

covidcontacttracing.com

COVID Contact Tracing

A guide to get us back to normal →

A methodology in contact tracing
using the tech available today.

Devon Proctor
Chief Executive & Technology Officer

Table of Contents

1 Overview

2 Our Approach

3 FAQ's

4 Appendix & References

“

The technology and data required to power this approach exist and are deployable today

01 Overview

COVID-19 challenges every aspect of modern life. To help prevent the spread of disease, schools, restaurants, and businesses around the world have closed their doors. There is consensus among epidemiologists and healthcare professionals that reopening society will require an efficient and reliable system for tracing the spread of COVID-19. Without the addition of precise and historic location data of patients, leaders will remain a step behind the disease.

The current digital approaches to contact tracing depend on untested and unready technologies that are unlikely to achieve sufficient penetration to be useful in response efforts. However, large technology companies already store the precise location data of many smartphone users. With the appropriate tools and protections, we can empower individuals to contribute this data directly to their healthcare providers and public health officials. Through this data collaboration, the American public can play an integral role in combating the COVID-19 crisis.

Effective strategies for using the vast data collected on individuals have been deployed in China, Israel, South Korea, and elsewhere. These strategies are possible because in some countries, central governments have ready access to the fine-grained location data of citizens through tight control over digital networks. In the United States, individuals entrust large technology companies—not the government—with the stewardship of their data.

By giving individuals the tools to take control of their historic location data, and safely contribute that data to their trusted healthcare providers, we can enable an effective COVID-19 response without sacrificing our traditional values of personal privacy and agency.

Americans have a proud history of heroism in the face of crisis, and understand that combating an invisible enemy requires mobilizing all of the resources at our disposal. With the support of individuals and the tireless ingenuity of healthcare workers, we can eliminate COVID-19. Through the efficient and safe delivery of location data, our intention is to equip today's heroes with one of the most powerful weapons available.

02 Our Approach

Covid Contact Tracing (CCT) has built a web-based software platform for individuals to aid in contact tracing by contributing their existing, fine-grained, Google geolocation data directly to their trusted healthcare provider. CCT provides the same partners with synthesis tools that allow epidemiologists and public health officials to make better-informed approaches to preventing and controlling the disease. Individuals concerned about exposure can cross reference their own location data to determine if they should self-present for testing and tracking.

With CCT's software platform, public health agencies can create more efficient tracing records, compute exposure risk scores for new patients, identify real-time patterns in emergent outbreaks, and otherwise inform clinical and epidemiological responses. Ultimately, this data will help governments assess the efficacy of restrictive measures, and shape strategies for staggered reopenings.

Data Acquisition

Google location history

Google stores fine-grained historical location data for a large fraction of smartphone users. This is collected from users who “opt-in” to collection through Android or Google Maps products. Google enables users to download their location data via the Google Takeout portal. This downloaded data includes raw time/geo stamps, as well as semantic locations (e.g. location id, travel type) inferred by Google systems. For example, a recent download from a CCT team-member contained 3,130,223 raw time/geo points, along with 13,773 place visits and 19,256 activity segments, dating back to 2009.

Google location data has previously been applied successfully to track sources of vector-borne diseases at scale.

Infection history

At CCT-partnered testing sites, nurses will prompt individuals to provide their historical Google location data using CCT software. If an individual is later diagnosed with COVID-19, their location history is added to a secure database stored on the healthcare provider's server (stripped of all personally identifiable information).

Patient query

Individuals can use CCT's platform to determine if they are at increased risk of exposure based on their location data, prompting self-presenting to testing centers of patients that represent a priority for diagnosis and tracking. Individuals can also opt in to passive location sharing to be alerted to heightened risk exposure.

CCT code, running on the healthcare partner's digital infrastructure, queries the database of locations of known contagious individuals, matches time frames of exposure, and computes a score based on the contagion-likelihood of recent physical interactions. This risk score is inferred from the intersection of the patient's location history with the location histories of known contagious individuals, and the nature of those intersections (e.g. semantic location, congestion, duration of interaction). After this score is reported to the healthcare provider, the patient's records are discarded.

