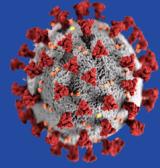


## CDPH COVID-19 After Action Report Chapter 18 – Enterprise Technology

# Chapter 18 Enterprise Technology

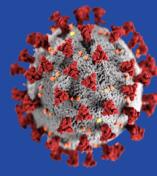


## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

## Version History

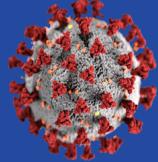
Version #	Date	Notes
0.1	10/10/2022	First Draft submitted to CPR Team
0.2	2/15/2023	Final Draft revised per review by CPR Leadership
0.3	7/31/2023	Final Draft reformatted
0.4	1/18/2024	Final Draft revised per Expert Review and CPR Leadership review
0.5	1/29/2024	Final Draft revised per re-review by CPR Leadership
1.0	5/2/2024	Final revised per CDPH Directorate review
1.1	1/9/2025	Final rebranded



## CDPH COVID-19 After Action Report Chapter 18 – Enterprise Technology

# Table of Contents

18. Enterprise Technology.....	18-1
Chapter Summary .....	18-1
Overview .....	18-1
Main Strengths and Successes.....	18-6
Main Challenges and Lessons Learned .....	18-9
Analysis of Activities .....	18-12
Technology Systems.....	18-12
Technology Workforce.....	18-22
Equity .....	18-29
Data and Technology .....	18-30
Communications.....	18-31
Workplan .....	18-32



# 18. Enterprise Technology

**Public Health Emergency Preparedness and Response Capabilities:** Information Sharing; Public Health Surveillance and Epidemiological Investigation.

**Related CDPH AAR chapters:** Data and Reporting; Vaccines; Contact Tracing; Testing.

In this chapter, some abbreviations may be used interchangeably with their respective full spellings for ease of reading.

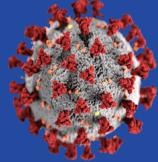
## Chapter Summary

### Overview

*This section provides a high-level overview of milestones and activities related to this chapter.*

The COVID-19 pandemic highlighted the critical importance of technology systems in unexpected and unprecedented ways. California's response was a data-driven one, and the need for accurate, timely metrics to make rapid policy decisions elevated the importance and visibility of public health technology systems. The unparalleled demand for data and metrics was universal across work streams and program areas, from outbreaks, hospitalizations, and deaths to testing, contact tracing, vaccines, and equity measures. In the beginning of the pandemic in early 2020, it quickly became clear that the California Department of Public Health's (CDPH) enterprise technology systems and technology teams were overwhelmed and unprepared by the volume of data. The existing systems had never been designed for a pandemic of such magnitude.

In response, State leadership deployed technology support teams from the California Department of Technology (CDT) and the Office of Data and Innovation (ODI) to assist CDPH. Early on, the California Health and Human Services Agency (CalHHS), CDT, and CDPH had to make key decisions about whether to reinforce older, existing systems or build completely new systems. The central question, according to one leader, was “what it would take to ensure that timely data was being presented to a policy decision-maker.”



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

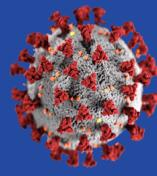
In some cases, existing systems, including the State's disease surveillance system and immunization registry, were bolstered and augmented in order to keep up with data volumes. This presented a unique set of challenges, since, according to one SME, "an enterprise system cannot be turned on a dime to increase capacity." In other cases, multiple new cloud-based systems were implemented to support the rapid expansion of program areas, especially around vaccines and contact tracing. Lastly, the new systems had to be integrated with the existing systems, a difficult task that required additional technology "middleware" to help the different systems exchange data and communicate with each other.

Under the guidance of the State CIO and CDPH leadership, necessary technology systems were able to move quickly from concept to go-live due to expedited procurement processes made possible by Executive Orders. Throughout the response effort, the significant majority of planning associated with the development of technology systems at CDPH was led by the State CIO and supported by department personnel, consultants, stakeholders, and other State partners. The ability to procure resources quickly and expedite contracting processes was the foundation of these ultimately successful efforts.

By the summer of 2021, most of CDT's staff had returned to their regular roles and teams were scaled down, although many contractors continue to support the new systems. This transition continued through September 2022, with CDPH's technology teams taking over ownership and oversight of more systems. This has presented specific challenges related to the alignment of security and architecture standards.

Nevertheless, from an enterprise technology perspective, CDPH is much more sophisticated organization. CDPH's technology tools, systems, and operational models have matured in efficiency, service delivery, and self-sufficiency.

The focus has now shifted to how to sustain the significant improvements that were achieved, and transition and scale down where necessary. As one IT leader noted, "the question is, where do we go from here and what services need to continue?" While many of the new systems were built specifically to address the COVID-19 pandemic, they also filled gaps and program areas that were previously lacking. For instance, California, in contrast to other states, did not possess a contact tracing system prior to the pandemic. Now that the contact tracing system and others have been built, many public health SMEs maintain that they need to continue. "We built them out in areas we were weak



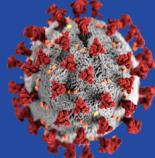
## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

on, and they should continue to be expanded and supported," one leader noted.

Efforts are currently underway to secure ongoing funding and obtain administrative approvals to maintain or expand the pandemic systems, as well as to replace the existing systems that were so difficult to stabilize. The goal is to ensure robust enterprise technology solutions that can support timely policy decision-making and data-sharing with State and local partners.

