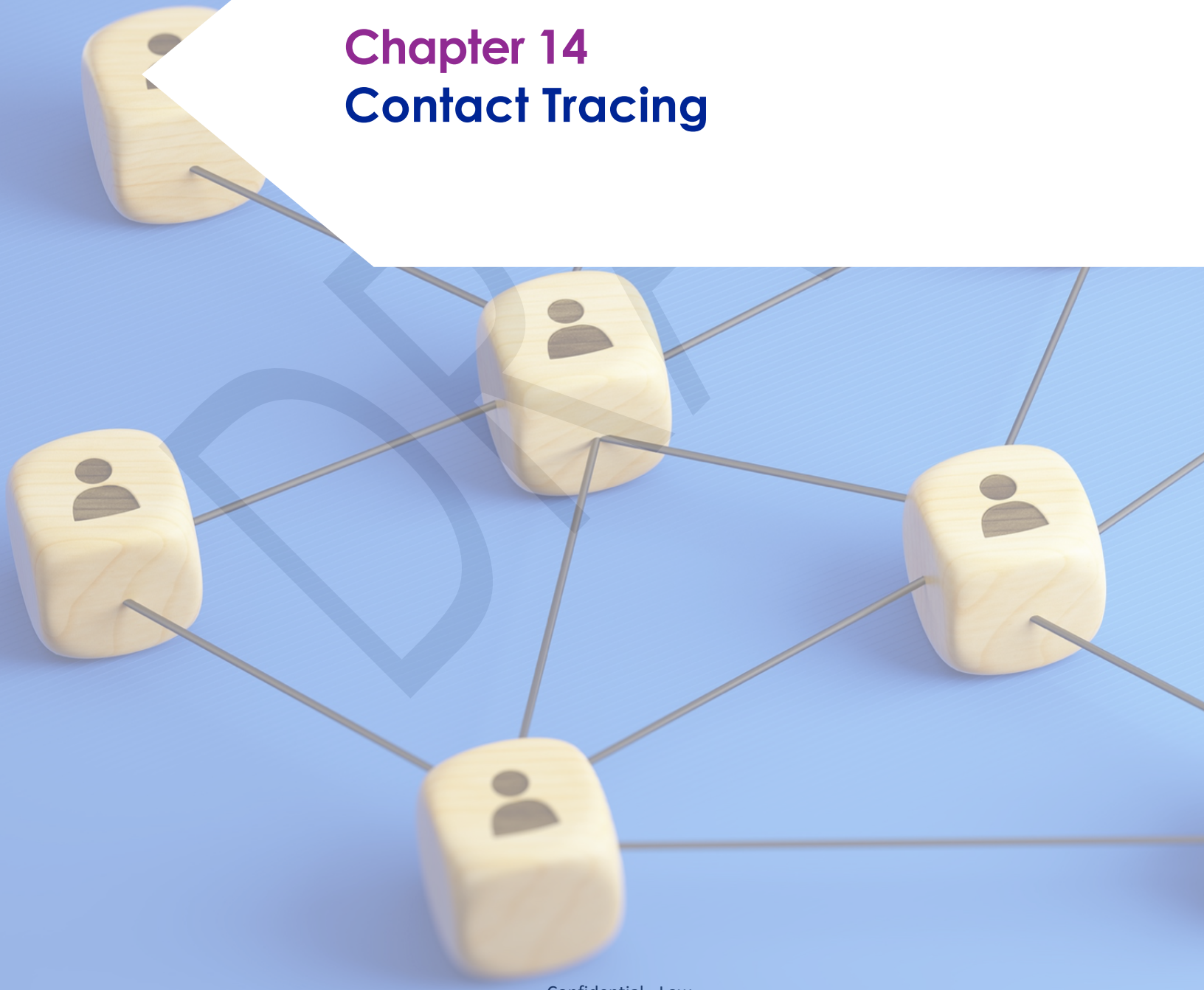
Chapter 14
Contact Tracing



Version History

Version #	Date	Notes
0.1	5/19/2022	First Draft submitted to CPR Team
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Table of Contents

14. Contact Tracing

Public Health Emergency Preparedness and Response Capabilities: Nonpharmaceutical Interventions; Public Health Surveillance and Epidemiological Investigations.

Related CDPH AAR Chapters: Testing; Epidemiology and Surveillance.

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.

Contact tracing is a confidential notification process and core disease control measure that has been used by public health departments for decades to slow the spread of infectious disease and avoid outbreaks like measles, tuberculosis, syphilis, HIV, and now COVID-19. In contact tracing, public health officers identify and inform people who have been exposed to someone with an infectious disease and offer them information and guidance. By helping those with cases and their contacts self-isolate or quarantine, public health agencies can slow the spread of the disease, help avoid outbreaks, and keep citizens safer from infection and serious illness.

California Connected: The Initial Vision

At the start of the COVID-19 pandemic, many states, including California, did not have a contact tracing program. On April 10, 2020, an influential whitepaper was published by the Johns Hopkins Center for Health Security on how to enable case investigation and contract tracing. The paper recommended that the U.S. implement a robust and comprehensive case identification and contact tracing system. In late April 2020, CDPH received approval to develop California's contact tracing (CT) program. On May 22, 2020, Governor Newsom launched California Connected, the State's contact

tracing program and public awareness campaign, to be administered by CDPH, in collaboration with many public- and private-sector partners.

To achieve this vision, CDPH created an entirely new program from scratch and in record speed. The California Connected program consisted of over 3,500 State contact tracers, over 200 program staff, three brand-new technology systems, a brand-new virtual training academy, and multiple complex program components. This monumental effort was unprecedented for the State, and CDPH faced numerous challenges, including mobilizing a redirected workforce that had been assigned to them; managing relationships with workers' home departments; navigating constant staffing changes; building business and operational processes from scratch; coordinating and proving technical assistance to all 61 Local Health Jurisdictions (LHJs); partnering with academia and private technology firms; and developing and implementing three new technology systems. These herculean tasks were all accomplished in a fully remote environment.

From the beginning, CDPH initiated, developed, and managed the California Connected program. The initial vision called for a new technology system (CalCONNECT); a Virtual Training Academy (VTA) to train contact tracers and case investigators; and the mobilization of up to 10,000 contact tracers Statewide, who would be redirected from State agencies and departments to work for LHJs in their local contact tracing programs.

As originally conceived, the three California Connected workstreams are depicted in **Figure 1**.

Figure 1: California Connected Workstreams First Wave

Workstream	Description
Workforce Expansion	This workstream focused on the redirection of State workers, who were trained as case investigators and contact tracers and virtually deployed to LHJs who requested support. The workforce expansion team tracked, reported on, and communicated with the redirected work force; ensured the work force completed required trainings; ensured compliance with human resources and labors laws; coordinated with the State "home" departments of the redirected workers; received Medical Heath Operational Area Coordinator (MHOAC) requests from the Medical and Health Coordination Center (MHCC) for CI/CT surge staffing, followed up on these with the requesting LHJs, identified staff to meet specific needs, and coordinated deployments of the work force to fulfill these requests; and worked closely with LHJs where staff were deployed to ensure needs were being met throughout the length of those deployments.
Workforce Training and Mobilization	This workstream focused on creating and delivering the necessary training to redirected State workers, LHJ staff, and other state department staff so that they could perform their case investigation and contact tracing work effectively.
Information Technology	This workstream involved the procurement, development, and implementation of the CalCONNECT system, the Statewide contact tracing platform that was designed to support contact tracing efforts.

What was originally termed a "contact tracing" program quickly expanded to include case investigation (CI), as it became evident that without case investigation, contact tracing was not possible. *Case investigators* communicate with individuals diagnosed with COVID-19; they link these individuals to care, clinical consultation, and/or resources, as needed; and they build trust and rapport with the individual and elicit information about any exposed contacts. Then, *contact tracers* attempt to notify the contacts about possible exposure to COVID-19. Without case investigators to elicit contacts, there are no contacts for contact tracers to call. While the roles are not identical, they are interrelated, and over time, the program increasingly referred

these two roles together using the shorthand "CI/CT" or just "CICT." (In this chapter, the CI, CT, and CI/CT abbreviations are used interchangeably with their respective full spellings.)

During the early stages of the pandemic in spring 2020 when the California Connected program was taking shape, universal case investigation and contact tracing was recommended. In a universal approach, LHJs would attempt to investigate and monitor every COVID-19 case and their contacts in order to slow the transmission of COVID-19 using phone calls and scripted conversations.

At this point in time, neither vaccines nor therapeutics were available. Very little was known about the virus, and PPE was in incredibly scarce supply. Surges had not occurred yet and case numbers were low. In this environment, containment was critical, and contact tracing work was the best tool to help contain the virus and slow the spread.

New Workstreams and Systems: The Program Scope Expands

The inclusion of case investigation was the first of many scope expansions for California Connected. In addition to the three original workstreams, further unanticipated functions quickly emerged. When it came to building a new technology platform and redirecting and training a new workforce, the State was confronted with the realities of implementing multiple complex elements simultaneously, and from scratch. As one leader noted, "operationalizing it all was so much more complex, and we weren't ready for it." This triggered creating new lines of effort.

As the program's scope expanded in response to local needs and the changing pandemic, additional workstreams were quickly incorporated underneath its umbrella as depicted in **Figure 2**.

Figure 2: California Connected Workstreams Second Wave

Workstream	Description
Technical Assistance, Support, and Capacity Building for LHJs	This workstream provided LHJ support, capacity building, and technical assistance. This team was created when it became increasingly clear that many LHJs needed more help with their contact tracing programs, including the development of standard operating procedures, support for local onboarding and training of redirected staff, peer-to-peer consultation related to best practices across a variety of disease intervention and outbreak challenges, and extra support and capacity building for onboarding to CalCONNECT and for the effective use and integration of CalCONNECT's many new functionality enhancements over time.
Schools Support	This workstream provided technical assistance, support, and training for schools, who were tasked with conducting contact tracing and case investigation. Members of this team also participated in broader policy and guidance discussions.
CA Notify	This workstream involved the piloting and implementation of a new technology called digital exposure notification that leveraged the Bluetooth technology on iPhones and Androids to approximate individuals who were within close proximity to one another. With digital exposure notification, users could opt into a program on their Smartphones that would provide them with notifications if they had been close to someone who had tested positive for COVID-19 during the period when they were likely infectious, if that person also was a user of the system and informed the system of their positive test.
Program Evaluation and Quality Improvement Unit	This unit developed and implemented a monthly survey of LHJs and pulled down data from CalCONNECT in order to collect and collate CI/CT data required by the Centers for Disease Control (CDC). The team analyzed these metrics and produced monthly reports for CDPH leadership, CalHHS leadership, and the CDC. This team evolved to support California Connected programs in program evaluation, program After Action Repots, and quality improvement initiatives. Currently this team performs the robust program evaluation required for the California Pathways into Public Health Initiative fellowship and internship programs.

Workstream	Description
Health Promotion and Education Unit	This team facilitated the collaborations with CDPH's Office of Communications and its Guidance and Policy team. The team built and maintained a number of public-facing websites, including *What to Do if You Test Positive for COVID, What to Do if You are Exposed to COVID, What is Contact Tracing, The Virtual Agent*, and the *CA Notify* landing pages.
Disease Investigation Unit (DIU)	This unit primarily focused on CalCONNECT support for local users. The unit provided broader technical assistance and training to LHJs related to other CI/CT areas and operations and also provided mentorship for new redirected State staff during their first weeks of deployment to LHJs.
Business Operations Team	This team supported the California Connected program work and handled work related to human resources, personnel, administration, assets, fiscal, contracting, and invoice payments. The team also responded to fiscal and personnel drills across the response.

The expansion of the program's scope prompted the creation and implementation of new technology systems as depicted in **Figure 3**.

Figure 3: California Connected Ancillary Technology Systems

Ancillary System	Description
Workforce Tracking MS Dynamics System	This system was implemented as part of the workforce expansion workstream. It helped the program team manage and track the thousands of redirected State workers.
Schools/Shared Portal for Outbreak Tracking (SPOT)	This system was a CalCONNECT enhancement for schools and workplaces. It was designed to make it easier for schools to comply with legal case reporting requirements by providing schools with a simple way to submit case information to their LHJs and the State.

To create new programs and multiple supporting technology systems, CDPH developed new partnerships and fostered stronger relationships with academia (especially UCSF, UCLA, and UCSD), private technology firms (Google and Apple), other State agencies and departments, and the LHJs.

Pandemic and Program Changes: The Program in Transition

Different public health tools apply to different pandemic phases. As the pandemic evolved, so too did California's case investigation and contact tracing approach. A number of different factors played a role: the first vaccines arrived in California in mid-December 2020. The State experienced multiple surges, during which case numbers rose to levels that made universal CI/CT impossible. LHJs were simply too overwhelmed and there were not enough trained staff during the surges.

More was known about the virus itself, especially the role played by asymptomatic transmission, which was not initially fully appreciated. In asymptomatic transmission, people who are carriers of the virus experience no signs or symptoms but can unknowingly transmit it to others. The main objective of early case investigation and contact tracing work is to stop the spread of the disease.

In response, the State's case investigation and contact tracing strategy began to shift in mid-2021 with emergence of the Delta variant. The effort began to socialize the concept of "prioritized" CI/CT as opposed to universal. Rather than investigating and following up on the contacts for every single case, CDPH encouraged LHJs to prioritize cases for investigation and contact tracing.

This involved prioritizing specific types of settings and situations for full case investigation and contact tracing. These included high-risk congregate settings that include populations and high-density settings (such as schools or health care settings) with case clusters or suspected outbreaks.