In circumstances where testing kits are limited, or patients must be otherwise triaged, healthcare providers can use exposure risk scores as an additional datapoint alongside clinical assessments.

“

Our Covid Contact Tracing technology provides the same partners with synthesis tools that allow epidemiologists and public health officials to make better-informed approaches to preventing and controlling the disease.

03 FAQ

Efficacy

1. Who is COVID Contact Tracing (CCT)?

CCT is a team of experienced Silicon Valley engineers, designers, lawyers and businesspeople. Everyone has come together on a voluntary basis with the sole intention of developing a solution to aid in the fight against COVID-19. As a public benefit corporation, solving this crisis will remain the foundational purpose of the company throughout its evolution. To learn more, visit <https://covidcontacttracing.com/>.

2. How does this work with other data collection efforts?

CCT's solution is a direct complement to the other contact tracing efforts underway, specifically manual contact tracing and BLE support. CCT's software platform provides an immediate service to public health agencies, hospitals, and at-risk citizens by back-filling data from existing COVID-19 patients, and using that data to prevent the spread to others. This software is an immediate complement to other data collection efforts in two ways:

a. It provides hospitals and public health agencies with historic geolocation data.

b. Makes that data useful for the identification of episodic outbreaks, and appropriate clinical responses. This approach is different from others because it uses **existing digital datasets**. However, it is a direct complement to all other data gathering efforts, both automated (e.g., Google/Apple BLE, other collection apps) and manual (i.e., serology testing and in-person contact tracing interviews by public health professionals).

3. How have you validated (directly or indirectly) your system, and is more validation needed before a roll out?

Our concept has been validated through successful roll-outs in China and South Korea. Our concept has also been validated by a group of software engineers and epidemiologists who teamed up in 2018 to develop a machine learning model that identified sources of foodborne illnesses. They used similar datasets, including anonymous and aggregated location data (as well as web searches). Researchers were able to identify unsafe restaurants by comparing people's location data (where they had been) with later search terms associated with food poisoning →

03 FAQ

symptoms. With this data, the researchers reliably identified restaurants with insufficient food safety practices. This rapidly accelerated the efficiency of corrective actions and slowed the potential spread of foodborne illness. The findings from this tactic were later published in [Nature](#).

4. How does your contact tracing strategy differ from China, Israel, and South Korea?

Our system relies on the voluntary aggregation of anonymized data, and uses sophisticated privacy measures to strip personally identifiable data. Please refer to the Privacy FAQ section below for more details.

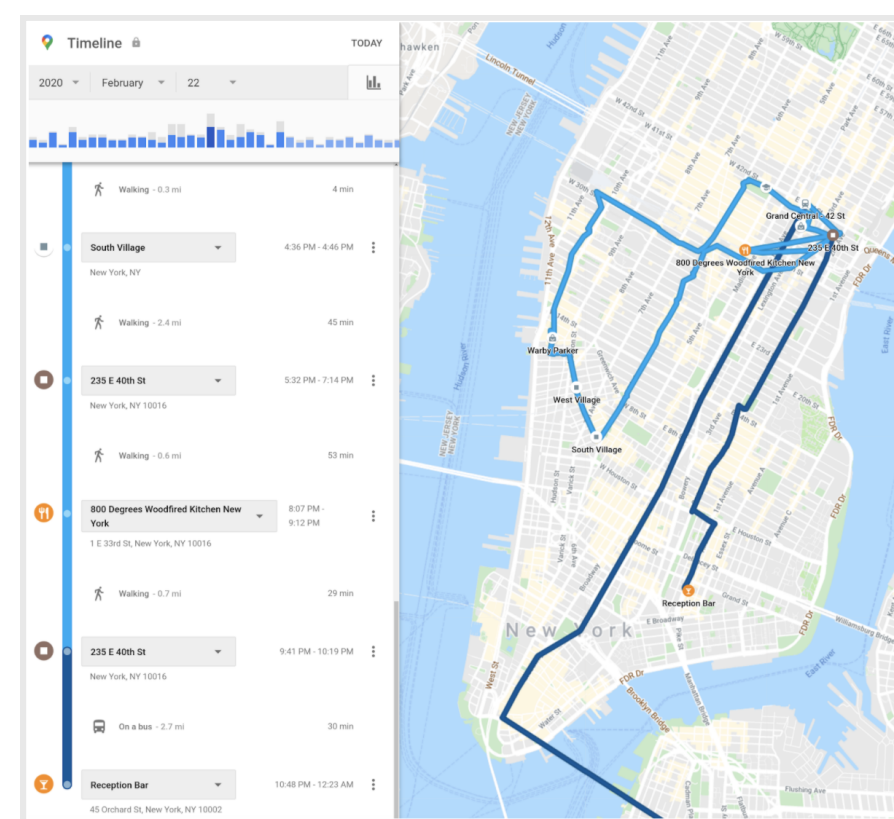
5. Does this replace the need for manual contact tracing?