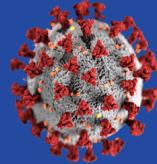
DRAFT



## CDPH COVID-19 After Action Report Chapter 18 – Enterprise Technology

### Timeline and Key Milestones

2020	
<b>Winter 2020</b>	<ul style="list-style-type: none"> <li>• <b>February – March:</b> Increased testing volumes overwhelmed CalREDIE, the Statewide disease surveillance system</li> <li>• <b>March:</b> Functionality to capture negative test result added to CalREDIE system</li> </ul>
<b>Spring 2020</b>	<ul style="list-style-type: none"> <li>• <b>March – April:</b> CDT provided early technology assistance to CDPH</li> <li>• <b>May:</b> CDT assumed technology leadership role</li> <li>• <b>May:</b> CalCONNECT (contact tracing system) launched</li> </ul>
<b>Summer 2020</b>	<ul style="list-style-type: none"> <li>• <b>June – August:</b> Procurement conducted for COVID-19 Case Reporting System (CCRS)</li> </ul>
<b>Fall 2020</b>	<ul style="list-style-type: none"> <li>• <b>October:</b> CCRS launched</li> <li>• <b>Late Fall:</b> PrepMod/COVIDReadi (interim vaccination program solution) released</li> </ul>
2021	
<b>Winter 2020/2021</b>	<ul style="list-style-type: none"> <li>• <b>Late December:</b> First vaccines arrived in California</li> <li>• <b>December:</b> CA Notify (public-facing digital exposure notification system) launched</li> <li>• <b>December:</b> CAIR2 (immunization registry) augmented by message broker software</li> <li>• <b>January:</b> myCAvax (vaccine management and ordering system) launched</li> <li>• <b>January:</b> My Turn (public-facing vaccine scheduling system) launched</li> <li>• <b>February:</b> Hourly COVID-19 immunization reporting established</li> </ul>
<b>Spring 2021</b>	<ul style="list-style-type: none"> <li>• <b>March – May:</b> Functionality and improvements continued to be released for new COVID-19 systems</li> </ul>
<b>Summer 2021</b>	<ul style="list-style-type: none"> <li>• <b>June:</b> Digital COVID-19 Vaccine Records (DVR) System launched</li> <li>• <b>End of June:</b> CDT support efforts scaled back</li> </ul>
<b>Fall 2021</b>	<ul style="list-style-type: none"> <li>• <b>September – November:</b> Planned procurements for ongoing maintenance and enhancement of CalCONNECT; a new software solution for CCRS; and efforts to replace CalREDIE.</li> </ul>
2022	
<b>Spring 2022</b>	<ul style="list-style-type: none"> <li>• <b>April:</b> Migration of San Diego's separate immunization registry (SDIR) into CAIR2 completed</li> </ul>



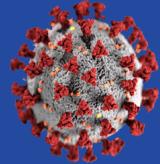
## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

2023	
Winter 2023	<ul style="list-style-type: none"><li>• <b>February 28:</b> California's State of Emergency for COVID-19 ended</li></ul>
Summer 2023	<ul style="list-style-type: none"><li>• <b>June 30:</b> CDPH's Medical Health and Coordination Center (MHCC) deactivated from the COVID-19 pandemic response</li></ul>

## High Level List of Major Enterprise Systems

Abbreviation	System Name	New or Existing?
CalCONNECT	California Confidential Network for Contact Tracing	New
CalREDIE	California Reportable Disease Information Exchange	Existing
CCRS	California COVID-19 Reporting System	New
CAIR2	California Immunization Registry	Existing
myCAvax	California Vaccine Management System	New
My Turn	My Turn	New
DVR	Digital COVID-19 Vaccine Record	New



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

## Main Strengths and Successes

This section describes the Main Strengths and Successes, including findings and corrective actions, related to this chapter. Further elaboration and a more detailed discussion of these strengths and successes can be found in the Analysis of Activities section.

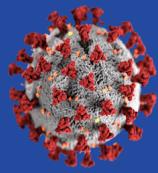
### **1. The State implemented multiple new technology systems at unprecedented speed to support the pandemic response, including contact tracing, reporting, and vaccines.**

As part of its pandemic response, the State implemented multiple innovative technology solutions to support new workstreams, including its contact tracing effort and COVID-19 vaccination campaign. These solutions included five major systems: CalCONNECT, the COVID-19 Reporting System, myCAvax, My Turn, and the Digital Vaccine Record. With the support of its partners and access to funding, the State procured and implemented these systems with record speed, in some cases cutting year-long procurement processes down to weeks. Each system presented an innovative solution to a specific pandemic problem, from the public-focused systems that enable Californians to book vaccine appointments and obtain their digital vaccine card, to the provider-and LHJ-focused systems that allow providers to order vaccines, schedule and manage clinics, and report vaccinations. These technologies support a vast array of services. As one leader noted, “it’s incredible how far we’ve come.” Now that these systems have been configured and implemented, many agreed that CDPH has a window of opportunity to institutionalize and integrate them.

Finding/Corrective Action: CDPH should identify opportunities for the standardization and integration of its technology systems from an enterprise perspective. (ID: Enterprise Tech 1)

### **2. The State successfully shored up its aging but critical systems to support COVID-19 disease surveillance and immunization efforts.**

In addition to implementing new technology systems, the state augmented and bolstered existing systems, including two mission critical systems—the State’s disease surveillance system (CalREDIE) and



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

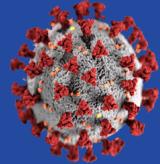
immunization registry (CAIR2). These older systems were never built to withstand a pandemic of this magnitude and the associated data volumes it created. In order to prevent these key systems from failing, CDPH and its partners worked around the clock, especially in 2020, to add new hardware, servers, integrations, and support technology applications. Especially when compared with the new systems, SMEs indicated it was impressive and a “huge success” to keep CalREDIE and CAIR2 up and running instead of replacing them—in addition to successfully integrating them with new cloud-based systems. At the same time, many indicated the need for CalREDIE and CAIR2 to be replaced with modern technology, efforts which are currently underway.

Finding/Corrective Action: CDPH should continue to pursue its CalREDIE and CAIR2 technology replacement projects, and identify other existing systems that may be good candidates for replacement or modernization. (*ID: Enterprise Tech 2*)

### **3. The authority to expedite and issue emergency contracts enabled CDPH to purchase the technology goods and services it needed quickly.**

The State’s ability to build new systems, shore up existing systems, and continually modernize its technology to meet changing pandemic needs was made possible by expedited procurement processes, increased funding, and exemptions enabled by emergency orders. Many SMEs indicated that the availability of the authority, funds, and resources “has been the most important key element” in helping CDPH respond from a technological perspective. “We were given the freedom to do whatever it takes to get the right systems, vendors, and people,” one leader noted. Others spoke of the seriousness with which IT needs were taken by executive leadership when it came to issuing emergency contracts. While this authority was enabled by the unique pandemic environment, there are lessons that can be applied to normal business operations—especially expedited procurement and contracting, which SMEs indicated has always been a challenge for the State.

Finding/Corrective Action: CDPH has the opportunity to document its emergency contracting and procurements processes for future responses, and identify what processes can be leveraged to improve regular business operations. (*ID: Enterprise Tech 3*)



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

See related finding Med Surge –1 in the Medical Surge Chapter in this AAR. See also the Contracting and Procurement chapter in this AAR.

#### **4. Other State departments, including CDT and ODI, stepped into manage CDPH's technological response when it became evident that the technology teams needed additional resources and support.**

As testing volumes began to increase in early 2020 and the first CDPH systems began to show signs of stress, it quickly became clear that CDPH's technology teams needed more resources. In May 2020, CDT and ODI helped scale up and manage CDPH's technological response efforts under the direction of the State CIO. These departments brought hundreds of personnel, engineers, project managers, and vendors to support the massive technological response, which included building five new systems, shoring up two critical existing systems, and implementing many other supporting applications and tools. CDPH program and technology teams were trained on how to run virtual 24/7 incident rooms and establish round-the-clock rotations. According to one IT leader, "everyone rolled up their sleeves," and without the help from State and vendor partners, "we would've been dead in the water."