As the strategy shifted, the program adapted its tools accordingly. As universal CI/CT gave way to more targeted, prioritized CI/CT, CDPH encouraged the use of automated tools to provide notifications and education for the general population. In the summer of 2020, California Connected developed the CalCONNECT Virtual Assistant, a text-based messaging tool. And as prioritized CI/CT became the recommendation, CDPH encouraged LHJs to leverage the Virtual Assistant to send automated surveys and educational information to contacts. The general public could receive messaging and guidance relating to quarantine, isolation, and care, so that the contact tracers could manually follow up with higher priority contacts (e.g., contacts who were unvaccinated, especially vulnerable, or part of suspected outbreaks).

Two Years Later: The Program Winds Down

The emergence of the highly contagious Omicron variant in late fall 2021 and early 2022 accelerated the shift to more targeted case investigation and contact tracing approach. Because of the short incubation period for this variant, the impact and feasibility of universal case investigation and contact tracing diminished. By the time a contact would have been notified, he or she would have already likely transmitted the virus.

At the federal and State level, Omicron's transmission dynamics helped codify the shift in CI/CT that was already underway. In February 2022, the CDC updated its guidance and recommended that universal CI/CT should not be conducted; instead, CI/CT should be prioritized for specific, prioritized high-risk settings and situations. In March 2022, California following suit, releasing updated guidance for LHJs that recommended they transition away from universal CI/CT and only conduct this effort for prioritized populations.

CDPH's March 7, 2022 letter to LHJs announced the strategy shift: "with the increasing availability of more effective prevention strategies at this stage of the pandemic, including vaccination, masking, ventilation, testing, and treatment, prioritizing CICT to the highest risk situations and leveraging other public health tools will have a more efficient and higher impact on prevention of the most severe outcomes of COVID 19."

In the following months, the California Connected program implemented several changes. The redirected State workforce program ended on June 30, 2022 and other teams concluded their work on July 30, 2022.

The CalCONNECT system continued to be leveraged to support contact tracing for other communicable diseases (such as tuberculosis and HIV/STDs). In October 2022 the system released functionality to support a new disease condition, mpox (also known as "monkeypox") that emerged in summer 2022. The addition of mpox to CalCONNECT included the integration of key variables, case and contact information, and a virtual assistant symptom monitoring tool. CalCONNECT was also updated to include a generic symptom monitoring tool that can currently be used for Ebola/Marburg and avian influenza; functionality for measles was implemented in November 2023.

While some programmatic workstreams ended, others were initiated. Two new programs devoted to building and training the public health workforce emerged out of the California Connected program. The Public Health Reserve Corps and the California Pathways into Public Health (Pathways) program were both inspired by the program's workforce expansion and training efforts, and

have grown into separate efforts to support future outbreaks of COVID-19 and/or other communicable diseases. In July 2022, the Pathways program received State funding, which extended the program for three years and added an internship component to its existing fellowship program.

On June 30, 2023, the California Connected program fully demobilized from the COVID-19 pandemic response.

Timeline and Key Milestones

	2020
Spring 2020	• **April**: Early discussions regarding Statewide contact tracing program • **April**: CDPH reported the need for 31,400 contact tracers, case investigators, and administrative staff • **April**: Invention of digital contact tracing technology announced by Apple and Google • **May 13**: Statewide contact tracing system (CalCONNECT) launched • **May 20:** Statewide contact tracing program announced
Summer 2020	• **June-August**: LHJ Support and Capacity Building team formed • **July**: LHJ Governance Council established for CalCONNECT • **July**: MS Dynamics system implemented to track redirected workforce • **August**: CalCONNECT Virtual Assistant introduced • **August:** Disease Investigation Unit created
Fall 2020	• **September**: UC San Diego initiated CA Notify pilot • **November 5**: Schools Portal for Outbreak Tracing (SPOT) launched
	2021
Winter 2020/2021	• **December 10**: CA Notify launched Statewide • **December:** Assembly Bill 685 established workplace reporting requirements
Spring 2021	• **March-May**: California provided incentives to encourage schools to reopen • **March**: Assembly Bill 86 established reporting requirements for schools • **April:** CalCONNECT system integrated with CAIR2 (Statewide immunization registry)
Summer 2021	• **End of August:** Beginning of Delta Variant Surge
Fall 2021	• **September-November**: Fourth Surge (Delta Variant) • **October-November**: New wave of CDC-Foundation disease investigators hired to serve as "school specialists" in order to help LHJs support the reopening of their schools

	2022
Winter 2021/2022	• **December**: Fifth Surge (Omicron Variant) • **January 4:** Omicron Variant Surge peak • **February**: CDC released guidance recommending a shift away from universal CI/CT
Spring 2022	• **March:** CDPH released guidance recommending that LHJs shift away from universal CI/CT
Summer 2022	• **June 30**: End of the State's redirected CI/CT workforce program • **July 1**: CalCONNECT system transitioned to Maintenance and Operations • **July**: State funding for California Public Health Corps Training and Pathways Program awarded to extend program for three years
Fall 2022	• **September 28**: All CA Notify operations transitioned from UCSD Health to CDPH • **October 4:** Integration of mpox disease condition into CalCONNECT system goes live
	2023
Winter 2022/2023	• **December:** CDPH received approval from CalHHS to expand CalCONNECT to other disease conditions • **December:** CalCONNECT SPOT platform surpassed 1 million COVID-19 records reported • **February**: CalCONNECT system expanded to support symptom monitoring for avian influenza • **February 28**: California's State of Emergency for COVID-19 ended
Spring 2023	• **March**: Disease Investigation Unit demobilized • **May 11**: End of federal state of emergency • **May 11:** CA Notify system and program demobilized
Summer 2023	• **June 30**: California Connected program fully demobilized for the COVID-19 emergency response • **June 30**: CDPH's Medical Health and Coordination Center (MHCC) deactivated from COVID-19 response

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. Establishing innovative partnerships with the technology industry and academia helped CDPH create the brand-new California Connected program and multiple IT systems to support case investigation and contract tracing work.

In creating a brand-new program with multiple complex workstreams from scratch, the State relied on new, innovative partnerships. CDPH partnered with UCSF and UCLA to quickly train thousands of redirected state workers; collaborated with Google, Apple, and UC San Diego to pioneer and pilot a completely new digital contact tracing technology; and worked with private consulting firms to develop new technology solutions to support statewide CI/CT, as well as manage the redirected workforce. Many teams were characterized by incredible camaraderie, commitment, and a "startup mentality," which helped California Connected build its programs and systems with speed and agility.

Finding/Corrective Action: CDPH quickly established external partnerships that led to groundbreaking new pandemic response tools, and should maintain these relationships in the future. *(ID: Contact Tracing 1)*

2. CDPH partnered with other State departments and agencies to establish, operationalize, and manage a pool of redirected State workers to help build contact tracing capacity at the local level.

Within the California Connected program, the Workforce Expansion team operationalized the vision to provide LHJs with contact tracers through redirected State employees. This team collaborated with Cal HR, GovOps, and CDPH's Human Resources Division to think through how this monumental directive could be implemented. Over time and through many meetings, the team developed and operationalized a process to manage the redirected state workforce. This included coordinating with home departments, identifying employees eligible for redirection, working with LHJs, and navigating complicated HR and

labor laws. Despite multiple obstacles, ultimately the program supported over 3,500 redirected State staff from over 100 different State departments. The team overcame a number of unexpected challenges to do "an amazing job" and reached an important milestone with the implementation of an MS Dynamics tracking system, which significantly improved workforce management. This team served as the foundational link between the pool of redirected State workers and the LHJs needing case investigators and contact tracers.

Finding/Corrective Action: CDPH successfully expanded the CI/CT workforce by managing, tracking, and reporting on thousands of redirected State workers, creating a workforce expansion model that can be leveraged in the future. *(ID: Contact Tracing 2)*

Finding/Corrective Action: In the future, when recruiting a redirected State workforce, CDPH should focus on employee skills and requirements rather than focusing solely on job classifications. *(ID: Contact Tracing 3)*

Finding/Corrective Action: CDPH should maintain the MS Dynamics system, which can be used to support emergency workforce rostering and other tracking efforts. *(ID: Contact Tracing 4)*

3. CDPH partnered with UCSF and UCLA to create a Virtual Training Academy to train redirected workers as contact tracers and case investigators.

Once State employees had been officially redirected, they needed to be trained before they could assist locals with case investigation and contact tracing. To achieve this, CDPH partnered with UCSF and UCLA to create the Virtual Training Academy. The VTA team quickly developed six new courses, many of them in both English and Spanish, along with a skills-based lab component to help prepare redirected state workers to perform contact tracing work. The biggest challenges were the diversity of skills and sheer number of learners who needed to not only be trained in CI/CT work, but also needed the opportunity to practice their interviewing skills in smaller group settings. To navigate these challenges, the VTA team leveraged the existing university infrastructure and professional networks to help source learning platforms as well as course facilitators. The team also relied on its expertise in training delivery and its close relationship with the San Francisco Department of Public Health, which allowed the team to monitor local COVID-19 response trends. Ultimately, over 11,000 learners

completed VTA courses since the program's inception in mid-2020, and almost 30,000 attendees participated in its continuing education and peer-to-peer Townhall and Communities of Practice sessions. SMEs felt that the VTA was an unequivocal success and it should be maintained to provide other opportunities for continued learning.

Finding/Corrective Action: CDPH successfully created and deployed a large-scale, skills-based training model that can be leveraged for future training needs. *(ID: Contact Tracing 5)*

4. When confronted with unanticipated and intense needs for local and school support, CDPH rapidly established a new technical assistance and capacity building workstream.

When the California Connected program was originally envisioned, its scope included training, workforce expansion, and technology. However, one large "blind spot" was the amount of technical assistance that the program would need to provide local agencies —and later, schools. Initially, the program created local liaisons to help LHJs onboard to the CalCONNECT technology platform. However, it soon became clear that locals needed more than onboarding support. As a result, a new workstream evolved devoted to local technical assistance, support, and capacity building. As LHJs struggled to conduct CI/CT work in their jurisdictions, the State responded to acute local needs with intensive, customized help that went beyond what is traditionally defined as "technical assistance." For instance, the CDPH Disease Investigation Unit provided workflow help and other specialized services; and the schools support group built relationships with schools, who suddenly found themselves responsible for case investigation and contact tracing. Often, since these teams were closely connected to LHJs and schools, they were also called upon to inform Statewide policy and guidance related to contact tracing, isolation, and quarantine. Although this workstream was unexpected and labor-intensive, its ultimate success was a result of the trusted relationships built with local agency staff and addressing their needs.

Finding/Corrective Action: In response to unexpected local and school needs, CDPH rapidly expanded its program scope to include technical assistance. It also built trusted relationships that enabled on-the-ground problem-solving. *(ID: Contact Tracing 6)*

5. Local agencies involvement helped create a robust contact tracing system, CalCONNECT, which can be leveraged for other communicable diseases.

As CDPH and its vendor developed CalCONNECT, local partners and users were closely involved in its design and configuration, and local needs were addressed and prioritized in unprecedented ways through the CalCONNECT system's agile technology development process, which emphasizes continuous incremental development and improvement in rapid releases based on user feedback. The State team maintained a continual focus on local needs, and LHJs were thought of as both end-users and co-creators of the system. The State team developed many mechanisms to obtain and prioritize feedback from the LHJs, including a formal Governance Council and an online exchange. The final major CalCONNECT system implementation for COVID-19 occurred in July 2022. Over the entire COVID-19 response, 59 of California's 61 LHJs used the system at some point for CI/CT work. State program staff have heard from local agencies that CalCONNECT filled a previously unmet need, and should be leveraged for other communicable diseases: "it's there, it's ready, it's flexible, and they're already trained on it."

Finding/Corrective Action: CDPH should maintain its responsiveness to local agency needs that was cultivated during CalCONNECT system development and consider LHJ perspectives as it determines the system's future. *(ID: Contact Tracing 7)*

6. In partnership with private technology companies and academia, CDPH successfully piloted and implemented Google-Apple's cutting-edge digital contact tracing technology called digital exposure notification. This technology, used across the U.S. and in many countries internationally, complements traditional contact tracing and is an important addition to the pandemic response toolkit.

In addition to the CalCONNECT system, which supports traditional contact tracing, the State launched Google-Apple's cutting-edge digital contact tracing solution, which in California was called CA Notify. The CA Notify program was a collaboration between the State, private technology firms, and academia, and it overcame many hurdles prior to launching in California. These included high-level resistance to the

program due to privacy concerns. However, the CA Notify program team learned how to explain the technology to assuage these concerns and California ultimately took a "leap of faith" to adopt this innovative tool. Over 17.2 million Californians activated the technology and the tool has sent an estimate 1.23 million exposure notifications to date. While the program might have benefited from a more robust public communications campaign, CA Notify was nevertheless a successful "test" of the technology and "one of the highest yields that the State got for its investment" according to leadership. Now that the groundwork has been laid and program evaluation has begun, it should be much easier to implement a tool like this in future pandemics.

Finding/Corrective Action: With the implementation of digital exposure notification, CDPH successfully adopted a new response tool that can now be evaluated, improved upon, and potentially activated again in the event of a future pandemic. *(ID: Contact Tracing 8)*

7. CDPH incorporated equity into its many contact tracing workstreams including workforce expansion and training, technology development, and technical assistance for LHJs and schools.

The California Connected program incorporated equity in its many workstreams, ranging from development of cultural humility training to an emphasis on recruiting bilingual workers. The State worked with its academic and local partners to match Spanish-speaking workers to the areas that needed it most. CDPH also successfully advocated for and achieved pay equity for bilingual redirected workers, who were originally not compensated for their language skills. In its schools' support work, the program worked to invite a broad spectrum of local presenters to their Best Practices Town Halls, understanding clearly that urban solutions were not always applicable to smaller, rural, and less-resourced jurisdictions. While equity played a role in all work streams, it was more successful in some areas than in others. The program is currently collaborating to develop equity metrics related to CI/CT efforts.