No, it's a complement to existing strategies. CCT's solution allows healthcare professionals to rapidly scale and automate their efforts. We owe it to the people on the front lines to develop and deploy the best possible tools. Data and software analytics will help healthcare workers do their jobs safely and swiftly.

It is important to note that this automation helps patients remember their past location through data visualization. During contact tracing interviews, this avoids the need for faulty, biased, personal recall.

6. How accurate are Google's geolocation datasets?

Anyone who is a registered user of a Google product can access their own historic geolocation datasets via <https://takeout.google.com>. Below is a screenshot of a representative data download by a CCT team-member for a day in February, in NYC.



03 FAQ

7. Is automated location useful?

Demonstrated successes in China and South Korea indicate that automated location data can be a powerful tool in preventing the spread of COVID-19. In a [recent Harvard Business Review](#), analysts assess the costs & benefits of business-government collaboration in technology adoption. Beyond COVID-19 applications, there are other examples of real-time disease detection. The previously-referenced white paper from [Nature](#) provides another example.

8. Isn't bluetooth proximity required for contact tracing?

BLE is an exciting technology, and will hopefully contribute to the response once available. As of today, the limited trials that exist have experienced underwhelming adoption. Fundamentally, BLE app solutions rely on interactions between two or more active users, resulting in extremely low "hit" rates when local adoption rates are below 50%. Because CCT relies on existing location data, our dataset is additive from the first user.

In Singapore, where direct government-recommendations historically result in high

participation rates, only ~one-fifth of the population is using the [TraceTogether](#) app. A number of recent articles, including this [Washington Post article](#), explain the limitations of digital contact tracing that rely on BLE. CCT's community-driven contact tracing solution relies on the existing heavy investment that has been put into gps, cellular data, and wifi networks.

9. Will voluntary participation generate sufficient data for healthcare providers?

Yes, voluntary participation will be sufficient to make a major difference in current contact tracing efforts. CCT sees value during three distinct phases of adoption:

Phase 1 (Immediate): Even without a database of volunteered location histories, having an immediate digital record for patients that have contracted COVID-19 helps a contact tracer speed up their interview, ask relevant questions, and get a much better understanding of when and where others may have been exposed.

Phase 2 (Near-term): 60-70% of confirmed positive COVID-19 patients volunteer their data. Once we have partnered with enough healthcare

03 FAQ

providers, we expect high rates of adoption from COVID-positive patients, who are introduced to the solution by their medical provider. At this phase, doctors and public health officials can use CCT tools to help determine the risk for new patients.

Phase 3 (Medium-term): 60-70% of individuals volunteer their data. This is the participation threshold that experts believe is necessary to curb the spread of coronavirus. This is a major challenge for new apps and protocols, but it is achievable with established infrastructure (i.e. existing data).

Polls, surveys, and public sentiment point to the fact that Americans want to help solve this crisis. The United States public has a long history of responding to calls to action. A recent [Kaiser Family Fund poll](#) conducted from April 15-20, 2020 (with 1,202 respondents) reflected positive attitudes towards track and trace technologies, particularly when coupled with an explanation of its ability to inform strategies for lifting restrictions and restarting the economy. Below are a few callouts from the poll: Once people are told that a track and trace app would help restart

the economy/allow more people to go back to work/school, 66% are willing to download a contact tracing app.