Finding/Corrective Action: CDPH should document its resources, standards, and processes for 24/7 operations should the need arise again. (ID: Enterprise Tech 4)

## Main Challenges and Lessons Learned

This section describes the Main Challenges and Lessons Learned, including findings and corrective actions, related to this chapter. Further elaboration and a more detailed discussion of these challenges and lessons learned can be found in the Analysis of Activities section.

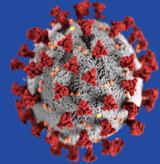
### **5. The pandemic highlighted the criticality of having modern, robust technology systems, which leaders need to make rapid public health policy decisions.**

CDPH was under pressure to provide continuous status updates to multiple stakeholders, which reinforced the need for reliable and scalable technology during the pandemic response. In the word of one leader, “there was a true realization that everything hinged on IT.” Initially, the teams were unprepared for these intense inquiries, which at times diverted them from their technical work. Over time, the implementation of automated dashboards, monitoring tools, and other modernization efforts gave audiences access to the information they needed. The pandemic has underscored the criticality of robust technology to all public health programs. While incredible progress was made, there is still much work to be done around data-sharing, system interoperability, cloud strategies, predictive analytics, and other areas. “We are entering a new mode, but we haven’t quite got there yet,” one leader commented. According to another, additional technology modernization and sophistication is needed so that leaders have visibility to the right data to make quick policy decisions.

Finding/Corrective Action: CDPH should continue investing in its technology modernization efforts currently underway, including improving system interoperability, focusing on cloud strategies, and improving data-sharing between State and local partners. (ID: Enterprise Tech 5)

### **6. The rapid increase in technology vendors revealed the need for improved vendor oversight, management, and planning.**

The sudden influx of technology vendors, while critical to supporting CDPH systems, presented challenges to manage and oversee their activities. In some cases, vendors were not able to scale up as quickly as



## CDPH COVID-19 After Action Report

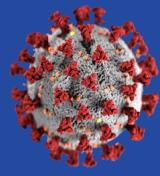
### Chapter 18 – Enterprise Technology

promised, or were unable to deliver certain functionalities that the State needed. Given the number of technology projects running concurrently, it was difficult to maintain adequate vendor oversight without clearly documented policies and processes. One of the main lessons learned, according to one leader, is that “vendor requirements are as important as system requirements.” Documenting vendor requirements, roles, and responsibilities would help the State manage its technology vendors more effectively. Furthermore, having vendor activation plans and vendor transition plans in place would allow the State and its partners to respond more nimbly to changing needs by scaling up and down.

Finding/Corrective Action: CDPH has the opportunity to create several planning documents to improve its oversight of technology vendors, including vendor requirements, activation plans, and transition plans. (*ID: Enterprise Tech 6*)

#### **7. Many new technology systems were implemented without significant input from ITSD, and as a result are not aligned with CDPH's technology standards, systems architecture, and security principles.**

As State and vendor partners quickly implemented technology solutions on CDPH's behalf, ITSD was often not included in key early planning discussions. As a result, many of the new cloud-based systems are not aligned with CDPH's enterprise architecture and security standards, which are based on storing personal health care data. Additional consequences include redundant platforms, the incompatibility of some systems with CDPH's environment, and the need to maintain a costly security operations center. It took over two years after the start of the pandemic for ITSD to assume oversight of the systems that had been built by State and vendor partners. Throughout the process, it faced delays and challenges because the systems were not aligned with ITSD's standards. Efforts are already underway to mitigate some of these challenges in future responses, such as development of a systems inventory, enterprise architecture standards, and security policies and principles. Going forward, SMEs identified the need for ITSD to be “at the table” much earlier in the decision-making processes, and suggested the establishment of an emergency information technology task force to foster communication on IT protocols between CDPH, CDT, and ODI.

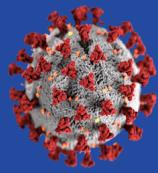


## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

Finding/Corrective Action: Create an emergency technology task force to promote mutual understanding and coordination, and finalize the systems inventory, enterprise architecture standards, and security policies, already underway. (ID: Enterprise Tech 7)

DRAFT



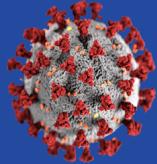
# Analysis of Activities

This section elaborates and provides more detail on the findings, corrective actions, and lessons learned that are presented in the Main Strengths and Successes and the Main Challenges and Lessons Learned sections.

## Technology Systems

### Test Data Volumes Destabilized CDPH's Existing Disease Surveillance System (CalREDIE)

- Statewide needs for COVID-19 testing quickly accelerated in Spring 2020. CalREDIE served as CDPH's system for collecting and storing COVID-related data from labs, healthcare providers and most local health departments. All 61 LHJs in California use CalREDIE in some capacity, and 58 LHJs use the system for surveillance of all notifiable communicable disease. CalREDIE includes multiple technology components and applications, including a front-end electronic record reporting (ELR) gateway, a staging area, a provider portal, and an alert system.
- In early 2020, the biggest challenge was making sure that the State's system for disease surveillance was able to handle increased data volumes caused by increased testing. According to many, CalREDIE was never designed for a pandemic of this magnitude, and stabilizing it required a monumental effort with much time spent in "crisis mode."
- CDPH's IT staff and CalREDIE program team suddenly found themselves in a unique position: responsible for an aging, existing system that "had been limping along for years with hardly any resources," that suddenly "became the most critical resource in the state."
- As cases started to rise, CDPH's technology team realized the disease surveillance systems would soon be overwhelmed and began making modifications, changes, and expansions. COVID-19 testing was becoming more prevalent, and in response, labs ramped up their testing capacity. The first system to be impacted was the front-end gateway, which receives raw lab data and initiates data processing on those messages. Before the pandemic, CalREDIE was processing an average of 10,000 test results per day. As testing ramped up, so did the system's daily averages.

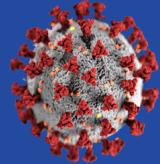


## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

By mid-summer 2020, the system was processing between 100,000 and 200,000 test results per day.