Finding/Corrective Action: CDPH emphasized equity in its CI/CT program, but can do more to formally incorporate it into in future responses. According to SMEs, CDPH should strive to understand health inequities from a "lived experience, not only from data." This would include engaging community-based organizations earlier and hiring staff from communities most affected by COVID-19 in an effort to tailor the response to each community's needs from the very beginning. *(ID: Contact Tracing 9)*

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.

8. The California Connected program experienced persistent staffing challenges, including staff churn, employee burnout, and duplication of work. These issues impacted other programs as well.

Without a plan in place to quickly increase its program staffing, CDPH relied on a variety of ways to build its California Connected program. In the beginning, California Connected program staff recruited help from other CDPH programs through their personal connections. This was on an individual, ad-hoc basis. Later, once the State implemented mandatory redirections, program staff had better access to a pool of workers who were willing to help. However, the unpredictable nature of these redirections led to an inconsistent workforce, staff burn-out, work silos, and duplication of effort. Dealing with internal staffing challenges ultimately took time away from the core team's efforts to build the California Connected program. It also negatively impacted other public health programs, who lost crucial workers to the COVID-19 response and are now facing overwhelming backlogs.

Better planning can help mitigate these issues in the future. According to one leader, in emergencies staff always need to be redirected, but staffing lists and approval processes can be created in advance.

Finding/Corrective Action: CDPH has the opportunity to anticipate and plan for pandemic staffing challenges for its programs, including identifying staffing plans in advance, setting protocols regarding potential redirections, planning for backlogs, and identifying staffing leads. *(ID: Contact Tracing 10)*

See the related finding *Infection Prevention – 12* in the Infection Prevention chapter of this AAR.

9. CDPH did not have existing program infrastructure in place to support workforce expansion, leading to unforeseen

difficulties and frustrations for the redirected State workforce and their home departments.

Creating the State's contact tracing workforce by redirecting State employees was a foundational pillar of the California Connected program. While the plan called for CDPH to redirect, train, and assign these resources to LHJs to help with contact tracing work, the operationalization of these theoretical tasks revealed a "huge blind spot." These difficulties caught many by surprise. As CDPH began to establish an entire program infrastructure from scratch, it recognized an acute need for HR, budgetary, and administrative experts to help with redirecting thousands of personnel. The team was also surprised by the unanticipated need for supervisors and case investigators, as well as the need for a technology system to manage the redirected workforce, which was originally unsuccessfully attempted in Excel. While the team eventually developed smoother processes and communication protocols, many redirected State workers and their home departments were initially frustrated with the entire experience. "To be fair to us, we've never redirected thousands of staff before at once," one leader noted, while pointing out that an important lesson learned is the critical importance of having program infrastructure in place before starting the program.

Finding/Corrective Action: CDPH should document the processes, workflows, systems, and communications protocols that it created in support of workforce coordination, and be ready to leverage them in future responses. *(ID: Contact Tracing 11)*

10. The lack of clarity around roles and responsibilities sometimes led to friction between the State and its academic partners, which could have been mitigated by having clear guidelines up front.

The diverse partnerships established between CDPH and academic partners were instrumental in building the California Connected program, but were also difficult to navigate at times. On occasion different institutional cultures created friction between the State, with public mandates, and its academic partners, which were often less cautious. Additionally, CDPH entered into a number of unique hybrid arrangements, providing State funding for program elements that were staffed by non-State workers. These relationships were established

quickly at the start of the pandemic. But more than two years later, it has become clear that more energy should have been invested upfront to clarify roles and responsibilities. This would have helped mitigate tensions over fuzzy program ownership. Especially because these academic partnerships are so valuable, it is critical that CDPH make these investments "at the outset." Important things to delineate include approval authorities, academic publishing agreements, and contractual relationships. As one respondent noted, "we need to make a point of sitting down with leadership and seeing what we need to communicate about this relationship now—and into the future—from the very start."

Finding/Corrective Action: CDPH should document the various contractual agreements that it entered into with its academic partners, and identify key and/or missing elements that should be included in future agreements *(ID: Contact Tracing 12)*

11. While CDPH established a program evaluation team to track process-based CI/CT performance measures, there is a need to conduct more sophisticated evaluations of program outcomes.

With teams focused on creating California Connected and its multiple technology systems as quickly as possible, it was difficult to devote resources to program evaluation. However, a Program Evaluation Team was established to report on key performance measures, many of which were based on federal reporting requirements. These measures are primarily process-oriented and concentrate on the timeliness of case investigation and contact tracing. However, when it comes to measuring its effectiveness—which is extremely difficult to do—there is more to be done. According to SMEs, there was no time or collective willingness to ask bigger questions if contact tracing and case investigation was "working." Others noted that the use of program analytics to inform policy "on the ground" remains a weakness. On the CA Notify team, internal program evaluations have begun and staff have identified several areas in need of further study, including the relationship between traditional and digital contact tracing.

As the State's strategy shifts away from universal to targeted contact tracing, it will be important to conduct an independent evaluation of this new program to help inform future emergency response efforts.

Finding/Corrective Action: CDPH should continue the evaluation activities already underway and should consider conducting an independent evaluation focused on program outcomes. *(ID: Contact Tracing 13)*

12. The State's public health workforce is under-resourced, and lacks reserves to draw on during statewide emergencies.

The pandemic exposed the fragility of California public health workforce's capacity, which, unlike other institutions such as the military, does not have a reserve corps that can be activated during emergencies. At many times throughout the response, there were simply not enough skilled, trained staff to complete the overwhelming amount of public health work. The State began to close this gap by establishing two nascent programs designed to bolster the public health workforce: the Public Health Reserve Corps and the California Pathways into Public Health (Pathways) program. The Reserve Corps is a program designed for existing State employees, who can volunteer, receive training, and be activated to serve in public health emergencies. The Pathways program is a training program that focuses on professional development for early career public health workers. These two programs represent efforts to establish a dynamic public health workforce (or "surge-force") at the State level. Additionally, CDPH can cross-train its employees in emergency response. The efforts create two opportunities: 1) Build the State workforce to reflect local diversity in terms of demographics, size, and vulnerability; and 2) Provide technical guidance and support for local agencies to form similar workforce capacity.

Finding/Corrective Action: CDPH should continue to invest in its newly-established State reserve corps and training programs, invest in cross-training for CDPH staff, and explore how to strengthen the local public health workforce as well. *(ID: Contact Tracing 14)*

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.

Workforce Expansion

Expanding the Contact Tracing Workforce: From Initial Concept to Operationalization

- In April 2020, CDPH prepared a report that estimated a need for 31,400 contact tracers, case investigators, and supervisory and administrative staff statewide. The estimate was based upon a survey in which LHJs projected the number of staff they needed to contact every COVID-19 positive person within their jurisdiction. This projection was based on an eventual surge in case levels up to three times the April 2020 levels.
- While more than 10,000 existing LHJ staff were immediately called upon to learn and conduct contact tracing, additional workforce was necessary. In May 2020, to supplement the LHJ staffing numbers, the State launched a plan to create a pool of up to 10,000 State employees who would be redirected from various state agencies to assist LHJs with contact tracing. The concept was for LHJs to be able to request support from this pool of "state redirects" to help conduct contact tracing for their counties remotely.
- Managing this workforce expansion was a monumental task according to experts, and early in the program there was little conceptual understanding of how this would be achieved. Members of the workforce expansion team had many conversations with departments who were being asked to redirect their staff, since "at the beginning, no one knew how it would be implemented and no one understood what it meant." At the onset, the team was comprised of just a handful of people, during this early phase a key challenge was "not having enough program staff to help with the vision up front."
- Leadership from Cal HR, GovOps, and CDPH's Human Resources Division (HRD) began collaborating to work through the details of how to expand the workforce. Once those high-level discussions began, a common understanding and process was developed. First, different State departments would provide CDPH with a list of their redirected staff, and

then those staff would be sent to training at the Virtual Training Academy (discussed below). After their training was complete, CDPH would assign redirected staff to LHJs who had submitted requests for contact tracers through their MHOAC program. Following this assignment, staff redirects were then onboarded to the LHJs, which was a complex process.

- In practice, there was lack of continuity between a worker's completion of training and their assignment to an LHJ as a contact tracer. There was often a gap between these events, during which workers would be temporarily sent back to their home departments and old roles. "They were really frustrated with the gap, and it was stressful to manage," one SME indicated. This was one of the biggest challenges associated with this workstream.
- The workforce expansion team worked nonstop to dispel confusion about the virtual deployment process. Many redirected staff thought they would be physically sent to different jurisdictions throughout the State, so "we had to explain constantly that this was all remote work." Additionally, the team continually reinforced the program's goal, which was to help the LHJs lower the number of COVID-19 cases in their jurisdiction. "We were there to serve the LHJs – we constantly had to share that with the redirected staff, to make sure they knew that the locals were our customer," one SME noted.
- Supporting this complex operation required a robust internal structure, and the workforce expansion team quickly grew. The workforce expansion team was divided into three separate sub-teams, each responsible for its own area. Having this structure established early on helped the team work together effectively and understand each other's roles and responsibilities. The three sub-teams were responsible to:
  - Coordinate with State departments who were providing the redirected staff
  - Coordinate with LHJs
  - Oversee HR matters and coordinate with supervisors who were also redirected state workers and who were assigned to oversee the redirected staff
- As the workforce expansion team began working with more State departments, it ran into numerous HR-related questions involving employee classifications, schedules, and unions. The team established

weekly meetings with HRD, and "it was extremely helpful to partner with them in real-time" as one SME noted. HRD provided immediate responses to questions relating to workforce expansion via a dedicated email inbox, and this responsiveness allowed the team to progress quickly.

- At its height in January 2021, the internal program team devoted to workforce expansion was comprised of approximately 100 State workers. Although the Governor's announcement had called for 10,000 redirected State workers, just over 3,500 were identified by their State departments to be redirected to serve as case investigators and contact tracers.
- Of these approximately 3,500 State staff identified for potential redirection, almost 3,000 completed training and were actively deployed to LHJs.
- The team rose to this unprecedented challenge, despite initially not having the necessary tools to manage this enormous workforce. In the words of one participant, "CDPH did an amazing job during this pandemic. We were 100% teleworking, and to bring on [almost 3,000] State employees and to train them to work with LHJs remotely – that's the first of its kind." In doing so, CDPH created a workforce expansion model that can be leveraged in the future. This model revolutionized the State's ability to place State staff at local levels and train them to become strong, valuable local team members.
- See the Data and Technology section in this chapter for a discussion on the MS Dynamics System used for workforce management.

Managing the Unique Characteristics of a Redirected Workforce

- When CDPH initially requested departments to identify workers who would be redirected for contact tracing, it asked for specific State classification, namely, Staff Services Analysts (SSA) and above. However, departments were reluctant to part with their SSAs, so CDPH modified this request to accept any classification. CDPH then negotiated Memorandums of Understanding (MOUs) with labor unions and ended up paying "out of class" for SSA classifications. Given the variety of employee classifications across the State, it was a struggle to identify equivalencies across departments—for instance, between the Department of Transportation, the Department of Parks and Recreation, and CDPH.
- Ultimately, the workforce expansion team learned that instead of focusing on classifications, it would have been more productive to emphasize

employee skillsets. To be a successful contact tracer, classifications matter less than the "personality and ability to do this kind of work," according to one respondent. SMEs indicated that recruiting a redirected workforce based on analyst classifications "was not the right way to go about it."

- The types of employees that departments sent to CDPH to be redirected as contact tracers also presented a unique set of challenges. Since they were not CDPH employees, CDPH did not know their strengths and weakness. Their skills and abilities ranged widely, from high performers who believed in the mission, to those who were underperforming at their home departments. However, this latter group sometimes ended up excelling in their new public health roles, which offered them a fresh start.
- Lastly, the fact that redirected employees could be recalled by their home department at any given time was also challenging. Since these employees were only on loan for a set amount of time (which could change), the workforce pool was constantly changing and shifting, with recalled employees leaving "holes that had to constantly be filled."

Navigating Technology Challenges in a Virtual Work Environment

- In addition to navigating the unique characteristics of the redirected workforce, the program team also had to help redirected workers navigate an entirely new work environment. There was an enormous learning curve associated with being thrust into a 100% virtual work environment, which was unfamiliar to a majority of redirected workers. The redirected workforce had to learn Teams, Zoom, and other remote tools.
- Some of the redirected employees lacked the technology skills and/or remote configuration to perform the job. Some did not own a computer, lived in rural areas without internet at home, or did not know how to use Word or Excel—things that "we take for granted," according to one SME. In some instances, the team provided informal training to help workers get up to speed on the technology tools. But in other cases, the program sent workers back to their home departments because the challenges with those workers could not be mitigated.

Unanticipated Need for Supervisors and Case Investigators

- During the early phase of contact tracing workforce expansion, the State did not anticipate that supervisors would be needed. However, as the number of contact tracers increased, CDPH realized belatedly that it needed supervisors to oversee their work. Finding the appropriate

supervisors among the redirected pool of state staff was challenging: although the contact tracers were assigned to (and worked most closely with) various counties, county-level managers were not allowed to act as official supervisors. Due to California's complex human resources rules, the supervision of redirected contact tracers "had to be filtered through state managers." The workforce expansion team relied on the HRD expertise in order to help negotiate these rules and bring in qualified supervisors.

- Additionally, as the program rolled out, it became evident that LHJs not only needed contact tracers, but case/disease investigators as well. While the two roles are related, they are not identical and require different skillsets. The State did not anticipate the need for case investigators. Case investigators typically receive at least two years of training, and many of the state redirects were not equipped to be case investigators. CDPH established a screening process to evaluate staff for any relevant experience, created a new case investigator training program at the Virtual Training Academy, and standing up a new Disease Investigation Unit and mentorship program that matched inexperienced investigators with an experienced team that they could learn from.