Twice as many people would prefer a contact tracing app managed by a public health agency than a tech company: 60% are willing to download a public app vs. only 31% if data is managed by a private tech company.

38% say they are most concerned that private companies will sell their personal data from the app. 33% say they are most worried the federal government will use the data for purposes beyond tracking the spread of coronavirus.

Privacy

10. Are you concerned about collecting more data on Americans?

This solution only uses existing data. No new data is collected. In its simplest form, this is a transfer of data collected by large companies to the hospitals/public health officials who need it.

03 FAQ

11. Why should we trust hospitals/public health departments with our data?

We believe that there is no organization that is better suited to act as stewards of community-based data. In practice, these organizations are already collecting a less-accurate version of this data through manual interviews. What is more, these entities are systematically entrusted with sensitive personal information (i.e. medical records) and rely on a robust legal framework for managing access (HIPAA). Data collected through the CCT portal is de-identified as part of the user download/upload process.

12. Won't Google oppose using their data for other purposes?

We are confident that they will not. Since it began using personal data for advertising revenue, Google has always maintained that individuals have a right to their data. As an organization, they have gone to great lengths to make it as simple as possible for users to view their own data.

13. Is any data uploaded through CCT without a patient's consent?

All information disclosed by patients to healthcare providers (made possible with CCT software code) is done so voluntarily. The portal that we provide to healthcare providers is

designed to rely solely on opt-in, informed consent. Moreover, as a patient navigates the CCT data upload process, we provide clear and conspicuous notice of a) the exact type of data that will be provided and b) how that data will be used and shared by the healthcare provider.

14. What data elements do patients provide through CCT?

CCT is designed to collect only those data elements essential to address the COVID-19 pandemic. Users are prompted to provide an index of their geolocation data for the sole purpose of analyzing risks of exposure and infectiousness. Immediately upon the upload of the patient's location data, all data points from before the estimated period of infectiousness are purged. CCT's software gives healthcare operators options to implement further data minimization measures. For example, operators can purge or aggregate the location data of confirmed COVID-19 positive patients after a specified period of time. In a further effort to prioritize data minimization, CCT does not retain data uploaded by prospective COVID-19 patients who query the indexed data as a way of assessing their exposure risk.

03 FAQ

15. How is location history data securely indexed?

Upon upload, CCT software merges time and geolocation stamps of indexed users, making it a non-longitudinal dataset.

Healthcare providers use their own system of privacy, and no individual-identifying information will be included in electronic databases.

16. Does CCT use uploaded information for any non-healthcare related purposes?

Data uploaded through CCT is held by our partner organizations, who control how it is used and shared. CCT does not monetize, share, or use the data for its own purposes. Rather, CCT provides and manages the software that enables healthcare providers and health professionals to collect, analyze, and process geolocation data directly from their patients.

17. Who does CCT share the uploaded data with and does CCT combine data from multiple healthcare professionals?

Data uploaded through CCT is pushed directly onto the healthcare provider's servers and CCT's software operates on the healthcare provider's tech stack. The data is controlled by

the healthcare provider and CCT does not receive a copy of the data. CCT only needs access to anonymized data to ensure proper functioning of the software and to provide further safeguards. In the instances where CCT accesses anonymized indexes of data, the software is built with physical and logical access controls, audit logs, and restrictive administrative privileges. Accordingly, when data is uploaded through CCT for one hospital, it is naturally segmented from datasets uploaded to other hospitals. Healthcare providers (not CCT) dictate how the data is used and shared. Please refer to the appended diagram for more information.

HIPAA

18. Can Covid Contact Tracing sign a business associate agreement?

For people unfamiliar with Business Associate Agreements (BAAs), you can find an overview in [this article](#). Covid Contact Tracing ("CCT") is not a business associate. CCT does not maintain—even on a temporary basis—any of the data shared by individuals with hospitals or medical providers. Individuals push that data directly onto the hospital's servers, and our software operates on the hospital's tech stack. →

03 FAQ

With a clear understanding of the urgency to find a solution, our mission is to get data where it matters most—the healthcare providers. These are the people who can best leverage the data to reduce the spread of the coronavirus, triage who should be tested, and identify those who should self-quarantine to prevent further spread.