- This sudden increase in volume was due in part to the new requirement for labs to report both positive and negative COVID-19 test results, which went into effect in early spring 2020. This represented a significant change and challenge. Previously, only positive results were required for reportable diseases, but suddenly, with both positive and negative results mandated, the volume of transactions spiked. Additionally, many more labs began offering COVID-19 testing, which also increased volumes.
- According to one leader, the core metric used to plan California's response was test results: "the processing of those lab tests is what our government used to plan the response." This led to an entirely new effort to generate reports for leadership to use in developing policy.
- As test data increased, the front-end of the disease surveillance systems began to fail and were not able to produce the required daily metrics, which created a "huge downstream effect." Leaders noted that it was important to consider the front-end impacts felt by later processes and teams. In this case, early delays at the gateway created a ripple effect, impacting the system's ability to separate positive from negative test results. The counties then became impacted by this, since LHJs used CalREDIE to access their data. LHJs reports were taking four hours to generate instead of 30 minutes. Similarly, CDPH's epidemiologists who relied on the system faced significant delays: reporting teams would receive raw data and spend 24 hours generating a report, but "before it was done you would have to start working on the next day."
- It took over six months for the State to stabilize the gateway and CalREDIE to accommodate the increased transactions without data loss. Stabilizing the disease surveillance systems and applications as a whole took almost one year, and involved the procurement and creation of an entirely new system – the California COVID-19 Reporting System (CCRS), discussed below.
- In hindsight, SMEs noted that more robust stress testing of CalREDIE could have been performed. While stress testing was done, it was not sufficient to prepare the system or the team for the extremely high data volumes



## CDPH COVID-19 After Action Report

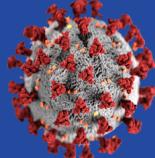
### Chapter 18 – Enterprise Technology

associated with an explosion in testing. But there is now an opportunity to “look back in the rear-view mirror,” in the words of one leader.

- At its peak, CalREDIE was ingesting 900,000 ELR messages a day at the gateway. As one leader reflected, “That’s a pretty high number. Today we have the ability to handle that volume. Looking ahead, could we do 2 million or 3 million? More importantly, should we be prepared to do that, given the associated costs?”
- See also the Data and Reporting chapter and the Testing chapter in this AAR.

### Implementing a New Reporting System (CCRS) Helped Improve Test Data Quality and Standardization

- In addition to the challenges resulting from high data volumes, another CalREDIE obstacle was poor quality data, which increased as more labs began sending test results. CCRS offered a solution to this data quality problem. Procured in late summer 2020, CCRS went live in October 2020 and was comprised of two main components: an “upstream” component in front of CalREDIE to help standardize data and improve data quality, and a data warehousing component located “downstream” of CalREDIE to assist in data storage and reporting. As increasing numbers of labs began performing COVID-19 testing, the numbers of data quality issues began to rise. Since the State has little control of the quality of lab data being sent in due to a lack of mandates, the CCRS solution vendor helped interface with the labs to improve and standardize data quality prior to it being fed into CalREDIE. This effort included manually contacting every single lab to request corrections to poor quality data, as well as installing software to analyze incoming data quality and suggest corrections to missing fields. Once CCRS had improved the quality of incoming data, the State was able to focus on automating manual processes in CalREDIE to alleviate burdens on staff.
- Ultimately, by scaling up CalREDIE and implementing CCRS to support and supplement it, the State was able to successfully meet the enormous data volumes. According to one SME, “where we are today is light-years away from where we started.”



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

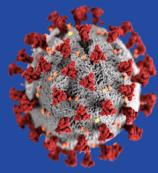
- Plans are currently underway to analyze alternatives and estimate costs for a new system to replace CalREDIE, a project known as the Future Disease Surveillance System (FDSS).
- For a more detailed discussion of CalREDIE and CCRS, see the Data and Reporting chapter in this AAR.

### Creation of New Cloud-Based System to Support New Contact Tracing program (CalCONNECT)

- From an enterprise technology standpoint, while the CalREDIE system was being stabilized and augmented, there was a parallel focus on building new systems to support the response effort. The first of these new cloud-based systems was CalCONNECT, the State's contact tracing system, a core component of the State's broader contact tracing program (California Connected), established in May 2020.
- Many senior CalREDIE staff were reassigned to help with the CalCONNECT project. By following an expedited procurement that evaluated other states' contact tracing systems, a minimum viable product (MVP) was released in just two months utilizing an Agile approach. As one leader put it, "we're now shifting to a new area. We are building new systems in the cloud, and this is all new to us."
- For a more detailed discussion of CalCONNECT and CA Notify (the State's digital exposure notification solution), see the Contact Tracing chapter in this AAR.

### Integrating Existing Technology Systems with New, Cloud-Based Systems Was Harder than Expected

- The creation of new, cloud-based systems required implementing supporting software and platforms to help the new systems "talk to" and integrate with the existing on-premise systems. These supporting solutions including scheduling software (Schedulo), integration software (Mulesoft), data warehousing software (Snowflake), and other supporting applications built on a variety of platforms.
- One of the most difficult integrations was between CalCONNECT and CalREDIE. Contact tracers using the CalCONNECT system needed to access positive case data so they could contact those individuals and conduct contact tracing; however, that case data lived in CalREDIE and



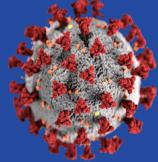
## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

was not easily accessible. The need for contact tracers to have access to case data prompted the integration of the existing disease surveillance system with the new cloud-based contact tracing system.

- Many SMEs emphasized how difficult it was to integrate these fundamentally different technologies, an effort described as “trying to integrate a BMW car with a BMX bicycle.” Whereas CalREDIE is built on a proprietary, older platform that is not prevalent within the broader industry, CalCONNECT is built in the cloud using modern, scalable, and widely-used technology. While the systems were eventually integrated and are able to exchange data, they lack interoperability due to being built on two separate platforms.
- To build the integration between CalREDIE and CalCONNECT, the State implemented another new technology solution—a data lake that was designed to facilitate data movement between the two systems. However, while this solution “sounded great on paper,” in reality “data would go in and it wouldn’t come out.” While the data lake was envisioned as a seamless solution, the reality of having many teams with varying levels of data lake expertise working on it further complicated integration efforts. The multiple teams working on the integration included ITSD, CDT, CalREDIE and CalCONNECT program staff, and CalREDIE and CalCONNECT system vendors (Sunquest and Accenture, respectively). These teams struggled with data corruption and integrity issues.
- Overall, one SME summarized, the integration between the systems is “a very finicky one that requires a lot of ‘care and feeding’—there are lots of eyes on it, lots of monitoring, and changes have to be very carefully done.” Now, months may pass without serious integration challenges, but this is due in part to the teams having learned “the hard way” how important it is to coordinate everyone involved before making system changes.
- For a discussion of the CalREDIE/CalCONNECT integration challenges from a Data and Reporting perspective, see the Data and Reporting chapter in this AAR.