Unanticipated Need for HR, Budget, and Administrative Program Staff

- As the state tried to quickly build out its program team to support the vast CI/CT effort, the lack of adequate infrastructure to help implement and operationalize this ambitious program became clear. Initially, the program had a handful of people to handle budgets, contracts, and HR. This was inadequate given that the program was tasked with creating a new technology system, mobilizing and training thousands of workers, and providing technical assistance and other support to locals. As one leader noted "people forget that those staff make it all happen—budgets, contracting, finance, and HR staff." In particular, HR staff were needed to help with complicated personnel issues, and financial staff were needed to help manage and track all the various funding streams, contracts, budgets, and invoicing. According to one SME, the State needed to have solid, strong team of financial staff with a sophisticated understanding of financial mechanisms.
- The various ambitious work streams within the California Connected program required expertise in all of these areas, as program staff were developing MOUs with locals, negotiating HR and timesheet issues with thousands of redirected State staff, and working with multiple third-party

vendors, consultants, and academics to create new training and technology systems.

- Eventually, the program acquired and developed these integral resources to create a more robust infrastructure. Leaders indicated that ultimately, "we were able to build it out and do it really well." Yet not all response teams or task forces in the response were able to accomplish this. For the next pandemic or public health emergency, the State can be better prepared by having a program workforce infrastructure already in place, and reinforcing the value of this type of work up front. CDPH should include HR and fiscal staffing positions in their emergency response workforce roster.

Public Health Reserve Corps

- The challenges associated with workforce expansion revealed California's lack of a well-resourced, trained public health workforce that could be activated quickly in an emergency. During the pandemic, the State struggled to hire workers with the skills and experience "to do the work we needed to do."
- In response to this key lesson learned, the State has initiated a Public Health Reserve Corps program as a first step towards closing this gap. The program will develop a pool of reserve workers, who can be called upon in future public health emergencies. This volunteer program is open to state employees; once enrolled and trained reservists can be activated up to twice per year, with each activation lasting up to 90 days. CDPH can activate reservists for a variety of public health "emergent reasons" without Governor's officially declared State of Emergency. This flexibility has been built into the program to allow for early intervention.
- In building and maintaining a reserve of trained public health workers who can be deployed quickly, the State aims to have this "preparedness infrastructure" in place for future pandemics and the program is accepting State volunteers.

Workforce Training and Mobilization

Virtual Training Academy: A Partnership between the State and Academia

- As the redirected workforce expansion continued, the next step was to train these workers as contact tracers and case investigators. Training this

workforce was a monumental effort and was undertaken by the State in partnership with two California universities—UCSF and UCLA. This innovative partnership was the first time such a collaboration had taken place at such a large scale. As one SME noted, "CDPH had an immediate, fast-thinking vision to reach out to the right people to get the job done—academics who were experts in training."

- The resulting Virtual Training Academy (VTA), which operated under the guidance of CDPH partners, created and delivered 6 new courses. The training courses prepared learners for roles as case investigators, contact tracers, outbreak managers, school specialists, and vaccine communication specialists, as well as cultural competency. The VTA also offered training in principles of safe schools and risk communication for K-12 school administrators. Over 11,000 learners have completed VTA courses since the academy's inception.
- As the pandemic evolved, so did the VTA, pivoting to meet the needs of locals and schools by creating additional training and support mechanisms to address remote workforce management, outbreak management, vaccine communications, school reopening, and more. The VTA also created and hosted continuing education programming in the form of virtual Townhalls and Communities of Practice events. Both of these forums provided a space for peer-to-peer learning and facilitated discussions. Since their inception, over 4,000 attendees have participated in LHJ Best Practice Townhall events and over 25,000 have participated in Communities of Practice events. Both of these event series concluded in February 2023.
- At the peak of the program, the VTA had over 90 full-time UCSF/UCLA staff and 7 State staff. As of May 2022, the program has over 40 full-time UCSF/UCLA staff and 2 State staff.
- Until its funding expires, the VTA will continue to provide free training to help ensure a cross-trained local and state public health workforce that can shift as needed to support a variety of public health priority efforts. The VTA receives funding from CDC's Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases (ELC) Cooperative Agreement.

Leveraging Existing Infrastructure, Networks, and Connections

- While much of the training content had to be developed from scratch, the VTA team was able to draw on existing infrastructure, networks, and

connections to build the program (all while still performing their "day jobs"). The VTA drew on the academic team's networks and experience, including experience with the California Prevention Training Center (CAPTC), as well as the strengths of practitioners and researchers, many of whom are national and international experts in their fields. Additionally, the informal networks within each university provided the team with a pool of skilled, enthusiastic facilitators to help quickly scale up the facilitation team. In May 2020, over 100 facilitators were quickly recruited and trained.

- According to respondents, some of the biggest challenges were "trying to provide skills-based practice at scale with consistent high quality" and the "pressure to train large numbers in a very short time." Some trainings had up to 1,000 individuals, yet these individuals also needed to practice their interviewing skills, since contact tracing often involved having delicate conversations. To meet this need, the VTA created "skills developments labs" in which 5-10 learners could practice their interviewing skills in a small group setting with a lead facilitator. This emphasis on skill-based learning differentiates the VTA from other existing CT/CI training.
- Another challenge was finding a system that could handle a large volume of remote-access learners while also supporting small break-out groups for skills-based training. Initially, the VTA team was able to leverage and modify UCLA's existing Learning Management System (LMS) to meet its training needs. Following an early pilot, the training was moved to UCLA's Canvas system; other platforms, including Zoom and Google classroom, were also incorporated into the trainings.
- In addition to leveraging the universities' existing platforms, the VTA team also hired university students and relied on technical support staff to ensure that the meetings ran smoothly. These staff set up and managed webinars and meetings rooms, managed polls and slides, and were responsible for troubleshooting technical problems.

Developing Training Content Rapidly for a Diverse and Inexperienced Workforce

- The VTA team was responsible for developing and delivering many training courses to a diverse workforce, many of whom had no background or knowledge of public health. Especially in the first half of 2020, there were many rapidly changing guidelines as more became known about COVID-19. As one SME noted, "we were building the plane

while flying it and constantly adjusting our curriculum and training." Many spoke of the challenges to stay nimble and adjust to rapidly changing needs. At the same time, the team focused on ensuring that the training was holistic, incorporated an equity lens, and "did not cut corners." The team but incorporated pedagogical best practices, including cultural humility, diversity, equity, and inclusion (DEI) principles, and working with communities.

- The team was also challenged by the differing needs of their learners. The learners were diverse in terms of experience, motivation, and interest in doing the work of contact tracing. In addition to the sheer size of learners, many were dealing with COVID-19 in their personal lives, and some came from communities most affected by COVID-19. However, the VTA team was able to overcome these challenges: "our experience in facilitating and working with learners helped us to reimagine how best to teach them," One SME explained.
- In developing training content, the VTA team was also able to leverage existing relationships with local public health departments. Specifically, UCSF had peers that were directly embedded in the San Francisco Department of Public Health (SFDPH) COVID-19 response, and thereby had access to local subject matter expertise that helped inform the VTA's training content. "It was really great that we had hands-on experience with CT/CI from SFDPH; we could figure out what worked and learn the 'on the ground' perspective," one leader explained.
- The team also used its evaluation data to improve content and courses. According to one SME, this "rapid revamping of prototypes" created a spirit of continuous improvement, and team members appreciated the freedom to recreate and improve their materials.

Bolstering a Tenuous Public Health Workforce

- The VTA team indicated that one of the most important lessons learned was how critically essential it is to have a public health workforce ready and in place. Many SMEs we interviewed believe public health has long been underfunded and under-resourced, and positions have been slowly eroded over time. Many felt that the field also has an image problem: according to one SME, "when public health is operating at its best, people don't know about it." This ultimately contributes to the devaluation of public health work. Going forward, it will be important to ensure that the public health resources and "safety nets" that have been established

during the COVID-19 response do not go away. Another SME noted, "we cannot go back to where we were pre-pandemic."

- CDPH already initiated two programs in an attempt to strengthen the public health workforce. In addition to the Public Health Reserve Corps program (discussed above in the "Workforce Expansion" section), the State has also initiated the California Pathways into Public Health program (Pathways), which the VTA team was instrumental in helping to develop. This program, funded by the CDC and the State, is a paid training, fellowship and job-placement program for early-career public health professionals. The program's mission is to increase the workforce capacity of local public health departments by providing training, support, and work experience for people from historically underrepresented and diverse backgrounds. The program was born out of a desire to "smooth the road" for entry level staff from historically underrepresented communities to enter and diversify the local public health workforce, so that ultimately staff could represent their local communities and effectively serve them. As one leader noted, "an effective response workforce must reflect the communities you are serving, and it should already be in place so you don't have to create it."
- The success of the Pathways program promoted stakeholders to successfully advocate for its continuation and expansion with State funds ($24 million over three years). Subsequently, the Pathways program expanded in Fall 2022 to include semester-long internships for community college, university, and graduate school students (in addition to its existing fellowship component). The program is currently funded through 2025.

Information Technology: Building the Contact Tracing IT System

- See the discussion of CalCONNECT under the Data and Technology section in this chapter.

Providing Technical Assistance to LHJs

Building Local Trust through the Establishment of Liaisons: Providing Technical Assistance and CalCONNECT Onboarding Support

- Within the California Connected program, the LHJ Support and Capacity Building team was composed of local liaisons devoted to supporting LHJs

as they onboarded to the CalCONNECT technology system and overseeing ongoing CalCONNECT adoption and use. However, it quickly became clear that LHJs needed help with more than just the technology system. The team's scope expanded to include building local capacity for contact tracing and case investigation by providing technical assistance and other support, including help with supporting LHJs develop COVID-19 C/ICT standards of practice (SoPs), processes, and procedures. As the team's scope and role evolved, some felt a lack of clarity regarding their direction and main objectives—whether it was focused on the CalCONNECT solution, helping locals with their programs, or both.

- The LHJ Support and Capacity building team, specifically created to support the onboarding and adoption of CalCONNECT, was started in mid-summer 2020 with a handful of CDPH liaisons and Accenture staff. The team began conducting outreach to different counties to understand different local structures and needs. CDPH assigned a program and technical liaison to each LHJ so they would have single points of contact for all CT/CI concerns. State program staff felt that this was essential to keeping LHJs "engaged in the process" and "to demonstrate that we were taking their needs seriously." However, others noted that there were multiple State groups engaging with LHJs. There was not always a clear delineation of tasks and responsibilities between workstreams, which created siloes and duplication of effort.
- At the local level, COVID-19 responses varied widely: in some counties, many staff were dedicated to the response full-time, whereas in other counties, a few staff were doing response work in addition to their other duties. In seeking to understand these differences, the State program team established and maintained frequent communication channels with LHJs via phone calls, meetings, and Town Halls. These communications were intensive with a regular cadence, and took up increasing amounts of time as more LHJs adopted CalCONNECT.
- Still, it took time for State liaisons to build trust. At first some LHJs were skeptical and did not initially believe their needs would be taken seriously by the State, given past experiences with the existing CDPH surveillance data system where they had not been sufficiently consulted. The California Connected program put concerted effort into establishing a culture of customer service across its program teams where the LHJs' needs repeated were considered "the north star." The program worked hard to overcome this hurdle and build trust over time to demonstrate

through actions "just how seriously local needs were being taken," including how quickly these needs were identified and addressed.

- Following this prioritization of LHJ needs, in order to facilitate the exchange of feedback and a mechanism for LHJs to directly contribute to development priorities, California Connected created the LHJ Governance Council for CalCONNECT in July 2020, which represented a major milestone for the program. While it was primarily created to involve LHJs in the development of CalCONNECT, it also provided a venue for CDPH to receive local feedback on some of the other California Connected program support areas as well, since the program was being developed alongside the new system. LHJs became "vision-makers" and could contribute to the direction and shape of the CalCONNECT system and the entire California Connected program. CDPH also established LHJ Best Practices Town Halls to encourage peer-to-peer learning and create a space for the exchange of best practices and tools related to case investigation, contact tracing, and related disease control efforts.
- As increasing numbers of LHJs began using CalCONNECT to conduct their CT/CI work, it became apparent that the local liaison team would need to provide more support. The onboarding process to CalCONNECT took four weeks and involved many complex pieces such as the creation of MOUs and privacy agreements; the delivery of robust training to LHJ users; the determination of authorized users and lists; and follow-up mentorship, technical assistance, and support. The MOUs in particular were time-consuming to develop. The program team had to "start from scratch" (as one SME noted) and make sure the agreements were very clear about what resources and services the State was providing to locals at no cost. However, the program team agreed that the development of MOUs, while challenging, was an overall success. The team was able to obtain consultation from specific OLS counsel staff who were assigned to their program which greatly added in the effective development, review, and revision of MOUs.
- In addition to providing support to get LHJs familiar with the CalCONNECT solution, the support and capacity-building team also provided a wide range of specialized technical assistance. This entailed working daily with locals on the ground to help them problem-solve real-life urgent scenarios: "everything was acute and had to be solved that day; it was so intensive and so immediate," one SME noted. It took some time for both LHJs and the State teams to figure out how to best partner, since the

support being provided by CDPH went beyond what is conventionally understood as *technical assistance* in the global public health arena. "Technical assistance wasn't the right term for what we did," another team member commented, reinforcing the intensive, customized, and personalized nature of the support provided—which respondents agreed was necessary and was a success.

