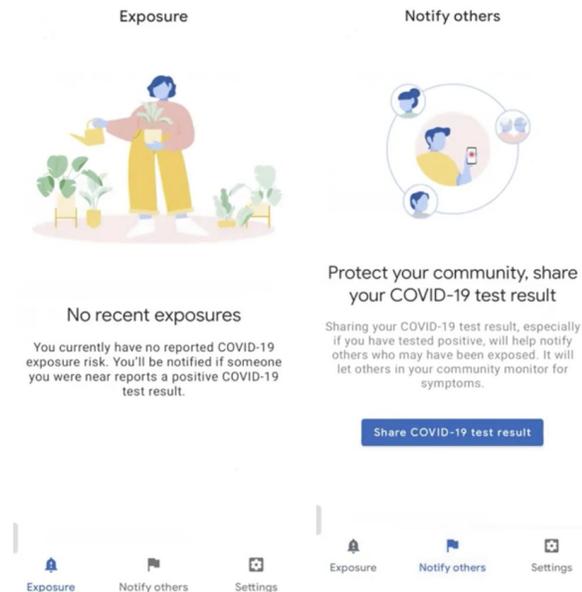
After the vendor bake-off was complete, the state selected a contact tracing solution and implementation began the following week. The entire process from vendor selection to reaching scale took about 16 weeks. Initially, two LPHAs went live with the minimum viable product (MVP) version as part of a pilot that was implemented one month after the contract

was executed. Two months later, Colorado scaled statewide to all LPHAs, requiring the system to be used for cross-county collaboration and requests for state assistance.

Through the contact tracing solution, public health agencies were able to track how the disease was spreading and notified Coloradans who may have been exposed as everyone waited for full COVID-19 vaccine distribution. Contact tracers and case interviewers talked to those who tested positive for COVID-19 and identified and notified their close contacts.

Exposure Notifications

The state also launched Exposure Notifications (EN) in October 2020 to augment and automate our local public health case investigation and contact tracing efforts. [Exposure Notifications](#) is a service that users can easily download and install on an iPhone or Android device that enables users who test positive for COVID-19 to anonymously alert people who were in close proximity to them. The service was designed to protect user privacy and does not collect, transmit or store personal information. Additionally, users can opt-in or turn off the service, which is available in multiple languages, at will.



The upgrade to EN helped Coloradans get key information faster, without overwhelming LPHAs or other health workers. The info also gave users a feeling of agency, as if they could do something positive to help their fellow Coloradans. After learning that users didn't always know what to do after getting a positive test result, we expanded text notification info to include instructions for isolation, contact notifications and other infection prevention strategies.

Colorado worked in close partnership with several public and private organizations, including Apple, [Google](#) and the Association of Public Health Laboratories for this launch, as well as engaging engineering volunteers from the U.S. Digital Service and the U.S. Digital Response.

To prepare for the initial launch, it was important to have an EN process that was simple so that adoption and usage would grow quickly. The State had been tracking EN developments since April 2020 but decided to “watch and wait” until major concerns – privacy, security, technical burden to build and maintain, the ownership of data and more – had been addressed.

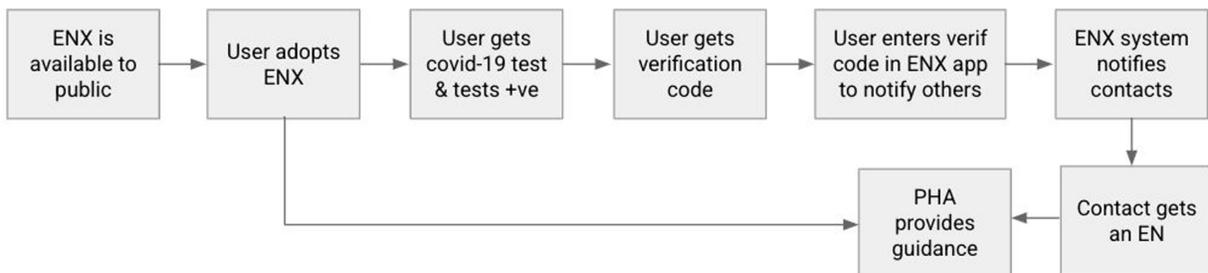


That decision saved valuable time and money as the state coordinated on all of its other COVID-19 strategies. The cross-agency team was able to quickly implement Google and Apple's new framework, Exposure Notifications Express (ENX), once it went live in September 2020. Within four days of Colorado launching its version of the ENX app on October 25, 2020, 588,000 Coloradans (~15% of the smartphone-owning population) had opted in.

The CDS team also automated the aggregation of analytics for the Colorado configuration of [Exposure Notifications Express](#). This work focused on automatically consolidating metrics across multiple anonymized data sources to enable the state to understand the progress of the service. Prior to this collaboration, gathering metrics for the service was a manually intensive process, with data sources scattered across dozens of platforms.

Colorado built a general purpose framework to collect key metrics across these platforms into an aggregated database and update this daily into a spreadsheet viewable by Colorado's epidemiologists, the Governor's office and our partners. This enabled the state to make data-backed product decisions for the service.

The team also automated the EN verification process for positive COVID cases by SMS, enabling users to be contacted significantly faster than the previously manual verification process over a contact tracing phone call. The improved efficiency automation enabled helped Colorado go from initially sending 20-40 codes per day to an average of 5,000 codes per day. This automated verification process was also shared with other states, several of which adopted a similar verification framework.



Throughout the work, Colorado consistently shared learnings with other states facing similar challenges. For instance, we hosted an Exposure Notifications Learning Summit to share our process, work and lessons for other government entities, including federal, state and local partners within the U.S., as well as international governmental organizations (listen to the recording [here](#)). We also began our own automated metrics work with the goal to create a general-purpose framework for other states facing the same problem. Upon deployment, we open sourced our code for our automated EN metrics pipeline for use by other states (see repository [here](#)).



The State of Colorado also served as a core member of the Western States Coalition, including Washington, California, Hawaii, and Oregon, to share learnings and discuss EN challenges.

Impact

Today, more than 50% of Coloradans have been vaccinated. Mask mandates are being lifted, children are returning to the classroom and businesses are reopening. Stopping the spread of COVID-19 is a credit to the tireless efforts of state and local public health agencies and the systems that supported their work.

As Sara Tuneburg said about the Exposure Notifications application amid the heaviest stretch of infections, “These are game changers in the landscape of increasing infections and hospitalizations. The more people who are in this, the more people who add their phone to the fight against COVID-19, the more protection we get.”

The case investigation and contact tracing software has enabled Colorado to investigate hundreds of thousands of cases and notify their contacts of exposure since launching a year ago. Moreover, integration between key state systems eliminated double and triple data entry for many LPHAs, saving precious time. Exposure Notifications have been activated more than 2.2 million times in Colorado (more than 39% of Colorado’s total population).

Given that every little bit helps in a pandemic, this work has made a real difference in curtailing COVID-19 sickness and death in Colorado. A modeling study from Google and Oxford University performed in the U.S. found that even if only 15% of the population uses an EN app, it could lead to a drop in COVID-19 infections and deaths.

It goes without saying that we have all been fighting a common enemy in COVID-19 since the pandemic began. The adoption of Exposure Notifications and contact tracing has been crucial in enabling Colorado to combat COVID-19. As we look forward, we hope that the need for Exposure Notification applications on our phones and contact tracing can take a backseat. Until that time comes, the State of Colorado is proud to have worked with so many experts on a comprehensive solution that continues to evolve as much as we need it to.