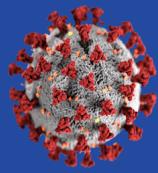
### California’s Immunization Data System was Shored Up in Preparation for the State’s COVID-19 Vaccination Program



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

- The second existing system that required intensive augmentation was the State's immunization information system (IIS), the California Immunization Registry (CAIR2). An immunization registry is a secure web-based database that can store patients' immunization records; all 50 states have immunization registries. CAIR2 is a secure, confidential, statewide computerized immunization information system used to track patient immunization records and keep an inventory of vaccines.
- Historically, the option for California providers to submit their vaccination data to CAIR2 was voluntary—but this changed with the arrival of COVID-19 vaccines in early December 2020. In order to be eligible to administer COVID-19 vaccines, providers were required to report vaccine data to CAIR2, per CDC and State requirements. Given this new requirement, it was suddenly mission critical to make sure that the registry could handle the anticipated influx of data associated with the COVID-19 vaccination campaign. AB 1797 (Chaptered 2022) mandates health care providers enter a patient's immunization record into CAIR2 through 2025.
- In preparing the system for the arrival of vaccines, the technology team applied lessons learned from earlier efforts to stabilize CalREDIE, the State's other mission critical existing system. The most important lesson was that "there was no room for failure" given the system's visibility and centrality to policy-making. According to one SME, "the level of focus on the system was the most important lesson. Everything had to go perfectly, and there was a heightened awareness that it cannot fail."
- The team accelerated the implementation of a message broker in December 2020 to help expand capacity system and "fault tolerance," which prevented the loss of data messages. CDPH also upgraded the CAIR2 hardware, added a cloud-based data warehouse (Snowflake), and made other improvements including enhanced integrations.
- Another challenge was that two local health jurisdictions, the Counties of San Diego and San Joaquin, did not participate in CAIR2 before the pandemic, but maintained separate immunization registries (SDIR and RIDE, respectively). These registries were not integrated with the State's system. However, CDPH needed to report vaccine doses administered for the entire State, yet lacked insight into the doses that were reported to SDIR and RIDE. As part of the implementation of the data warehouse, solutions were built to de-duplicate records as well as receive vaccine



## CDPH COVID-19 After Action Report

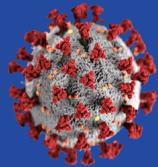
### Chapter 18 – Enterprise Technology

doses from the two other separate registries. In April 2022, San Diego migrated to CAIR2—a significant milestone—leaving only one remaining registry whose data is not in the State's registry. Efforts are underway to better share data between RIDE and CAIR2.

- State technology teams spent significant energy improving the data quality of immunization records. “What we achieved on the immunization data quality is incredible,” one SME noted. Efforts included software tools to help improve data quality as well the creation of a Data Strike Team to work with providers to improve the quality of submissions.
- Similar to CalREDIE, which will be replaced by a modern disease surveillance system, planning for the replacement of CAIR2 is currently underway.
- For a more detailed discussion of CAIR2, see the Vaccines chapter in this AAR.

### Multiple, Innovative Vaccination Systems were Implemented to Support the COVID-19 Vaccination Program (myCAvax, My Turn, and Digital Vaccine Record)

- In late 2020 the impending arrival of vaccines in California prompted the creation of new technologies to support the State’s vaccination program. The State procured and began to build myCAvax, which would be California’s vaccine management system that included provider enrollment, provider registration, and vaccine allocation, ordering, and shipment. This system, like CalCONNECT, was built in the cloud.
- From an enterprise technology standpoint, myCAvax represented another major pivot and the addition of another completely new technology and program. “Unlike the contact tracing system, myCAvax isn’t looking for 10,000 people to make phone calls,” one leader noted. “For vaccine allocation, you have to onboard providers and assign them vaccines, and then get shipments to them.” Another added, “we didn’t have anything to cope with that, so we had to create it,”
- In November and December 2020, as health care providers were starting to enroll in the vaccination program, myCAvax was not ready. A decision was made to use another technology solution, PrepMod/COVIDReadi, to bridge the gap. This temporary solution allowed providers to enroll in the

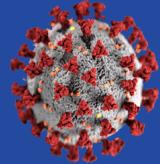


## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

vaccination program while myCAvax was in the procurement and development process. In mid-January 2021 myCAvax went live with its initial enrollment functionality. This was a major milestone since it automated the previously-manual provider enrollment process in PrepMod/COVIDReadi.

- The myCAvax project team, including State and contractor staff, continue to build and release functionality in response to changing pandemic needs and new vaccine products. As of September 2022, the system had nearly 9,000 providers enrolled and has been used to order 53 million COVID-19 vaccine doses from the CDC. It was accomplished in a highly accelerated timeline that was previously unheard of for a State of California technology implementation.
- While the vaccine management system was designed to support California providers who would be administering vaccines, it was not built for the public. The State's vaccination campaign needed a statewide "front door" that would allow Californians to assess their eligibility for the vaccine, search for vaccine clinics, and book their appointments. This prompted the implementation of another entirely new, large-scale cloud-based technology system called My Turn.
- My Turn was unique in many ways, most notably that it would be used by the public. As one leader noted, "We had very few systems that were open to the public before." But with My Turn, there was suddenly a need to provide a system that 40 million Californians could use.
- In early January 2020, My Turn went live within 9 days, which is exceptional considering that projects of this magnitude typically spend two or more years in the planning phase, and another two years in development before going live. As of August 2022, Californians used My Turn to schedule over 10.7 million appointments and intake for 3.4 million walk-in appointments. The system offers scheduling in 14 different languages.
- In June 2021 the State implemented the Digital COVID-19 Vaccine Record (DVR). The DVR allowed the public to obtain a digital copy of their vaccine card. After an individual entered their details, they could get a link to a QR code which could be saved on their phone. The DVR was popular with the public, and within six months of implementation, 6.3 million Californians downloaded their digital vaccine record. As of mid-



## CDPH COVID-19 After Action Report

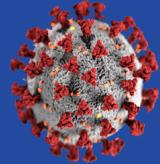
### Chapter 18 – Enterprise Technology

April 2022, almost eight million Californians have downloaded their records. The DVR is offered in eight different languages.

- Each of these systems (myCAvax, My Turn, and DVR) constitute large-scale technology project and were “incredibly innovative solutions that addressed specific pandemic problems,” according to one leader. For each solution, “we went from no system at all to having a mature system with hundreds of people working on it,” another noted.
- For a more detailed discussion of myCAvax, My Turn, and DVR, see the Vaccines chapter in this AAR.