- The support provided initially drew upon best practices gleaned from San Francisco Department of Public Health's COVID-19 response, but much of the assistance had to be tailored to individual counties' needs—especially for counties with few staff. Some of California's smaller counties were so overwhelmed by the response that they did not have the bandwidth to adopt the CalCONNECT system. Getting some of the counties "engaged at the most basic level" took between anywhere from three to five months and was based on establishing trusted personal relationships with local staff as well as leveraging peer-to-peer trusted relationships between LHJs that had adopted CalCONNECT and those who were wary.
- The relationships established between CDPH and LHJs were crucial in helping the State understand the actual types of support and assistance that LHJs needed, which were sometimes different from the stated request. LHJs would submit requests for contact tracers into the MHOAC program. Once the request was received, program staff would evaluate it and then reach out to the county to discuss the need. Sometimes requests would come in for 2,000 contact tracers, which was "unrealistic." After program staff met with LHJs to discuss the request, they could then create a deployment request; redirected contact tracers were generally deployed to LHJs 20 at a time. This process helped the State identify and solve the true problem, whether it was a need for contact tracers or for different forms of support.
- At its height, the LHJ Support and Capacity team had 20 people including State and Accenture staff.
- For a more detailed discussion of CalCONNECT, see the Data and Technology section in this chapter.

Disease Investigation Unit Offered Specialized Support and Workflow Assistance

- In addition to the State liaisons to LHJs, the California Connected program also established a team of communicable disease investigators (CDIs) funded by the CDC Foundation. CDPH created this 100% virtual team—

the Disease Investigation Unit (DIU)— in August 2020 to help support contact tracing and case investigation. While the DIU's scope was not clear initially, it grew organically in response to local needs to include a menu of services even beyond the expanded State technical assistance. The DIU operated in multiple ways, and included "strike teams" that could be virtually deployed to LHJs on short notice to help support the management of local outbreaks. Sometimes this meant handling the day-to-day CICT work for an LHJ while the local health department's more experience DI staff moved their focused on the outbreak scenario; but with more experience gained over time, the DIU themselves were also tasked to support some of the outbreak management efforts directly. More often, the DIU focused their efforts on LHJ capacity building, and a team of DIU staff were often brought in following a general assessment of LHJ needs. It was common for an LHJ to need addition non-technical support related to CalCONNECT, and this unit would help them better integrate the CalCONNECT platform into their existing workflow. This included helping locals better understand the platform; update their existing contact tracing and case investigation procedures and workflow; incorporate the school component of the platform (SPOT); and provide additional training and mentorship to local system users.

- The DIU's work was by nature unique and fluid, and a large component of it was organizational change management. Many local jurisdictions, understaffed and under-resourced, found it overwhelming to be asked to adopt a new technology system, often in the midst of medical surges. Adopting CalCONNECT was a "huge learning curve," one SME noted. Another explained that LHJs were in essence being asked to interrupt their response work by "adding something that was a great benefit, but required a temporary slow-down of their current response work." Additionally, some LHJs already had well-established contact tracing and case investigation programs and processes, and were reluctant to change. As one SME noted, "when you're used to handling investigations one way, and now you're going to incorporate a brand-new system, there will be hesitation."
- This DIU continues to offer specialized support to LHJs around CalCONNECT and contact tracing and case investigation. One of the DIU's key lessons learned is the importance of "being flexible and keeping your knees bent" given the constantly changing nature of the pandemic, which necessitated changing response strategies. While the DIU was

originally designed as a response to COVID-19, more than two years after the start of the pandemic, broader conversations about the future of the California Connected program (and the DIU) are taking place to determine the program's applicability to other communicable diseases. As one SME noted, "outbreaks will always happen. It would be helpful to have a permanent unit in place to support any type of communicable disease outbreak—such as TB or MRSA—in a school, business, SNF."

- Before the DIU team was demobilized, they had been cross trained and supported response efforts for mpox CI/CT, returned travel monitoring for Ebola, and symptom monitoring for avian influenza. They also supported numerous CDPH-lead COVID-19 research projects, including CalSCOPE and INSPIRE, that involved reaching out to and interviewing cases, and they were trained and served as vaccination educators and school specialists for many LHJs. The bilingual DIU staff created a Spanish Translation sub-team and supported critical translation needs, in particular helping translate updates to the CalCONNECT interview and CA Notify website. A sub-team of the DIU also facilitated numerous training, technical assistance, and capacity-building support for most LHJs across the State. They also created a SPOT onboarding training and delivered 44 SPOT trainings to over 1,400 attendees, including representatives across Los Angeles County schools.

Program Staff Faced Many Challenges, including Inconsistent Staffing, Lack of Strategic Direction, and Work Silos

- As the State worked to help LHJs, they also struggled internally to staff up their program. In the early days of the program before the Governor's mandatory redirect order, there was no system in place to obtain staff. Existing program staff had to personally recruit individuals from within CDPH and the State, including obtaining supervisory approvals. This ad hoc staffing approach was stressful and took time away from building up and running the California Connected program. As one SME noted, "it is incredibly hard to lead a team and staff it up at the same time." It would have been helpful to have a lead who was devoted to resourcing and staffing out teams, instead of relying on program staff.
- Redirecting staff from within CDPH to work on the COVID-19 response impacted other public health programs. In particular, California's programs devoted to tuberculosis and sexually transmitted diseases were "really hobbled" for most of 2020 and a portion of 2021. Respondents

noted that this scenario reflects global pattern in which many public health programs suffered "huge losses" as attention was turned to the COVID-19 response. Still, many agreed that during the next pandemic, this scenario can be anticipated and needs to be planned for and mitigated.

- Once the State's mandatory redirection of staff was implemented in early summer 2020, staffing problems persisted, but in different ways. The California Connected team suddenly found themselves with "a huge influx" of people coming into the program, which left the existing team "scrambling." The team welcomed the additional resources, but it was not always clear how redirected workers could be of best service, despite how much they wanted to help. The largest challenge was the fact that home departments could recall their workers at any time, which led to a continuous state of churn and turnover. "People were always rolling off and we were always onboarding new teams," one leader noted. Relying on a fundamentally inconsistent workforce was a continual stressor.
- While struggling with these challenges, program staff experienced significant burn out due to both their professional and personal stressors. Hesitant to take time off and functioning with little sleep, staff worked long overtime hours, learned to use multiple new technologies remotely (and simultaneously)—all while worrying about family members and friends getting sick, and grieving loved ones lost to COVID-19. All of these combined stressors took an immense personal toll on State program staff, who juggled multiple expectations with limited support.

LHJs Struggled to Accept, Manage, and Report on Contact Tracing Funds and Data

- As the State provided CalCONNECT and contact tracing/case investigation support to LHJs, it quickly became clear to contact tracing SMEs that some counties needed assistance with more basic topics, such as how to accept and report on the program funds (most of which was disbursed through the CDC's Epidemiology and Laboratory Capacity [ELC] for Prevention and Control of Emerging Infectious Diseases Cooperative Agreement). According to leaders, "it was a huge lift for most LHJs to even accept the cash at a basic level." Some counties lacked the appropriate line items in their general ledgers to receive the money, while other counties did not want to accept the funds due to ideological reasons. The contact tracing team focused its efforts on helping LHJs get the funds in place to help augment staffing for contact

tracing. However, LHJs struggled to find qualified staff to hire, and in some cases the funding was either not used or redirected.

- LHJs also struggled with reporting and using data. This area was a challenge for locals long before COVID-19 and it was exacerbated by the pandemic. Developing workplans and quarterly reports is simply "not something that most counties know how to do" and remains an ongoing issue that is closely related to local staffing, one SME noted. In some cases, individuals who were tasked with reporting ELC metrics were not aware of this until they were suddenly due.
- Larger counties such as San Francisco, Los Angeles, and San Bernadino had resources to evaluate, analyze, and report on the program data they were collecting, and San Francisco distributed robust and dynamic dashboards weekly. However, CDPH's efforts to encourage other counties to adopt this model proved unsuccessful. Smaller rural counties were stretched too thin and were too overwhelmed with their caseloads; there simply was not enough time or resources to reflect on, interpret, and utilize the data that they were collecting and reporting. As one leader noted, "smaller counties were sharing one epidemiologist across COVID but also across other diseases. How would they have the time to dig into these questions?"
- For a more detailed discussion of COVID-19 response funding, including ELC funding, see the Fiscal Administration chapter in this AAR.

Program Evaluation Team: Creating and Reporting on Program Measures

- In addition to their LHJ support work, California Connected program staff also created a Program Evaluation Team, who was first tasked with establishing a system for collecting and reporting program data rapidly. One of the core challenges this team faced was trying to align federal and state reporting requirements. For instance, CDC reporting requirements were static whereas California's were more dynamic and evolving with changing statewide priorities. "Juggling what CDC requires versus what CDPH wants to measure was definitely a challenge," one SME noted.
- This challenge was further complicated by the different LHJ protocols, which made it even more difficult to develop process and impact measures. Keeping in mind the types of data that were being collected in CalCONNECT, the team had to "triangulate" it with federal, state, and

local perspectives. Ultimately, the team developed program evaluation metrics that were applicable across all jurisdictions, complied with federal reporting requirements, and met California's evolving statewide priorities. "Reporting has gotten better," one SME noted. However, others noted that if the State wants to build a sustainable public health infrastructure, it will be important to improve reporting processes, including the interpretation and use of data to improve programs—especially when quick program adjustments need to be made (e.g., during surges).

- Most of the program's key measures were process-oriented. For instance, most of California's measures—which are derived from CDC's measures—are tied to the timely outreach and interview of cases and contacts. For example, key impact performance included: cases with outreach initiated within one day; cases interviewed within two days; contacts notified within two days, and contacts tested within 14 days of notification, among others. Every month, in order to continue to receive ELC funding, LHJs were required to report on these CDC-derived measures. In addition, they were asked to report on California-specific measures, which were often more programmatic (e.g., related to staffing levels, program capacity, or other special topics).
- However, it proved more challenging to measure the impact of contact tracing and case investigation on actual disease control—in other words, if the work resulted in fewer COVID-19 cases or in more people isolating and quarantining. One leader noted, "I don't think we've ever landed on or saw data that answers those questions. We have not yet gotten to the point of measuring the impact of contact tracing and case investigation on COVID-related outcomes."

Providing Technical Assistance to Schools

This section discusses CI/CT work in schools. For a broader discussion on the Safe Schools for All team, see the Policy Development and Guidance chapter in this AAR.

CI/CT Schools Support: The Emergence of a New Need, New "End User," and New Workstream

- In late fall and early winter 2020, amidst the discussion of reopening California's K-12 schools, it became clear that the California Connected team would have an integral role to play. In partnership with USCF and UCLA, the program formed the Schools Support technical assistance team

of experts who could respond to technical assistance requests from LHJs related to school outbreaks, help with CI/CT logistics, and help interpret changing schools-related guidance from the State.

- On the policy side, the Schools Support team began participating in the State's larger Safe Schools for All (SS4A) team, which was "kicking into high gear" in December 2020 and January 2021. This multi-agency, multidisciplinary was comprised of leadership from many different response work streams, including vaccines, testing, and isolation and quarantine. The California Connected Schools Support team was brought in to provide expertise on contact tracing, isolation, and quarantine, which was used to develop guidance for schools. The Schools Support team also continued to provide technical assistance to schools, responding to requests from LHJs via the SS4A online portal.
- The K-12 school response in California had varied widely during the pandemic. Some schools were closed for over a year; some had never closed; and some had adopted a hybrid remote/in-person model. However, in April 2021, there was a concerted effort from the Governor's Office to reopen schools for in-person instruction.
- California K-12 schools suddenly found themselves with new and unexpected responsibilities. Traditionally, LHJs—not schools—were responsible for disease investigations. However, with COVID-19, California essentially "outsourced contact tracing to schools," according to one SME.
- This was due to a variety of factors. In Spring 2021, LHJs were simply too overwhelmed to take on the work. The burden of conducting CI/CT work at the local level was already overwhelming, and "there were just not enough people to run these programs at the highest surges."
- Additionally, a year into the pandemic, many resources had already been exhausted. When the pandemic had started in early 2020, California moved to protect its most vulnerable populations, particularly the elderly and those living in congregate facilities. According to one leader, "our initial response, rightfully so, was to ensure the people at more risk were getting the time, attention, and resources. But then the resources were gone, and kids were starting to get affected."
- Lastly, the rationale for outsourcing contact tracing to schools was the fact that schools had "information on the ground" critical to contact tracing. Unlike LHJs, schools know which students eat together, are in class

together, and carpool together; schools have access to class rosters, seating charts, and already have existing communication channels with parents and caregivers.

- These factors all contributed to the outsourcing of contact tracing to schools themselves. According to SMEs, the schools were confused as to why they were being asked to take the lead, but they eventually assumed ownership of this work. Part of the State's financial incentives tied to re-opening including funding for schools to hire contact tracers. Some schools did hire staff, including retired administrators or consultants, to do the work. However, this created a quandary in which the State expected a non-public health workforce to perform public health work. This was challenging, "especially when we didn't take ownership of that ask" and tried to understand if schools had the proper tools and resources to fulfill the "asks," according to one SME.
- Once it was established that California schools (and not LHJs) would be responsible for CI/CT work in schools, State program staff found themselves with a new customer base that added another layer of complexity. This represented a shift in the traditional contact tracing program, which had previously emphasized LHJs as the "end users" whose needs must always be kept in mind. While LHJs did have school specialists, CDPH realized that in order to make this work, "we needed to be talking to school stakeholders directly and not just LHJs," SMEs noted. Now, LHJs were no longer the sole "end users" and their needs had to be balanced with the needs of the schools.
- Program staff felt that this large shift was navigated successfully. Since the program was already well-established, there was already a robust network of people in place who were able to ramp up quickly to provide assistance to schools. This group was able to step in, buffer the LHJs, and provide the extra coaching to school districts. As one respondent noted, "this was something that went really well. We had way more capacity for technical assistance than was needed."
- In Fall 2021, California Connected brought on another Schools Team comprised of 60 disease intervention staff, which were provided for free by the CDC Foundation for a period of time. These staff were all trained as schools specialists and were deployed remotely to help LHJs with school-related challenges and communications. This team later merged with the Disease Investigation Unit.