To that end, we designed CCT to work directly on the servers and tech stack of healthcare providers. With this design, we deploy software on existing HIPAA-compliant infrastructure, and when a user provides data through the CCT platform, the data goes directly from that user into a HIPAA-compliant system. CCT does not receive a copy of the data, and it does not even provide a pass-through for the data as a conduit. We understand that HIPAA diligence can be a blocker to engaging new vendors, which is why we designed our system to provide data from patient to doctor, and run analytics on healthcare servers. CCT does not need to access Protected Health Information (PHI) from these systems as software is deployed.

19. Do you comply with HIPAA?

We don't receive any PHI, so HIPAA doesn't apply to us. We just provide and manage the software that enables

healthcare providers to collect, analyze, and process geolocation data directly from their patients. We do not require access to PHI, and we only need access to anonymized or aggregated data—only that which is located within the healthcare provider's servers—to manage the functionality of the software.

20. Aren't you a business associate since you'll be accessing the PHI made available by patients?

Please see the description in question FAQ 18.

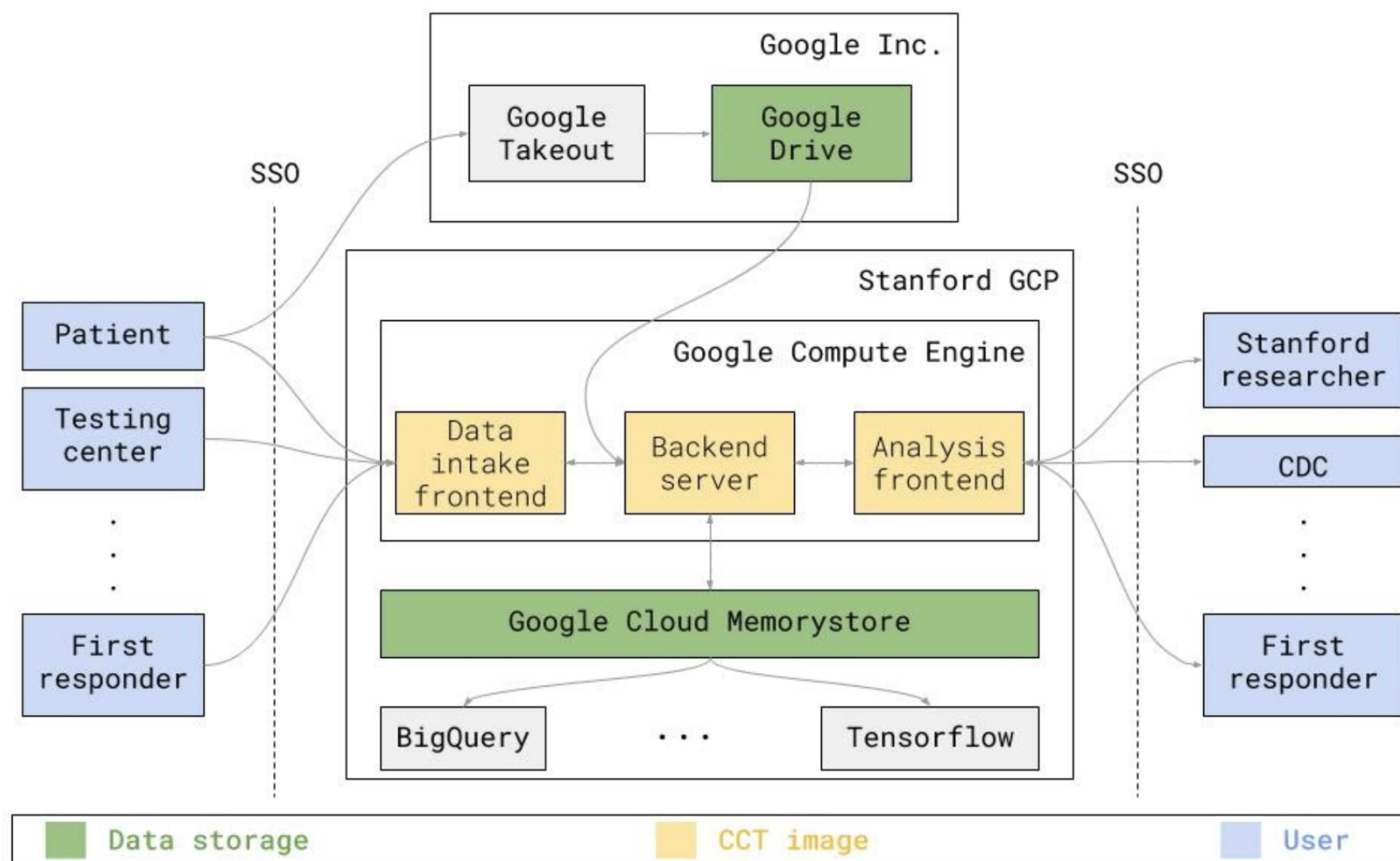
21. How are you ensuring that data is de-identified under HIPAA regulation?