### **Technology Teams Were Under Pressure to Deliver Constant Updates, Reinforcing the Centrality of Technology to the Response. Over Time, Dashboards and Automation Facilitated Easier Reporting.**

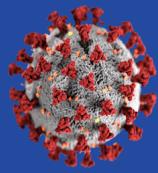
- In early-to-mid 2020, the general sense of crisis was felt acutely by CDPH's technical teams, who, in addition to bolstering existing systems, fielded constant requests for updates. ITSD suddenly found itself at the center of the State's response in unprecedented ways. A technology leader spoke of a significant realization, namely that “everything hinged, every day, on how IT was doing and if we were able to keep up.”
- The amount of interest in CDPH's technology work and its new centrality to the pandemic response was unexpected. The number of stakeholders requesting updates was so large that at times it diverted the technical teams from their work. The teams “were spending their time doing updates instead of spending their time fixing things faster,” according to one SME. With so many parties wanting to be involved, the demand for updates was “overwhelming and unrealistic.”
- Over the course of the pandemic, CDPH went from having no status dashboards to an elaborate dashboard and reporting system with daily and even hourly reports. In February 2021, hourly COVID-19 immunization reporting was established that enabled leadership to monitor vaccination rates in near-real-time. On the provider and clinic side, the State went from “no system to a mature system” with the implementation of CCRS, which enabled sophisticated reporting. As automated reporting and dashboards were added, this reduced the demand for status updates from CDPH's technical teams.



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

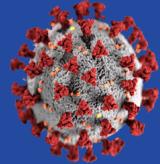
- Within CDPH ITSD, reporting and monitoring occurs every morning for all COVID-19 response systems. Individual response systems have dashboards and metrics that provide an indication of system health, and identify potential glitches. There is also a comprehensive dashboard that depicts the traffic and dataflow between all of the response systems on both the immunization and the surveillance side. Additionally, the security operations center continuously monitors metrics and triggers related to information security. The extent of alarms, monitoring, dashboards, and reporting for these systems enable ITSD to track system health, performance, and security in innovative ways that were “unheard of” before the pandemic, and freed up technical teams to continue their technology work.
- The criticality of CDPH ITSD’s work, and the scrutiny that technology teams found themselves under, reinforced the elevated importance of technology and data to the response. As one leader noted, “programs run the programs, but without IT you can’t get much done nowadays. If a program wants funding to expand their staffing and the program, IT needs three times as much to support what they want to do.”
- For a more detailed discussion of reporting, see the Data and Reporting chapter in this AAR.



## Technology Workforce

### State Partners Stepped in to Provide Technology Assistance and Resources, and Expedite Contracting Processes

- In early 2020, CDPH technology teams and programs were charged with managing existing technologies and used internal resources to gather data and report out to several state agencies. Within a month of the outbreak, the existing systems and personnel became overwhelmed as neither were designed to meet the demands of a statewide pandemic. “Our first step was to look for resources, but State staff alone were totally overwhelmed,” one CDPH SME noted.
- CDPH’s technology teams and program data teams struggled to scale up, and the Governor’s Office directed CDT and ODI to provide assistance to enhance CDPH’s capabilities in technology, data, and reporting.
- In May 2020, Governor Newsom deployed the State CIO and personnel from CDT to help develop, deploy, and manage all technological response efforts at CDPH. Various CDT technology teams, including vendors and engineers, were virtually embedded with CDPH teams from May 2020 to June 2021, and assumed ownership of many activities. The CDPH CIO and technology team took direction from CDT, and CDT also assumed oversight over the procurement of CalCONNECT, California’s contact tracing platform, in May 2020, as well as other systems.
- CDPH’s numerous technology teams collaborated with CDT teams based on the need and workstream area, from procurement oversight to troubleshooting and augmenting the State’s existing surveillance and immunization systems.
- The assistance provided by CDT included process improvements, including how to run virtual incident rooms and “tiger teams” (cross-functional experts brought together to solve a specific problem). “CDT was there with us every day, offering up their people, their project managers, and helping us go through change management,” one leader commented, recalling Sunday meetings with the State CIO to shore up the systems.



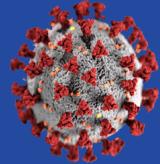
## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

- Leaders and staff described these early efforts, through the summer of 2020, as frenzied. “Our measurement was, how do we make sure these systems no longer crash,” one leader noted, emphasizing the criticality of meeting daily reporting needs in order for policy decisions to be made.
- In Fall 2020, the chaotic pace became more manageable with the introduction of a three-shift operations structure. Because CDT was responsible for state-wide IT, they already had this structure in place to ensure around-the clock-support, whereas CDPH’s technology had never been a “24/7 shop.” Once CDT supported CDPH to establish this operations structure, “things became more manageable,” according to one expert.
- CDT’s intensive support continued through June 2021 and then tapered off. Collaboration with CDT continued for certain hybrid systems, such as the Digital Vaccine Record, which was partially hosted by CDT.
- In addition to providing its personnel and resources, CDT and its partners helped expedite the contracting process, which was integral to getting the new systems built rapidly. “We sped through the process really fast, and the help we got was instrumental,” one SME noted. There was a willingness to provide whatever was needed, from faster approvals to increased funding. Because “we were given the flexibility and ability to get things going really fast,” CDPH was able to procure the technology goods and services much faster than usual in order to respond rapidly to the pandemic.
- For a discussion of expediting procurements in the context of procuring PPE, see the Medical Surge chapter in this AAR.

### **Vendor Relationships Helped CDPH Scale Up its Technology Systems and Services Rapidly**

- In addition to its partnership with CDT, CDPH also relied on vendors and contractors to quickly scale up its IT services to respond. “We had to rely so much on vendors because we didn’t have enough knowledge or skill in the State to handle the volume,” one leader noted. As multiple existing systems were bolstered and multiple new systems were implemented, CDPH contracted with many vendors to support the increased workload, from systems integrators to project managers. Since the State was “not equipped to stand things up in a rapid fashion,” according to one SME, it



## CDPH COVID-19 After Action Report

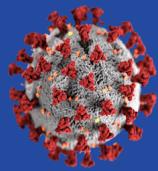
### Chapter 18 – Enterprise Technology

relied on “trusted vendor partners who were able to step in and get things up and running under the direction of State staff.”

- Overall, CDPH’s partnership with its technology vendors was successful and collaborative. For the most part, vendors were able to provide the crucial needed knowledge and bandwidth. However, in some instances, even vendor resources were constrained.
- There were many challenges to upgrade the CalREDIE system, which is built on a proprietary platform that is not common in the industry. CDPH found it difficult to find vendor support to bolster, expand, and troubleshoot the CalREDIE system. As one SME noted, “when you have only two vendors who know the system and the specialized database structure, there isn’t anything you can do.” Multiple times other vendors attempted to help, but were unable to due to a lack of familiarity with the system’s proprietary technology.
- Ultimately, the CalREDIE vendor was able to scale up its team of 2-3 to 10-15 people, but it was a challenge. “We were lucky to be able to scale up CalREDIE, since even the vendors themselves didn’t have the capacity to help us quickly expand,” an IT leader noted.
- With the support of many vendors and consultants, the State was able to stabilize its existing systems and implement new systems, which it would not have been able to do otherwise. As one SME commented, “they were so essential—we wouldn’t have been able to do it without vendor support and having a good solid working relationship.”
- A key lesson learned is the importance of having a well-defined set of vendor requirements for supporting the State’s systems. “The takeaway is that vendor requirements are important as system requirements,” one leader emphasized: “these vendor relationships need to be in place, and we need to have activation plans to make sure they’re willing to set up and have the right resources.” This would entail not only identifying and establishing the right vendors, but having more frequent enterprise-level planning meetings with them to prepare for “the next disaster.”