- Additionally, the broader California Connected program provided training for LHJs who were responsible for working with schools. The VTA created a deployed a new training course specifically for LHJ "school specialists." This course covered basic principles of pediatric COVID-19, how to communicate effectively with school districts and respond to schools' questions, and when to triage questions to other members of the LHJ (among other topics).
- For further discussion of the SS4A team, see the Policy Development and Guidance chapter in this AAR.

Helping Schools Understand and Implement State Guidance

- One of the main areas that schools required help with was how to interpret and implement the State guidance that was being promulgated. According to respondents, this guidance was initially very granular and very specific, and the school support team spent a great deal of time helping schools think through how it could be implemented in different settings and scenarios "A lot of what we did was trying to think through how it could be enacted in specific circumstances," one SME noted.
- Modified quarantine was an especially difficult topic that the program team helped schools work through. They responded to many questions about isolation and quarantine, including who has to quarantine, how classrooms are shut down, and for how long. Although this topic fell under the contact tracing umbrella, it was also deeply connected to testing. "CI/CT in theory fits into a nice little bucket, but for schools it doesn't," one team member noted.
- As the pandemic evolved, the guidance became less granular and more emphasis was placed on local decision-making. However, school districts were reluctant to take on more authority. As the guidance shifted from highly specific to more general, "it was a really uncomfortable transition and schools became paralyzed" one SME noted. While the State provided options related to CI/CT, schools preferred to be directed rather than independently having to consider so many different options and scenarios. Another leader agreed that "whenever there was the slightest little bit of gray area, schools just wanted to be told what to do."
- However, the program team agreed that one of the great successes was the team's agility in being able to respond rapidly to changing needs. This was due in large part to the team's incorporation within the broader Safe Schools for All team and inclusion in larger policy discussions. Included as

a true "thought partner," program staff were able to understand the "backstory" and the "big picture" behind guidance decisions, which in turn empowered them to help schools implement and operationalize the guidance in different settings and scenarios. For instance, team members noted that it was crucial to be included in conversations around testing and masking, which gave them insight into how and why a policy decision was made. Ultimately, the team's position within the larger response allowed it to respond with amazing agility: according to one SME, "we were able to turn on a dime," that was a "great success."

Communicating with Schools: Establishing the Network

- The Schools Support team created extensive communication and outreach to school districts, administrators, principals, and other school stakeholders. These communication channels had to be established; CDPH already had good mechanisms for communicating with LHJs, but not with schools. As one respondent noted, "we just didn't have anything in place and not a lot of time to develop it."
- In establishing communication with schools, the team integrated listening as much as possible. After certain milestones, the team conducted follow-up phone calls with schools to ask them how things were working for them. In listening for trends, program staff were continually asking what resources the schools needed to continue doing CI/CT work.
- As part of its communication efforts, program staff developed documentation and websites designed for school districts, a newsletter, and webinars for school administrators. They also partnered with external stakeholders to promote trainings to different schools, such as smaller less-resourced schools in rural school districts.
- Respondents noted that a key lesson learned was the importance of communication, trust, and "centering all public health messages within the schools' context and listening to the schools' voice." The State needed to ensure it placed a "school lens" on top of the public health lens. To this end, the State program team first had to build relationships with schools, administrators, and districts, and then ensure that their voices, needs, and experiences were represented. This need continues today and "it cannot be stressed enough," according to one respondent.

Early Siloes and Discrepancies Led to More Attention Being Paid to K-12 Schools than Higher Education and Childcare

- The State's work on K-12 schools was initially very siloed. Schools were in a unique position, existing at the intersection of many different COVID-19 response workstreams, such as testing, vaccines, and even occupational health. However, schools work was a "very siloed space," especially in its early days, one SME noted.
- This was reflected in the guidance being developed, which focused overwhelmingly on K-12 schools. According to SMEs, policies and guidance for K-12 schools were "robust," "intricate," and "specific," in contrast to the guidance developed for higher education and childcare. When it came to higher education and pre-K children, there were simply not as many people working on it. There was a "huge discrepancy" between the resources devoted to K-12 schools on the one hand, and higher education and children on the other. For example, many high school students attend community college classes, yet there was only one individual responsible for translating higher education guidance. If that person was unavailable, "we couldn't translate the guidance."
- The disproportionate allocation of resources created an age equity issue, according to program staff. However, as the leadership team within CDPH for schools developed, there was a concerted effort made to break down siloes and "bring more people to the table." Over time, the leadership team and its processes matured to be more inclusive. In late 2021, for instance, CDPH hired a position focused on childcare to represent and advocate for childcare providers in school-related conversations.

Equity Considerations in Schools: Focusing on Regional Differences

- See the discussion in the Equity section in this chapter.

Schools Technology: School and Shared Portal for Outbreak Tracking (SPOT)

- See the discussion on SPOT in the Data and Technology section in this chapter.

Equity

This section describes equity considerations specific to this chapter.

Equity and the CI/CT Program

- CDPH, the California Connected program, and supporting systems incorporated health equity as a top priority. This emphasis on equity was reflected in many ways, including the emphasis on non-English languages. Given that 11 million or approximately 35% of Californians speak Spanish as their first language, all systems that interacted with the public had options for Spanish-speakers. CDPH also integrated multiple languages into the contact tracing "language line." This allowed the individual case investigator or contact tracer to dial directly into the language line to access real-time translation services.
- Additionally, as the State assisted LHJs to help prioritize cases for CI/CT, it collaborated with UCSF to develop LISTSERVs based on the California Healthy Places Index (HPI) zip codes to identify neighborhoods with socio-economically impacted individuals. Some LHJs (Santa Clara specifically) were able to leverage the CalCONNECT system and work with academic partners to identify neighborhoods in Santa Clara that were more likely to be Spanish-speaking. This enabled them to proactively assign bilingual staff to cases and contacts identified in these areas.
- CDPH also partnered with a Central Valley Task Force, comprised of eight central valley counties who struggled with high case and exposure rates. "We prioritized the unique CI/CT needs that came out of that Task Force," one leader noted.
- When it came to program analytics and reporting, CDPH also applied an equity lens. In collecting and evaluating CI/CT performance measures, program staff analyzed the population to identify who was being contacted, and how quickly they were reached. "We were always able to stratify by race, age, and gender to make sure there were no disparities in the performance of the work," according to leadership.
- However, challenges remained when it came to reaching certain vulnerable populations. Program staff noted that the State should continue to forefront equity concerns and needs. These include developing solutions to specific isolation and quarantine scenarios. For instance, some populations, including individuals from multi-generational

immigrant families, would have benefited from additional services such as wage replacement and hotel options, to help them quarantine. The fact that younger generations, who often served as interpreters and breadwinners for their families, were unable to isolate and quarantine, revealed the limitations of CI/CT work. According to one SME, better planning and more tailored strategies would have enabled more people to isolate and quarantine, potentially reducing total cases.

Equity and Training

- The VTA incorporated equity in its training courses in multiple ways. Two of its courses, (Case Investigation and Contract Tracing and Vaccine Communications) were offered in both English and Spanish. The team also created a Spanish skills "lab" so that bilingual staff could practice conducting live interviews in Spanish before having to conduct them in the field.
- The VTA also partnered with community-based organizations to develop a course on Cultural Humility, which addressed questions of health equity, historical racism, and implicit bias and how it might affect a CI/CT interview.

Equity and Redirected Workforce

- In terms of equity and workforce expansion, California Connected focused on hiring bilingual workers wherever possible. With funding support from the CDC, the program hired approximately 45 bilingual staff for the DIU team, which offered specialized support and workflow assistance to LHJs.
- CDPH surveyed the redirected State workers to identify their bilingual capabilities so they could be matched to specific LHJ needs. However, these bilingual redirected State workers were not initially compensated for using their language skills, since in their home departments and normal roles, these staff were not receiving "bilingual pay."
- In California, bilingual pay is monthly pay differential that is granted to a certified bilingual employee who is in a designated bilingual position. Bilingual redirected staff were sometimes being asked to use their language skills but were not being compensated for this. CDPH advocated for bilingual pay authorization for these employees, but was initially told there was no way to accomplish this both because there was

no mechanism to test or certify staff remotely during the pandemic and also there was no special pay mechanism set up for the contact tracing emergency program. Ultimately, the State was able to pass an emergency authorization to compensate these workers for their bilingual skills, but this process took many months to put in place.

Equity and the Digital Exposure Notification System (CA Notify)

- The CA Notify team discussed equity in relationship to digital exposure notification, but is only now beginning to study and understand these complexities. Currently, the program is working to understand why some users adopted the technology, why others users did not, and the barriers to adoption. In this pursuit, questions related to equity are at the forefront. During the operationalization of the program, CA Notify had a technology ethicist on the team who focused on technology accessibility as well as racial and economic barriers.
- Given the strict privacy measures in place, the team relies primarily on inferred data or indirect estimates when it comes to program evaluation. For instance, the team is working on analyzing user adoption through indirect estimates of Android versus iPhone user populations. While iPhones have a larger user body in California, Androids phone cost less, and the team has begun work to reach and understand Android user communities. Regarding the role of equity in digital exposure notification, one SME noted that "it wasn't something we overlooked and we did the best we could, but there's much more to do."

Equity and Schools

- In providing technical assistance to schools and weighing in on the State's contact tracing guidance, the team emphasized regional differences between schools and attempted to bring in partners from smaller, rural counties. Although many members of the team were from urban areas, the team continually emphasized that "we cannot have a 'San Francisco' school approach, because it doesn't make sense for other counties like San Joaquin." These counties had drastically different resources: in San Francisco, there were 14 people working on COVID-19 school issues, whereas San Joaquin had just one person for 200 schools. Keeping these differences at the forefront helped maintain an equity lens.

- Equity was incorporated in other ways as well. CDPH held a two-day webinar for internal program staff, specifically addressing equity in schools. Additionally, team members noted that the efforts to streamline and decrease the data entry burden on schools was also a "mission for health equity." That burden was the biggest on lower-resourced schools with more low-income students. Easing reporting and data entry requirements alleviated some pressure on these overwhelmed schools.
- For a discussion of the inequitable emphasis on K-12 schools, see the Analysis of Activities in this chapter.

Data and Technology

This section describes data and technology specific to this chapter.

CalCONNECT System

Envisioning, Procuring, and Developing a Brand-New Technology System

- Following the announcement of the California Connected program in May 2020, one of CDPH's first tasks was to create a contact tracing data system to enable the program. While CDPH has a surveillance system that is used to collect and store data related to infected persons (cases), there was no existing software platform or system in place to facilitate contact tracing, data collection, or notification.
- In order to create a system as quickly as possible, CDPH immediately began work to identify program needs and system requirements. The Governor's Office and the California Department of Technology (CDT) facilitated the creation of a team of national technology experts, many from Silicon Valley. These experts guided the State as it conducted the investigative work necessary to derive system requirements, including having conversations with leading IT vendors. As one CDPH leader noted, "it was essential to have those experts consulting with us, and it allowed us to move quickly."
- The State conducted an expedited procurement process, selected an IT vendor, and the first iteration of the CalCONNECT system was launched in just 10 days on May 13, 2020. This Minimum Viable Product (MVP) was the first of many iterations of the system. In early summer 2020, the focus was on building out new functionality and on onboarding 5-10 California counties per week onto the system.
- Additionally, during this phase the team focused on integrating the new system with existing CDPH technology, especially the California Reportable Disease Information Exchange (CalREDIE). CalREDIE is the State's current surveillance system of record that stores COVID-19 records received from laboratories. This integration was problematic and the focus of an enormous amount of effort. The two systems are based on fundamentally different technology models: CalCONNECT is modern, flexible, and based in the cloud, whereas CalREDIE is an older, proprietary technology solution that is less adaptable.

- As COVID-19 case numbers surged in summer 2020, the systems could not handle the volume, causing failures and loss of data. A "data lake" was set up to alleviate pressure on the systems, and the team mapped the data fields between CalCONNECT and CalREDIE. This was an unprecedented accomplishment given the volume, complexity, and timeliness of data exchanged between the two systems.
- The CalCONNECT team continued to improve and refine the system, which included automating manual processes such as importing and error handling. One significant addition was the roll-out of the Virtual Assistant, a text-messaging tool that helped automate parts of the contact tracing process. While originally contact tracing was conducted solely over the phone, as case numbers grew it quickly became apparent that contact tracers simply could not make enough calls. "We heard from LHJs that they just couldn't keep up," according to another SME.
- The introduction of the Virtual Assistant in August 2020 helped alleviate the impending bottleneck. Initially, it was used to send texts to individuals alerting them to expect a phone call from a contact tracer. Eventually, the Virtual Assistant replaced phone calls in some cases, as it offered contacts the ability to complete a short interactive survey via text and then receive health education, guidance, and links to local resources.
- System refinements and improvements continued with input from LHJs, and in April 2021, CalCONNECT was successfully integrated with California's immunization registry, CAIR2. This major milestone allowed contact tracers to view individuals' vaccination status and to prioritize unvaccinated contacts for contact tracing.
- By late summer 2021, the majority of system development had taken place. Despite the system's agility and flexibility, the Omicron surge in Fall 2021 and Winter 2022 created a spike in case volumes that overwhelmed CDPH's COVID-19 technology, especially CalCONNECT's integration with CalREDIE. In over a week, case volumes in California tripled, creating backlogs and errors that strained the systems as well as contact tracers. "We didn't have the capacity to turn it around as quickly as the LHJs needed us to," one expert noted. While the CalCONNECT team had automated many manual processes, it still wasn't enough: "It took us too long to realize that people always want everything automatic and in bulk." The team learned that only through such automation can systems be made surge proof.

- The final major CalCONNECT system implementation for COVID-19 occurred in July 2022 when the platform went into Maintenance and Operations (M&O). Over the entire COVID-19 response, 59 of California's 61 LHJs used the system at some point for CI/CT work. Although Los Angeles County is not using the full solution, they are receiving select records via SPOT and working those investigations in the platform. San Diego and Alpine counties never onboarded to use CalCONNECT.

