COVID Safe Paths

Privacy-Aware Contact Tracing Towards Resilient Societies

April 2020

A Systems Approach: Technology To Help Slow The Spread Of Covid-19, Restart The Economy, And Build Resilient Societies

A global, citizen-centric movement to develop free, open-source, privacy-by-design tools for citizens, public health officials, and larger communities to flatten the curve of COVID-19, reduce fear, and prevent a surveillance-state response to the pandemic.

Background

Containment, the key strategy in quickly halting an epidemic, requires rapid identification and quarantine of the infected individuals, determination of whom they have had close contact within the previous days and weeks, and decontamination of locations the infected individual has visited. Achieving containment demands accurate and timely collection of the infected individual's location and contact history.

Traditionally, this process is labor intensive, susceptible to memory errors, and fraught with privacy concerns. With the recent almost ubiquitous availability of smart phones, many people carry a tool which can be utilized to quickly identify an infected individual's contacts. Unfortunately, the very same first-generation contact tracing tools have been used to expand mass surveillance, limit individual freedoms and expose the most private details about individuals. We believe there is a better approach.

Technology (see a demo here)

Safe Places | A browser-based mapping tool for contact tracers to more efficiently interview infected patients and create anonymized maps and data files of public places and times where the infected patient has been.

COVID Safe Paths App | An Android/IOS app that enables users to download aggregated and anonymized, infected patient location trails and simply compare them on their phone with their location history to see if they have been in close proximity to individuals who have subsequently learned that they are infected. ***Available today in Apple App Store and Google Play Store.***

Requires basic infrastructure | Smartphones + internet + a computer + minimum training for contact tracers.

Why This Solution is needed

Track, trace and treat | Contact tracing has been pivotal in containing and slowing the spread of COVID-19. However, this process is traditionally time consuming and prone to human memory errors – this technology can help.

Keep it private and avoid a surveillance state | Safe Places creates a reliable tool and infrastructure for public health professionals, while COVID Safe Paths reduces the risk of privacy violations by replacing centralized storage of sensitive data with time-limited storage of data on the user's own device and requiring user consent for data sharing; hence avoiding a surveillance state.

The future ahead | Safe Places and COVID Safe Paths aims to help societies get back online by improving the public health infrastructure for tracking and tracing, and leveraging technology to understand how the disease is spread and more surgically target interventions. Its open-source and modular nature allows other applications to be built on top of it, hence facilitating synergies and enabling a collaborative ecosystem approach.

Born from MIT, and now made up of global collaborators and volunteers from top academic, business, and technology companies globally
To learn more and get involved, visit us at: **https://covidsafepaths.org/ led by Path Checks, Inc.**

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Conceptual model and value statements

Safe
Places

COVID Safe Paths and Safe Places has **considerable utility for Public Health Professionals and the General Population**

Providing Value Across Stakeholders

- **Undiagnosed Citizens:**
Provides citizens a personalized exposure profile from which they can make informed decisions about their health and interactions with others.

- **Patients:**
Provides a fast and easy way to provide details of where citizens have been over the last 28 days, eliminating the human error of relying on memory.

- **Healthcare Authorities:**
Enables health agencies to communicate to citizens their personal risk profile. Agencies today don't have the ability to answer the question "Should I be concerned or not?" for every citizen in their constituency.

- **Healthcare Contact Tracers:**
Helps contact tracers do their existing jobs more effectively by using data instead of citizens' memories to determine where they have been in the ~14 days leading up to their positive COVID-19 diagnosis.

See Appendix for sample Workflows for users and contact tracers.

Safe Places- A Web Tool to Make Contract Tracing More Effective and Efficient

- Helps contact tracers do their existing jobs more effectively by using data instead of citizens' memories to determine where they have been in the ~14 days leading up to their diagnosis.

- Safe Places inputs location data from the infected person's phone, either through the COVID Safe Paths app or from Google Maps/other location tools.

- The health official, in conversation with the infected individual, can redact patient identifiable information