#### Sudden Influx of Technology Vendors Revealed the Need for Robust Vendor Oversight and Transition Planning

- While vendor relationships were integral to the success of the response work from a technology perspective, the sudden influx of vendors and



## CDPH COVID-19 After Action Report

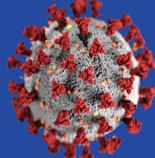
### Chapter 18 – Enterprise Technology

contractors created new challenges for the State. With so many new vendors involved in building and bolstering systems, it was increasingly difficult to maintain adequate oversight. In some instances, vendors overstated the functional abilities of their systems. According to one SME, “we got assurances that systems could do certain things, but it wasn’t until three months later that we learned it couldn’t.”

- According to leadership, one of the key lessons learned is the importance of having standardized processes and procedures documented. “All parties need to know their scope, deliverables, and what’s acceptable and not acceptable,” one SME summarized. “We need to have more oversight, whether it’s regular stress testing and checks and balances, because programs don’t necessarily know what to look for,” another added.
- SMEs also indicated the importance of a transition and knowledge transfer plan to shift maintenance and operations from vendors to State staff. According to SMEs, the State needs to develop and implement a plan to eventually decrease the heavy reliance on technology vendors and transition portions of this responsibility to State staff. SMEs agreed that this may take years to achieve.

#### **CDPH’s Technology Division was Not Involved in Early Decision-Making, Leading to Later Misalignment between Systems and Standards**

- The partnership between CDPH, CDT, and ODI was integral to helping the State scale up quickly, including creating new systems from scratch and bolstering existing systems. However, ITSD was not involved early in important processes and decisions relating to systems that it would eventually be required to support. There was “significant pushback and resistance” from CDPH programs and vendors towards having ITSD more involved in the implementation and support of vendor systems. Due to the lack of early involvement, more than two years into the pandemic response CDPH finds itself responsible for new technology solutions that do not align with its enterprise architecture and security standards.
- Some of the cutting-edge technology solutions that were spearheaded by other State partners have resulted in unique challenges. These challenges include redundant platforms, different security standards, and

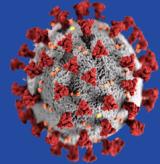


## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

the use of open source software not supported by CDPH. For instance, while CDPH's existing on-premise and cloud-based systems are hosted by Microsoft, many of the new systems developed during the response reside in other cloud environments. As a result, ITSD lacks security visibility into cloud systems managed by third parties and had to create a costly security operations center as a work-around.

- CDPH has robust security standards due to the Protected Health Information (PHI) and Personally Identifiable Information (PII) that it processes. During the pandemic other State partners deployed technology systems on CDPH's behalf. Now, more than two years later, ITSD is facing unique challenges as it takes over maintaining these systems including the need to contract back with other State departments that are better equipped to support infrastructure incompatible with CDPH's technology environment.
- There are several lessons learned from these challenges. CDPH needs to keep an inventory of all systems implemented on its behalf to plan for the effort and costs to maintain them. ITSD is also currently documenting its security policies and principles in an easy-to-understand format, so that in the future, the document can be given to vendors and agencies upfront.
- Additionally, in future responses, CDPH enterprise technology representatives “need to be at the table much earlier on” to provide important input on systems that it will be asked to support in the future. As one SME noted, ITSD ultimately has “full accountability for all IT functions, and we have to be involved in the process to ensure compliance to security, implementation, and architecture standards.”
- Plans are already underway to build processes that will allow ITSD to provide input, including the development of an IT intake process and score card. This will constitute a “paradigm shift” that will take time to implement and that will need to be sponsored and communicated by leadership.
- Lastly, SMEs articulated the need for an emergency IT planning task force between CDPH, CDT, and ODI to foster mutual understanding and communication, and to conduct emergency response scenarios. These scenarios could be annual “table top” exercises based on different scenarios (for example, “how to be ready and know who to contact if you



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

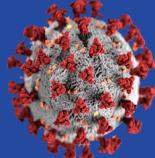
have 24 hours to initiate a new application"). With this structure in place, the task force would be better able to support the needs of CDPH while also meeting the standards of CDT and other partner agencies.

#### Technology Siloes Present an Opportunity to Consolidate IT Services

- One of the initial challenges early in response was the fragmentation of CDPH's technology management. While ITSD, as the central IT department, had extensive knowledge of network and application support, many business programs have their own shadow IT department, which housed critical programmatic knowledge. In some cases, these programs have very limited coordination with ITSD.
- This fragmentation creates siloes and inefficiencies, as different programs house individual teams who are charged with supporting their program-specific systems, reports, and data analytics. "There are too many pockets of people doing similar things," one leader noted. For external State and vendor partners who collaborated with CDPH, this sometimes led to the experience that "you're not working with a single department, but with 20 separate teams who happen to have CDPH email addresses."
- While CDPH programs are distinct and unique, the need for technology is common and could be further consolidated to reduce duplication and inefficiency. There is a need to harness the individual technology talent to better consolidate services. "With a roadmap to consolidate and standardize these services, we will be able to do a lot more," one SME commented.

#### CDPH Technology Teams Worked Unprecedented Long Hours in a New, Remote Environment to Shore Up Systems

- CDPH's technology teams responded urgently and "stepped up to the call of duty with a heroic effort" in order to keep critical systems and infrastructure running. This involved unprecedented, long hours, especially over key periods. For instance, from approximately October 2020 through January 2021, while critical systems were being stabilized, the team worked 7 days per week, starting at 6 am and ending at 2 am. Since the call to action was urgent and unprecedented "there was never a delay in getting people to step up." As one technology leader noted,

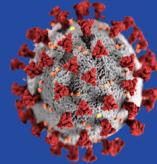


## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

“Californians were dying every day, so the question was, could we do one little thing more?”