The only data that must be preserved is the set of (bucketed timestamp, bucketed lat/lon) tuples. Arbitrary bounds on differential privacy can be achieved by injecting variable levels of noise to this data during the upload process. Under the HIPAA Privacy Rule, data are de-identified if either:

1. An experienced expert determines that the risk that certain information could be used to identify an individual is "very small" and documents and justifies the determination, or
2. The data do not include any of the 18 identifiers (of the individual or his/her relatives, household members, or employers) which could be used alone or in combination with other information to identify the subject.

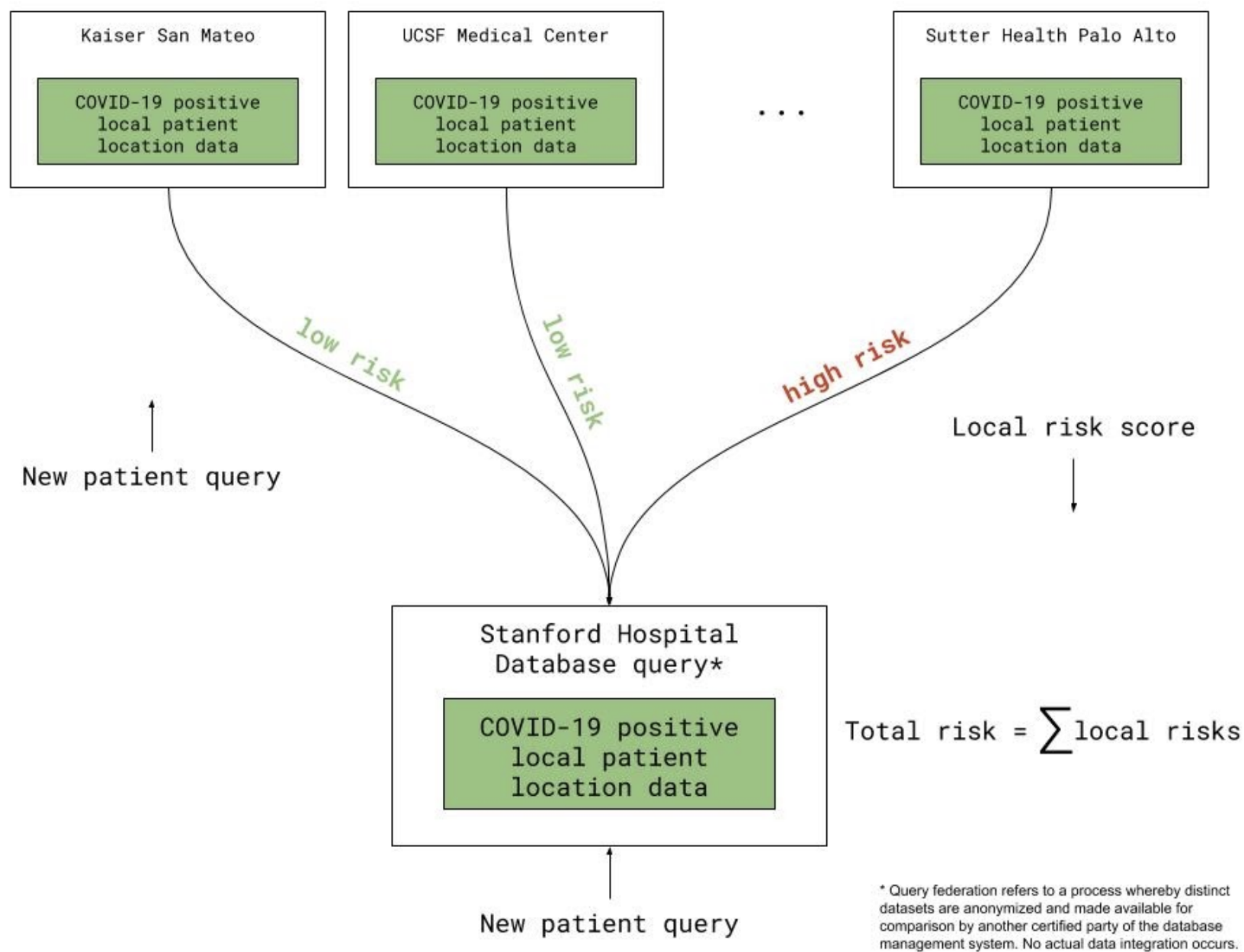
04 Appendix

Figure 1: CCT Software Platform Dataflow Overview



04 Appendix

Figure 2: CCT Query Federation



04 References

References

"Phones Could Track the Spread of Covid-19. Is It a Good Idea" 15 Mar. 2020, <https://www.wired.com/story/phones-track-spread-covid19-good-idea/>. Accessed 30 Apr. 2020.

"How smartphone apps can help 'contact trace' the ... - Reuters." 14 Apr. 2020, <https://www.reuters.com/article/us-health-coronavirus-tracing-apps-expla/explainer-how-smartphone-apps-can-help-contact-trace-the-new-coronavirus-idUSKCN21W2I8>. Accessed 30 Apr. 2020.

"Seoul's Radical Experiment in Digital Contact Tracing | The" 17 Apr. 2020, <https://www.newyorker.com/news/news-desk/seouls-radical-experiment-in-digital-contact-tracing>. Accessed 30 Apr. 2020.