- The information can then be published in an anonymized, aggregated way leveraging the encrypted trails.
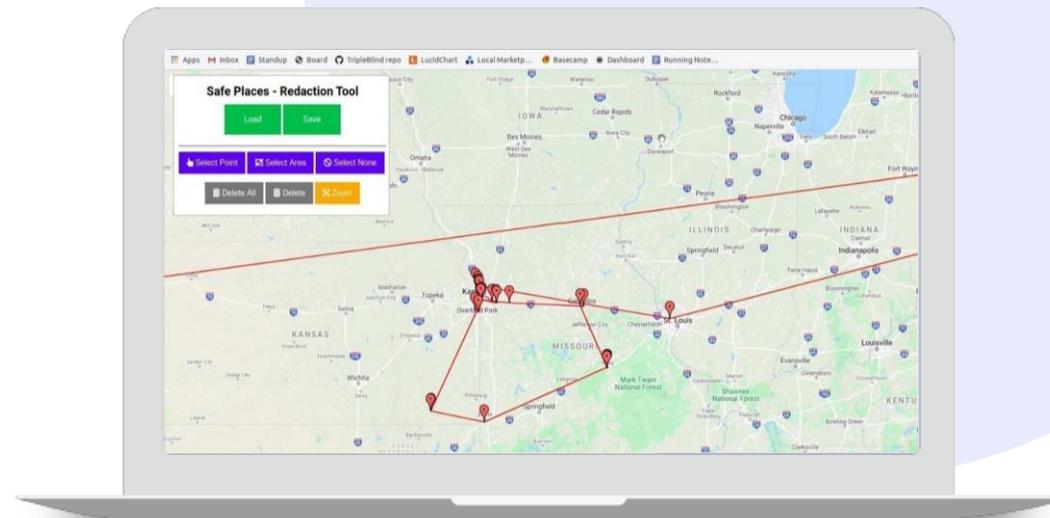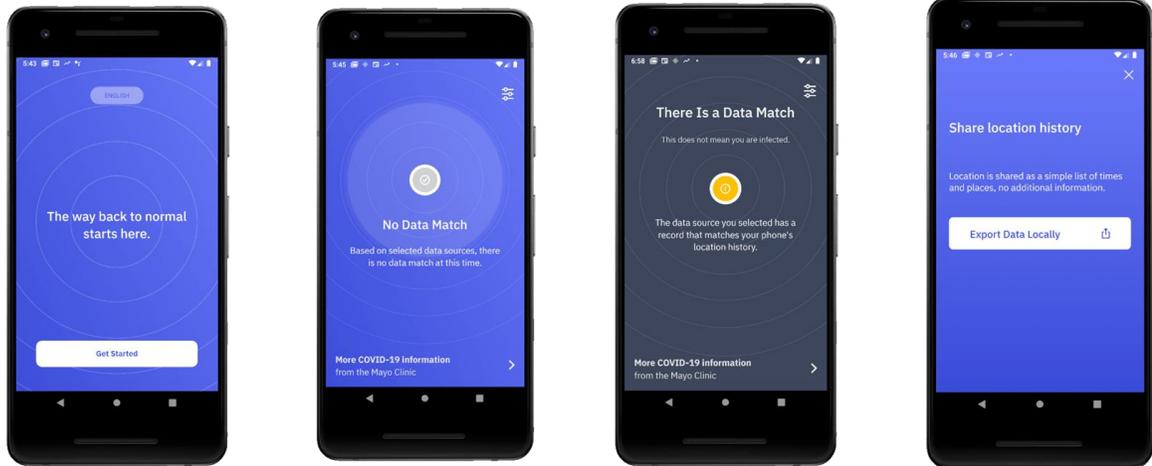

Faster and **more accurate** *than a traditional patient interview*

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The COVID Safe Paths application has been built to easily capture and share relevant information to individuals, with a robust privacy-centric and open source back-end

Privacy-Centric ———— Open-Source ——— Secure——— Collaborative

See a quick demo of the user interface here

- ✓ Notification if you have crossed paths with a now diagnosed COVID-19 patient

- ✓ Advanced capability to send alert that provides location of where contact may have occurred

- ✓ Use phones to look for GPS and Bluetooth based proximity

- ✓ COVID Safe Paths will include Google-Apple Proximity API

- ✓ Customizable information resources

- ✓ In future iterations, additional functionality related to symptom tracing or health certificate management

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Safe Places and Safe Paths: Integrated tools for track and trace today; tomorrow comprehensive toolkit of re-entry solutions

SafePaths App

Today:
- Exposure notification
- Access to resources
- Ongoing Tracking
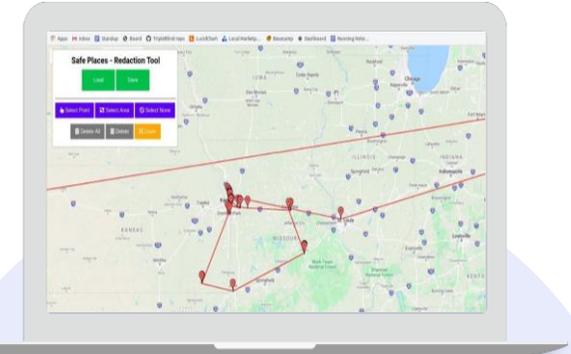- Interface with public health infection data

Coming Soon:
- Personalized guidance
- Symptom tracking
- Quarantine Verification
- Immunity Passport
- Corporate verifications

Platform incorporates all relevant data inputs and APIs

- Telecom
- GPS
- BlueTooth
  (Apple/Ggl/PACT/Pepp-pt)
- Wifi
- Others

SafePlaces WebTool

Today:
- Expedite tracing conversation
- Improve quality and accuracy of data
- Aggregates data for reporting

Coming Soon:
- Predict HotSpots, Spread Prediction
- Coordinate at-home population
- Integrated Dashboards
- Certification

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COVID Safe Paths Alliance

MIT Safe Paths

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Mentors: Amandeep Gill (I-DAIR), Bernardo Mariano Jr (WHO), Brian McClendon, Don Rucker (HHS), and Subbu Subramanian, Suraj Kapa (Mayo Clinic)

Faculty Mentors: Ronald L. Rivest, Yael T. Kalai, Daniel J. Weitzner, Hal Abelson, Jonathan Gruber, Nickolai Zeldovich, and Adi Shamir.