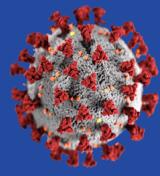
- While CDPH’s technology teams did not hesitate to rise to the occasion, SMEs spoke of the toll this schedule took. Many felt this was not adequately acknowledged or compensated. For instance, in the summer 2020 it was difficult to fathom the 10% pay cut for CDPH employees. The State ultimately restored base pay and issued raises but this was not a certainty when CDPH technology teams were working almost around the clock.
- Within the context of enterprise technology, equity was not addressed explicitly, but did play a role in the shift to remote work. CDPH’s technology teams were sent home to work remotely in mid-2020, but leadership acknowledged that the pandemic “caught us flat-footed” when it came to teleworking and the creation of a hybrid workforce. From a technology perspective, there were many questions that could have been resolved earlier, including how to give employees the tools, resources, and platforms to support teleworking. “None of that had been documented or thought about, so it had to be thrown together,” one SME noted. Ultimately, the model that was created was “a good one,” but if employees had been sent home earlier, it would have helped CDPH better prepare for the new hybrid workforce model.
- From an equity perspective, many challenges remained unchanged. Whether an employee works remotely or in the office, managers are responsible for ensuring that their employees have access to the same opportunities, training, and equipment to do their work. As one leader noted, for enterprise technology, equity “is about making sure that managers understand it, have awareness of it, and give opportunities.”



## Equity

*This section describes equity considerations specific to this chapter.*

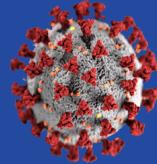
- CDPH's new public-facing systems, My Turn and DVR, were made accessible in multiple languages so they would be accessible to a wider range of Californians. My Turn is available in 14 languages and DVR in 8 languages. The My Turn system was designed to mirror the accessibility of the State's Medi-Cal system (which is available in California's threshold languages) to ensure that it was "equity-focused."
- In addition, My Turn facilitated equity by capturing the data to measure the success of equity work, especially the efforts of community-based organizations (CBOs). Capturing and analyzing data elements such as race, ethnicity, and zip code allowed the State to assess and adjust its equity initiatives. For instance, My Turn helped facilitate mobile vaccination clinics by helping the State assess where to offer clinics, and then offering clinic-specific links and QR codes.



## Data and Technology

- See the Analysis of Activities in this chapter for a discussion of enterprise technology. See also individual chapters in this AAR for discussions of program-specific systems.

DRAFT



# Communications

*This section describes communications specific to this chapter.*

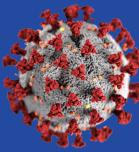
## External: Public and LHJ

For a discussion of the external communications related to specific systems, see the following chapters:

- My Turn, myCAvax, DVR, CAIR2: Vaccines chapter
- CalCONNECT and CA Notify: Contact Tracing chapter
- CalREDIE and CCRS: Data and Reporting chapter, Testing chapter

## Internal: CDPH, CDT, ODI, CalHHS, and other State Departments

See the discussion in the Analysis of Activities, Technology Workforce section in this chapter.



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

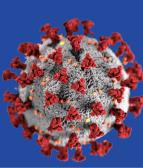
## Workplan

This section is designed to be used as a workplan for future pandemics.

Definitions:

- **Phase:** The phase of the response in which the major tasks should be conducted (Planning; Initial start-up, Ongoing operations, or Close-out).
- **Major Tasks:** The tasks and activities that have to be conducted as part of the public health emergency response to a respiratory pandemic.
- **Success Criteria:** Criteria used to assess whether a task has been achieved successfully.
- **Considerations Based on COVID-19 Response:** Things to consider, including pitfalls, risks, and lessons learned, based on the COVID-19 response.
- **Finding ID:** The ID(s) from the related Finding/Corrective Action (where applicable).
- **Lead:** The lead person(s) responsible for task completion.

Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
<b>Planning; Initial start- up; Ongoing operations; Close-out</b>	Coordinate with other technology stakeholders (CDT/ODI)	<ul style="list-style-type: none"><li>• CDPH has adequate technology resources to respond to changing pandemic needs.</li><li>• New systems are aligned with CDPH technology</li></ul>	<ul style="list-style-type: none"><li>• Establish emergency technology task force.</li><li>• Involve CDPH ITSD early when systems are being implemented on its behalf.</li></ul>	<ul style="list-style-type: none"><li>• Enterprise Tech 4, 7</li></ul>	

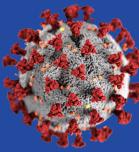


# CDPH COVID-19 After Action Report

## Chapter 18 – Enterprise Technology

Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
		standards and environment.	<ul style="list-style-type: none"><li>Socialize CDPH security principles and enterprise architecture standards.</li></ul>		
<b>Planning; Initial start-up; Ongoing operations</b>	Identify what systems need to be built and/or augmented	<ul style="list-style-type: none"><li>CDPH's public health systems are flexible, scalable, and reliable.</li><li>State leadership and policymakers can rely on public health systems for accurate, timely data.</li></ul>	<ul style="list-style-type: none"><li>Evaluate need for new or improved systems in main program areas.</li><li>Evaluate need for supporting software/tools (e.g., data warehouse, data lake, front-end gateway, de-duplication software, etc.).</li><li>Recognize that integration between old and new systems may require additional applications.</li></ul>	<ul style="list-style-type: none"><li>Enterprise Tech 1, 2, 5</li></ul>	

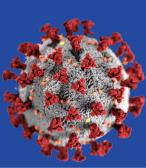




# CDPH COVID-19 After Action Report

## Chapter 18 – Enterprise Technology

Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
<b>Initial start-up; Ongoing operations</b>	Obtain necessary authority to rapidly procure technology goods and services	<ul style="list-style-type: none"><li>CDPH technology teams can rapidly acquire needed technology resources.</li></ul>	<ul style="list-style-type: none"><li>The authority to expedite procurement and contracting processes may be in the form of Executive Orders, emergency proclamations, or exemptions.</li><li>Contracting rules and regulations not waived must still be followed.</li></ul>	<ul style="list-style-type: none"><li>Enterprise Tech 3, Med Surge 1</li></ul>	
<b>Planning; Initial start-up; Ongoing operations; Close-out</b>	Engage and manage vendor partners	<ul style="list-style-type: none"><li>State staff maintain effective oversight of its vendors.</li><li>Roles, responsibilities, and deliverables are understood by all parties.</li></ul>	<ul style="list-style-type: none"><li>Document vendor requirements as well as system requirements.</li><li>Develop activation plan.</li><li>Engage partners early.</li><li>Clearly document vendor roles, responsibilities, processes, and deliverables.</li></ul>	<ul style="list-style-type: none"><li>Enterprise Tech 6</li></ul>	



## CDPH COVID-19 After Action Report

### Chapter 18 – Enterprise Technology

Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
<b>Close-out</b>	Develop a transition and M&O plan	<ul style="list-style-type: none"><li>CDPH can scale down its partner support and assume ownership of systems and processes without impacting service delivery.</li></ul>	<ul style="list-style-type: none"><li>Maintain ongoing inventory of systems that CDPH will be required to support in the future.</li><li>Migrate support to CDPH staff.</li><li>Anticipate challenges associated with migrating systems to the CDPH technology environment.</li></ul>	<ul style="list-style-type: none"><li>Enterprise Tech 6</li></ul>	