"Machine-learned epidemiology: real-time detection of ... - Nature." 6 Nov. 2018, <https://www.nature.com/articles/s41746-018-0045-1>. Accessed 30 Apr. 2020.

"Most Americans are not willing or able to use an app tracking" 29 Apr. 2020, <https://www.washingtonpost.com/technology/2020/04/29/most-americans-are-not-willing-or-able-use-an-app-tracking-coronavirus-infections-thats-problem-big-techs-plan-slow-pandemic/>. Accessed 30 Apr. 2020.

"Contact Tracing - CDC." <https://www.cdc.gov/coronavirus/2019-ncov/php/open-america/contact-tracing.html>. Accessed 30 Apr. 2020.

"Contact Tracing - Bluetooth Specification v1.1." [https://blog.google/documents/58/Contact Tracing - Bluetooth Specification v1.1 RYGZbKW.pdf](https://blog.google/documents/58/Contact%20Tracing%20-%20Bluetooth%20Specification%20v1.1.RYGZbKW.pdf). Accessed 30 Apr. 2020.

"KFF Health Tracking Poll – Late April 2020: Coronavirus" 24 Apr. 2020, <https://www.kff.org/global-health-policy/issue-brief/kff-health-tracking-poll-late-april-2020/view/footnotes/>. Accessed 30 Apr. 2020.

"How Digital Contact Tracing Slowed Covid-19 in East Asia." 15 Apr. 2020, <https://hbr.org/2020/04/how-digital-contact-tracing-slowed-covid-19-in-east-asia>. Accessed 30 Apr. 2020.

"What is a HIPAA Business Associate Agreement (BAA)?" 28 Apr. 2017, <https://healthitsecurity.com/features/what-is-a-hipaa-business-associate-agreement-baa>. Accessed 30 Apr. 2020.