Listening to the Locals: LHJ Involvement in System Development

- As CalCONNECT was developed, the State kept the needs of LHJs at the forefront and they were thought of as "co-parents" of the system. One subject leader noted, "We wanted to make it easy for the LHJs. We wanted to make a system that was so efficient and innovative that they want to adopt it." To this end, CDPH included an LHJ representative on the core team to provide local insights and perspectives. Initially, discussions with LHJs were informal, but as the project grew, CDPH established a more structured LHJ Governance Council in July 2020 to provide a venue for feedback.
- The creation of the LHJ Governance Council represented a major turning point in the relationship between CDPH and LHJs in the contact tracing program. The CDPH contact tracing program continued to prioritize LHJs' needs and voice as the priority direction for system development. As a result of CDPH's request, Accenture, the IT vendor responsible for configuring CalCONNECT, helped CDPH establish the LHJ Governance Council forum, which allowed LHJs to "have a real voice in the process and be part of the decision-making" as the solution was built. The Council met twice weekly and provided a feedback loop for locals, who could share input on the solution along with specifics about their pain points. It also incorporated a tracking system and online forum where users could communicate, provide comments, and upvote or downvote system improvement requests. According to one SME, the Council was a "concrete way to demonstrate to the [LHJs] that they were in charge of what the product was going to look like." In November 2021, the Council meeting cadence moved to once per week.
- The extent to which LHJs were involved in system development "was a real triumph for this program," according to one SME. With local representatives at the table, the State was able to listen to them when deciding what to prioritize. For instance, during surges (such as the first

Winter 2020 surge), the CalCONNECT team suspended their regularly scheduled releases following local requests. According to one team member, "they needed [us to pivot to focus on] a certain change, so we stopped everything we were doing to change it for them."

- The strong structure and feedback loop that was established between the CalCONNECT team and the LHJs was an overwhelming success. In the words of one leader, "it was running smoothly from the start and stayed strong."
- See also the Analysis of Activities in this chapter for further discussion of technical assistance and CalCONNECT onboarding support.

Increasing Automation Prompted by Delta and Omicron Surges

- In the second of half 2021, the Delta and Omicron surges prompted CDPH to shift from a universal CI/CT approach to a targeted approach. These variants were fast-moving and highly-contagious, and CDPH began to promote the use of its automated tools to increase the speed of local contact tracing efforts. LHJs were encouraged to automatically transfer cases into CalCONNECT instead of moving them manually from CalREDIE. They were also encouraged to use the automated Virtual Assistant tool to trigger automatic notifications.
- CalCONNECT SMEs indicated that the unique structure of the contact tracing program has advantages and disadvantages. One disadvantage is the lack of awareness of CalCONNECT's capabilities in other CDPH program areas (e.g., the COVID-19 Science Branch). Experts indicated a desire to be better connected to other teams: "We have a lot of data that could answer questions they have. In a perfect world, we would be a bit more formally connected to the other teams and still retain the ability to move quickly."

Limitations in Contact Tracing for Minors

- In California, case investigation and contact tracing for minors is not permitted without consent of a parent or legal guardian, except in relationship to infections that are formally categorized as "sexually transmitted diseases." This presented unique challenges especially with the increasing automation of the CI/CT. It was impossible to determine if a certain phone number belonged to a minor or a guardian, which prevented CDPH from gathering CI/CT information via the Virtual Assistant. Instead, the State was authorized to send one-way "push"

notifications to the phone number on file that included general information (e.g., "if someone in your family has had a recent infection or exposure to COVID-19, these resources may be helpful…"). The limitations on minor CI/CT notifications were exacerbated by the Delta Surge, increased testing, and the reopening of schools in 2021, which led to a wave of minor COVID-19 cases.

Schools/Shared Portal for Outbreak Tracking (SPOT)

- The Schools/Shared Portal for Outbreak Tracing (SPOT) is an ancillary tool connected to CalCONNECT and was created by the CalCONNECT team. It expedites contact tracing by allowing schools and workplaces to enter outbreak data into the portal, which is then fed into CalCONNECT and sent to LHJs. As one team member described it, SPOT was envisioned as a reporting tool with "one-way flow of data."
- SPOT launched on November 5, 2020, and helped CDPH comply with new State reporting requirements for schools and workplaces. By facilitating the reporting of basic case information, SPOT supports schools' compliance with AB-86, which required schools to report positive COVID-19 cases in students and staff. It also supports employers' compliance with AB-685, which amended State labor code requiring notification of an imminent hazard to employees.
- The adoption of SPOT was initially mixed. The CalCONNECT team conducted a SPOT "roadshow" to demonstrate the tool's usability to schools and LHJs. While many staff were excited about the tool, a lack of change management resulted in lower user adoption. LHJ administrators in particular were reluctant to switch to a new system.
- Before the Delta Surge in summer 2021, some schools had adopted the tool for their reporting purposes. But the timing of the Delta surge, which coincided with the reopening of a large wave of schools, created pressure to expand the tool's scope beyond basic reporting. LHJs who were engaged in outbreak management at schools "wanted more and more information" to improve their processes and figure out data solutions for contact tracing, case reporting, and outbreak tracing on the LHJ side.
- Schools, however, were using the tool to monitor and report cases, but requiring additional fields increased the data entry burden. A trend emerged over time: during lulls, LHJs would advocate for the State to add more required fields into SPOT. However, during surges, the State team would encourage LHJs to remove these requirements and only ask for the

"bare minimum" to ease the reporting burden for schools. Sometimes the value of adding more fields was unclear, with some team members asking, "are we collecting data to inform action, or just for the sake of collecting data?"

- The SPOT development team devoted increasing amounts of energy to meet the needs of schools and thinking through the schools' workflow processes. The team created templates to reduce the burden of manual data entry, and developed a workflow to integrate with Aeries, a widely used school information management system. The team also held weekly SPOT working groups to solicit users about their needs and feature requests; these meetings are still ongoing. These meetings are usually attended by representatives from at least 12 different LHJs. The SPOT team uses these meetings to reach agreements regarding the tool. As one SME noted, "we try to build consensus. When we change the required fields, we're changing it for everyone."
- Los Angeles County adopted CalCONNECT in a limited fashion in order to use SPOT and the Disease Investigation Unit team performed 44 SPOT onboarding trainings for over 1,400 school site users in Los Angeles.

CA Notify Technology

From Concept to Statewide Rollout: Privacy Concerns, Pilot, and Program Launch

- In April 2020, Apple and Google announced the availability of virtual contact tracing technology (known as digital exposure notification). The system facilitated automated text notifications to be sent to users who were determined to have been in close proximity to someone who tested positive for COVID-19 while they were likely infectious, as long as that person also had the system activated and informed the system of their positive test. While these vendors were the first ones to offer their solution, many vendors were exploring the idea simultaneously. Based partially on research from MIT, many developers were working on the concept in trying to identify "what levers could be pulled" in response to the pandemic. Apple and Google, however, offered their technology free of charge, and not having to go through a procurement process made it easier for the State to adopt.
- The fact that the technology was being provided free of cost presented unforeseen contractual challenges. As the State worked with Apple and

Google to establish the program, the free technology raised questions about what legal relationships and ownership models to use, since the State's typical contractual relationships did not apply to this unique situation. It was a "square peg and round hole" conundrum, given the unprecedented nature of the collaboration between the State and private industry.

- Once the technology, known as Exposure Notification Express (ENX), became available, the first challenge was obtaining authorization to conduct a pilot at UC San Diego. State leaders, including early CA Notify leadership, conducted many early conversations focused on privacy, policy, and communications issues. These complex conversations involved the Governor's Office, Legislators, control agencies, CDPH, CDT, and the vendors. One of the biggest hurdles was the newness of the technology. "It was something so new and seemingly exotic, and it made people nervous from a privacy perspective. Once you understand the technology, it becomes more straightforward, but there was a lot of suspicion upfront," one leader noted.
- Accordingly, the team spent many months socializing the concept and tool in order to assuage privacy concerns and gain executive authorization. The team had many conversations during which they "knocked down all of the different objections," which ultimately taught them how to talk about the technology effectively.
- Once the pilot was authorized, UC San Diego rolled out CA Notify in September 2020 with a "privacy first" approach as part of its return to campus program. Five additional UC campuses joined the pilot in October 2020. On December 7, 2020, the Governor announced that the technology would be rolled out statewide and it launched on December 10, 2020.
- Overall, the CA Notify program accomplishments were remarkable given the magnitude of the pandemic, the privacy issues, and complexity of the larger political landscape, which included a change in presidential administration and differing opinions about privacy and government intervention. "It's miraculous that we got as far as we did," one SME noted, and other commented that "we all suspended our disbelief that this would work." In a "leap of faith," the State adopted the digital exposure notification solution based on pilot data that did not have widespread evidence yet. Respondents credited the State and the

Governor's administration for being willing to take this risk during a difficult, uncertain time.

- As of mid-April 2022, approximately 17.2 million total users have activated the CA Notify technology on their smartphones since the statewide launch in December 2020. Additionally, the technology has sent an estimated 1.25 million digital exposure notifications since its launch. In September 2022, all CA Notify operations (including its call center, webpages, and data analytics) were transitioned from UCSD to CDPH.

Relationship of Digital Exposure Notification to Traditional Contact Tracing

- While the CA Notify program was housed within the State's California Connected contact tracing program operationally, the CA Notify program was deliberately kept separate from CDPH's traditional, manual contact tracing program largely due to privacy concerns. As a stand-alone, independent program, CA Notify was in many ways supplemental to traditional contact tracing and has an entirely different target population.
- In traditional contact tracing, contact tracers have access to the names, addresses, and phone numbers of individuals they are contacting. But with digital exposure notification, when users enable the technology on their phones, their phones exchange encrypted, anonymous data to let them know if they were exposed to COVID-19 (for instance) while standing in line at the grocery store. CA Notify works faster and more efficiently than traditional contact tracing interviews—and can capture possible exposures at large mixing events such as concerts and conferences where contact tracing is difficult, and many people do not know each other.
- Traditional contact tracing is a labor-intensive, manual process, but during surges LHJs found themselves unable to keep up with the explosion of case rates. With a small number of cases, universal contact tracing can be accomplished. However, for the LHJs on the frontlines of manual contact tracing, it was impossible to manually trace every case and follow up with contacts and LHJs had to prioritize high-risk populations or locations. Exposure notification via CA Notify was positioned as complementary to traditional contact tracing work, since it allowed the State to send notifications to individuals that otherwise would not have been identified by manual contact tracers (e.g., strangers standing next

to each other in line). In this way, digital notification extended the coverage for manual contact tracing and helped expand capacity.

- Additionally, exposure notification also rose in prominence because of its ease and cost-effectiveness. As the pandemic ebbed, according to respondents, there was "less and less justification" for maintaining an expensive workforce of manual contact tracers. Digital exposure notification was an economical, easy-to-maintain "safety net," and having this safety net in place allowed for more targeted manual contact tracing of priority cases or outbreaks.
- SMEs noted that the relationship between traditional contact tracing and digital exposure notification, and how they integrate for more coverage, will likely be studied for "years to come" to better understand and utilize both efforts in future pandemics. In particular, CA Notify exemplifies how novel technologies can help increase capacity quickly (as opposed to staffing, which takes longer to scale), and can potentially be applied to other program areas as well.

New Partnerships Between the State, the University System, and Private Technology

- One of the main lessons learned was the importance of the new and unconventional partnerships established between the State (CDPH and CDT), the UC system (especially UC San Diego) and private technology companies (Apple and Google). Many respondents credited these tremendous and unprecedented partnerships, which enabled the CA Notify team to bypass traditional bureaucratic barriers: "we jumped in as a team, everybody contributed their expertise, and we figured out how to get it done. This couldn't have happened in a normal environment."
- Many agreed that as the pandemic recedes, CDPH should look for opportunities to sustain, expand, and leverage these partnerships. The success of CA Notify demonstrates how private technology companies can support the public health system, whose fragility was exposed by COVID-19.
- The CA Notify partnership also created unique challenges. With so many institutional stakeholders, different pieces of the program were owned by different stakeholders, creating fragmentation. This was especially true during the program's start-up phase. Since entering its maintenance and operations phase, these dispersed program pieces have been transitioned to CDPH, leading to a more cohesive environment.

New Partnerships with Other Western States

- CDPH also developed partnerships with other States who were implementing the same digital contact tracing technology. The Western States Collaborative (now known as the Digital Notification Alliance) began as a small group of States including Washington, California, Colorado, and Hawaii. This collaborative group met weekly and provided a space for States considering implementing the technology to exchange ideas and lessons learned, as well as have policy discussions.
- While there was a national CDC learning lab, the more detailed discussions enabled by the Collaborative allowed states to iterate and learn from each other's implementation experiences as they adapted the technology to their needs. For instance, some states bypassed the pilot phase altogether, whereas others included additional functionality. The Collaborative enabled California and its partner states to "quickly leapfrog over challenges" instead of "rewriting the story" and "recreating the same things." Ultimately, this reinforced the importance of having common resources and infrastructure that are not duplicative in a national pandemic.

Lack of Robust Marketing and Communications Resources Hindered User Adoption

- With the focus on obtaining buy-in for the exposure notification program and then operationalizing it, marketing and communications were not as resourced as much as it could have been. Moving quickly to build the program, communicating with the public was a critical area that was under-developed. During the initial launch, CDPH promoted CA Notify with advertisings and billboards, rather than a "major push from the top."
- As one SME noted, "this tool is all about communication and that's where we had an opportunity to do better." For this type of technology, it is crucial to gain the public's trust, listen to and address privacy concerns, and explain how the tool works not just through the early phases and launch, but continuously. "We scratched the surface but didn't have the resources to carry it out," another SME commented. Ultimately, many agreed that having more resources devoted solely to marketing, communications, and messaging around CA Notify would have increased user adoption of the technology.

Looking Ahead: Evaluating the Program and Incorporating Exposure Notification in Future Pandemics

- More than two years into the pandemic, the CA Notify program is evolving and looking to the future. Many of the approval processes that were suspended in the rush to operationalize the program are now being reintroduced. With their reintroduction there is a recognition that some policies and procedures, especially those related to technology implementations, need to be more agile. The State needs to "develop a trustworthy way of getting evidence to leadership and the public so we can make progress without having a full peer review," according to one SME.
- Developing such evidence also has its challenges. While the CA Notify program helped prevent spread of COVID-19, its effect is difficult to quantify. At the start of the program and pandemic, the frameworks to measure the program's impact via key performance indicators did not exist. They are now being developed as part of program evaluation efforts. Yet due to privacy concerns, the datasets are slim and the team must rely on inferred and indirect estimates, much in contrast to the robust demographic data common in other areas such as vaccines. Working with more limited data makes it even more difficult to measure the program's impact, although efforts are currently underway.
- While digital exposure notification was introduced in a difficult environment, the important infrastructure has been laid, will not need to be recreated, and can be built upon in the future. "This was a test, and the test worked," one SME noted. In California, digital exposure notification has been accepted as a tool in the pandemic response toolkit and should be used and promoted as part of a full suite of public health preventive activities. "If we can keep this bundled up and ready to go, next time we will be starting at a much higher baseline and it will be a lot easier," another expert agreed. During the next pandemic, leaders anticipated that this tool will be part of the standard of care.

MS Dynamics System

A New Technology Solution to Help Track and Manage the Redirected Workforce

- Creating a new workforce from scratch created unforeseen operational challenges. At the start of the program there were no HR systems or processes in place to manage and track critical information, including redirected employees' home departments, training completion status, or LHJ assignment. CDPH initially used Excel spreadsheets to track the redirected workforce, but its size and complexity caused frequent crashes. In the beginning "It was a nightmare with so much confusion – there were so many spreadsheets, we didn't know who was doing what or where people were," one SME noted.
- Ultimately, this lack of structure contributed to a poor experience for redirected State staff. CDPH received frequent complaints from redirected staff about the lack of clear communication. It became clear that a solution was needed to better manage, track, and communicate with redirected staff, who were "doing a really hard job but feeling unsupported," according to one leader.
- To help better manage the redirected workforce, CDPH contracted with the consulting firm Crowe to create a technology solution devoted to managing the contact tracing workforce. The system, built on Microsoft Dynamics, went live in on July 21, 2020, (just several weeks after being conceptualized) and represented a turning point for the entire California Connected program. The MS Dynamics system enabled CDPH to download reports, create pivot tables, and create "snapshots in time" of staffing numbers and outstanding items. CDPH was able to track employee classification level, training completion status, and if employees were bilingual or not (among other things). Additionally, program staff were able to load the LHJ requests for contact tracers (submitted through their MHOACs) into the MS Dynamics system in order to align requests with the existing pool of redirected staff. Finally, standard communications could be loaded into the system and automated to send out to redirected staff at specific milestones, such as a welcome-onboarding informational email when staff are first redirected to the program, which improved communication and information exchange requested by redirected staff.
- Lastly, CDPH also brought in additional consultants to help "create a smoother ride" for redirected staff. All of these efforts created efficiencies and improved communications with redirected staff and their home departments.

- Ultimately, "it's not easy to track thousands of people who aren't physically in your office," as one SME noted. The difficulties associated with managing, tracking, and communicating with redirected staff revealed the importance of carefully thinking through the operationalization of infrastructure and new processes, which was an important lesson learned. As one leader put it, while redirecting and assigning a workforce sounds simple in theory, "without a data system to track it, it's incredibly hard to operationalize."

Communications

This section describes communications specific to this chapter.

External

Communicating with LHJs

- Communication with LHJs was central to all of the various workstreams within the California Connected program. However, the cadence and success of these communications varied by workstream.
- For the Technical Assistance and LHJ Capacity Building team, communication with LHJs was constant. In addition to the numerous formal discussions and meetings, there was a large amount of less formal communication based on the relationships built between State and local staff. "Even the most basic communication, being able to just pick up the phone, was way more effective than a mass email," one respondent noted.
- However, for the CI/CT Schools Support team, communication was more challenging. While the State Safe Schools for All team was working directly with schools, they were also coordinating with the school teams at the local level. Within LHJs, the workers devoted to school-related issues tended to be disconnected from the workers devoted on CI/CT for the general public. This silo would sometimes hinder communication from CDPH to locals, since there may be different points of contact for different parts of the work.
- For a discussion of communication between the CalCONNECT team and LHJs, see the Data and Technology section in this chapter.

Communicating with Private Technology Vendors

- In general, there was strong collaboration and partnership between different institutions—including the State, the private sector (Google, Apple, Accenture, and others), and the academic institutions (UCSF, UCLA, UCSD, and others). Many noted that the CI/CT workstreams would not have been as successful without this cross-team communication and collaboration, which helped build new systems and programs with speed and agility.
- However, there were certain unique challenges associated with these innovative relationships. For the technology projects, there was a learning

curve associated with working from colleagues from the technology sector. There was a lot of translation that needed to occur, and especially during the early phases of the technology projects, a lot of time was spent "translating public health needs for our tech partners." Once early challenges were overcome, communication was streamlined and the public-private teams were more unified.

Communicating with Academic Institutions

- Similar to its relationship with the technology sector, the State's collaborative relationships with the University of California system were crucial to developing key areas of the California Connected program, including the VTA, the CA Notify system, and the CI/CT Schools Support.
- Program staff noted that having more clarity early on around tasks, roles, decision-making responsibilities, and boundaries would have made collaborations easier. This was especially true for schools-related work. So many different stakeholders were involved in this effort, both as part of the CI/CT Schools Support team and the broader, multi-agency Safe Schools for All team. Early on, there were not enough detailed discussions to allow all partners to understand each other's roles and move forward with a unified stance. There was also lack of clarity around approval and decision-making processes. Ultimately, this led to silos and duplicative work. However, the leadership team addressed these difficulties as the response continued, which helped to create a more effective and efficient system that produced robust programming.
- The California Connected program incorporated continuous quality improvement and programmatic After Action Reports (AAR) within its programs, including its Schools Support team. After the challenging Schools-related efforts, the program facilitated an AAR effort and used the results to institute changes to its processes, communications, and collaborations between SS4A, California Connected, and the UCLA/UCSF Schools support team. This lead to improved partnerships and deliverables, including improved training webinars for California schools.
- The early lack of clarity around roles and responsibilities also led to friction between the State and academic partners regarding ownership over certain program pieces. The urgent need to quickly build programs and systems led the State to move "too fast" when it came to these early conversations. While the State funded certain programs, they are housed within academic departments. Now, according to one leader, "we are

suffering from the fact that we weren't super clear" about which entities have ultimate executive approval, authority, and ownership over some of the programs that were built in partnership but are fully funded by the State.

- Academic partnerships were (and continue to be) incredibly valuable for the California Connected program, as well as other CDPH COVID-19 response efforts. According to program SMEs, it is because this partnership is so important that going forward, the State should invest more time in sitting down with its partners to clarify and document short- and long-term roles and responsibilities for jointly-created programs.
- Roles and responsibilities documentation should include language related to publication and public engagement. Institutional cultural differences around these topics caused tension between CDPH and its academic partners. In general, academia wanted to take a more rapid and expansive approach, whereas the State was more cautious. For instance, academic partners were very eager to rapidly publish results and findings on the CI/CT innovations they had contributed to. Yet CDPH took a more selective and rigorous approach to publishing, which included requiring more evaluation data, longer review processes, and only publishing significant contributions. When it came to public engagement, academic partners wanted to host large public events to showcase programmatic achievements. CDPH, on the other hand, maintained that in a pandemic, such events should be designed to get input, share, or learn.

Internal

Communicating within CDPH

- When it came to communications within CDPH, for the California Connected program, these varied greatly by workstream. For instance, the workforce expansion team developed positive, productive communications with other CDPH divisions and departments, including legal, contracts management, and the human resources (HRD). HRD was especially valuable as a "sounding board" and trusted advisor, given their expertise on union issues and labor laws. "Even in an emergency, we have to think about those other requirements," one SME noted, and it was critical to have HRD's support in this area.
- New positive relationships were also developed with the legal team and with the Contracts Management Unit (CMU). With expedited

procurement processes in place, it was much easier for the program's needs to be heard.

Communicating within the California Connected Program

- When it came to the California Connected program itself, communication was more challenging due in part to the enormous scope and complexity of the program. Especially for schools and LHJ support work, the lack of coordination among teams led to siloes. Some areas of the program suffered from a lack of clarity around objectives, roles, and responsibilities, leading to duplication of work.

Communicating with Other State Departments

- Within the California Connected program, the workforce expansion team was responsible for communicating to over 100 State "home" departments regarding the status of their redirected workers. Initially, there were no communication protocols in place; these had to be developed over time. The team emphasized the need to remain transparent and respectful, but it was difficult to maintain steady, transparent communications to a group that large given the small size of the program team.
- The changing nature of the pandemic also exacerbated this challenge, since information was changing on a daily, or even hourly basis. As one SME noted, "I felt like we were always behind. We couldn't keep up, and you don't know what you're missing in communications unless it's brought to your attention." However, the team tried to "roll with the punches" and prioritized transparent, respectful communications to both the redirected workers and their home departments.
- CDT was also a valued partner that the program communicated with extensively regarding its technology workstreams. Partnering with CDT on the CalCONNECT solution up front helped the State successfully conduct a procurement in approximately two weeks—which would typically take between four to six months. This partnership "enabled us to get out of our own way" and move incredibly quickly to select the system and the system integrator.

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.

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
Planning; Initial start-up	Establish (or re-activate) partnerships with academia, vendors, and technology partners	• Innovative collaborations allow the State and its stakeholders to work together effectively. • Roles and responsibilities are clearly documented.	• Spend the time to outline contractual relationships up front, especially regarding approvals, decision-making authorities, program	• Contact Tracing 1, 12	

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
			ownership, and publishing processes. • Create a RACI or similar matrix. • Partners during COVID-19 response: Academia for training and CA Notify pilot (UCLA, UCSF, UCSD); consulting firms for IT implementation (Accenture, Crowe); technology firms for digital exposure notification (Apple, Google).		
Planning; Initial start-up; Ongoing operations	Establish local technical assistance teams	• CDPH provides CI/CT technical assistance and specialized support to LHJs, schools, and other local jurisdictions. • Technical assistance teams	• Anticipate that local technology adoption challenges will be significant. • Anticipate and plan for State program staff burnout.	• Contact Tracing 6	

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
		are nimble and can pivot quickly.	• Develop a plan to mitigate siloes and duplicative work on the State side.		
Initial start-up; Ongoing operations	Ramp up internal program staffing	• CDPH has adequate staff to support its CI/CT response operations. • CDPH programs can expand and contract to meet shifting demands.	• Consider designating a State HR lead responsible for recruitment (rather than relying on program staff). • Anticipate and plan for staff burnout. • Consider incorporating language about emergency redirections in every CDPH position. • Investigate an equitable way to plan for and assign CDPH staff during emergencies (e.g., a standard rostering system).	• Contact Tracing 8, 10; Infection Prevention 1	

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
			• Other CDPH programs may be negatively impacted due to lost staff.		
Initial start-up; Ongoing operations	Expand the CI/CT workforce	• The State can expand the CI/CT workforce to meet its needs. • Workforce expansion is supported by adequate infrastructure.	• Consider maintaining the Public Health Reserve Corps and including the PHRC in standing Communities of Practice and trainings each year. • Have a system in place to track the expanded workforce (e.g., MS Dynamics or other tool). • Identify the required skills and resources needed for redirection (e.g., Excel, Word, interviewing, etc.) instead of relying solely on	• Contact Tracing 2, 3, 4, 11, 14	

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
			employee classification.		
Initial start-up; Ongoing operations	Train the CI/CT workforce	• Workers have the necessary training to successfully perform their work.	• Partner with organizations who are training experts. • Keep a training contract open for baseline training that can be quickly leveraged in emergencies. • Leverage the VTA training model developed for COVID-19, which was very successful. • Develop new trainings as needed throughout the response.	• Contact Tracing 5	
Initial start-up; Ongoing operations; Close-out	Incorporate results of CI/CT program evaluation	• CI/CT resources are strategically allocated to maximum impact based on the results of the	• Determine if a universal CI/CT or targeted approach is needed. • Continue to monitor program	• Contact Tracing 13	

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
		program evaluation. • Evaluate program workstreams throughout and at the end of the response.	measures and invest/adjust resources in areas with the greatest impact. • Define reporting processes, including the interpretation and use of data to inform programs. • Use evaluation results to inform policy and guidance.		
Initial start-up; Ongoing operations	Roll out digital exposure notification tool and program (CA Notify)	• Digital contact tracing is used successfully to complement traditional contact tracing.	• Anticipate privacy concerns and have a plan in place to address them with pre-approved messaging. • Budget for public media and communications campaign. • Continue/revive partnerships with other States to	• Contact Tracing 8	

Response Phase	Major Tasks	Success Criteria	Considerations	Finding ID	Lead
			learn about best practices.		
Initial start-up; Ongoing operations	Maintain and expand the contact tracing platform (CalCONNECT)	• California has a statewide platform to support local case investigation and contact tracing work.	• Listen to and prioritize local needs and requests. • Expect to provide significant technology support to LHJs, especially under-resourced ones.	• Contact Tracing 7	
Planning; Initial start-up; Ongoing operations	Incorporate equity	• Equity is formally incorporated into all CI/CT workstreams.	• Develop formal CI/CT equity metrics. • Incorporate equity from a "lived experience" as well as data. • Hire staff from vulnerable communities who can advocate for those communities.	• Contact Tracing 9	