Research Mentors: Yoshua Bengio (MILA), Richard Janda (McGill), John Halamka (Mayo Clinic)

Path Check, Inc

Greg Nadeau

CovidWatch, OpenMined, CoronaTrace, CovidActNow

The technology has been developed with clinical input from **Mayo Clinic** and **Massachusetts General Hospital**, and mentors from the **World Health Organization**, the **US Department of Health and Human Services**, and the **Graduate Institute of International and Development Studies**. The initiative has world renowned senior advisors that include Ron Rivest (Encryption), Yoshua Bengio (Machine Learning) and Alex "Sandy" Pentland (Social Physics) as well as Kevin Esvelt and Kent Larson on the team.

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Deploying technology, thought leadership, and implementation support to unlock society

Technology

SafePaths Mobile App
SafePlaces WebTool

Open Source Code
API
Algorithms

Interoperable BackBone

Think Tank

Interoperability Standards

Privacy Guidelines

Landscape Analysis

Publications

Implementations

Public Health Engagements

Training and Monitoring

Venture Capital and Startups

Corporate Relations

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Privacy at its Core

Each of us is the primary owner of our personal data. Health, education, location, and contact tracing data is personal data. No service provider or government agency should be able to use that data without user consent.

Technology should follow
the principles of Privacy by Design

a. Proactive not reactive; preventive, not remedial
b. Privacy as the default
c. Privacy embedded in the design
d. Full functionality – positive-sum, not zero-sum
e. End-to-end security – full lifecycle protection
f. Visibility and transparency – keep it open
g. Respect for user privacy – keep it user-centric

Data should be protected in accordance with Fair Information Practice Principles (FIPPs):

a. Notice/Awareness.
b. Choice/Consent
c. Access/Participation
d. Integrity/Security
e. Enforcement/Redress

Application of these Principles to Safe Paths:

a. Possible contacts determined privately on a user's own device using open source code and cryptographic algorithms
b. Data never leave the user's device (100% local), unless they become ill and opt to release it to a health official
c. Trusted health officials remove all diagnosed patient personally identifiable information – only releasing the redacted location trail
d. Only release the redacted, disconnected, and aggregated space-time points
e. Space-time points will be deleted after they are no longer actively needed, estimated at between 21 and 28 days.

Appendix

Frequently asked questions – for public health officials

1. How does Safe Places help public health officials and epidemiologists?

Containment of an infectious disease requires identification and quarantine of infected individuals and potentially infected individuals. COVID Safe Places helps health officials and epidemiologists work more quickly, collect better data, and watch and respond to what is happening in their community. COVID Safe Places aims to replace a time consuming interview, vulnerable to the patient's memory errors, with a fast transfer of reliable location data. COVID Safe Places quickly builds maps showing where known cases and potential sites of exposure are located in the community. With this additional data, public health officials and epidemiologists can make better decisions about how to protect a community's health.

2. Is it secure to use?

Yes! Data security and personal privacy are the core features of COVID Safe Places.   We made deliberate choices, like storing all data on the patient's phone rather than on a central server, time limited data storage, and using an open-source approach to build the technology, all to keep your patients safe.

3. How is the patient's location history shared with public health officials?

Patients push the share button on their COVID Safe Paths app. The app gives them a QR code (small square black and white picture) to share with their health professional. The health professional can then upload the file to the Safe Places website.

4. How is identifying information removed from the patient's location history?

Public health officials use Safe Places (i.e., browser-based mapping tool) to remove identifying data, such as a person's home, from their location history. Easy to use tools make it quick to redact identifying data.

5. What about people without a smartphone?

Not all patients use a smartphone. If you choose to collect data from these patients through an interview, it can easily be added to Safe Places so you still have a full picture of the situation in your community.

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Frequently asked questions – for public health officials (continued)

6. What about presumptive positive cases?

Public health officials determine who in the community to collect data from. Whether or not to include data from presumptive positive cases in addition to confirmed cases remains an open question. Our team looks forward to continuing conversations with you about what approach is most useful for you.

7. Is Safe Places useful to public health officials after the immediate coronavirus has passed?

Yes, collecting and viewing data trends and map exposure sites allows public health officials to quickly take action to limit a severe peak in infection rates as communities emerge from the most severe quarantine phase.

8. What is required to use Safe Places?

Safe Places operates as a browser extension. All you need is a computer with internet access.

9. How are public health officials trained to use Safe Places?

Public health workers are under enormous stress as the coronavirus pandemic spreads. We have minimized the training needed to successfully use Safe Places. Training occurs by remote video conference sessions, training videos, and supporting documents. We also provide one-on-one consultant support during training. We are here to make your implementation of Safe Places successful and look forward to customizing a training program that works for you and your staff.

10. What do we tell patients about Safe Places and their data?

Safe Places provides a Communications Kit to help public health workers talk to patients about Safe Places. At the heart of that communication is how we ensure maximum privacy for the patient's information. We also provide easy to use diagrams to help the patient share their information from their phone.

Frequently asked questions – for public health officials (continued)

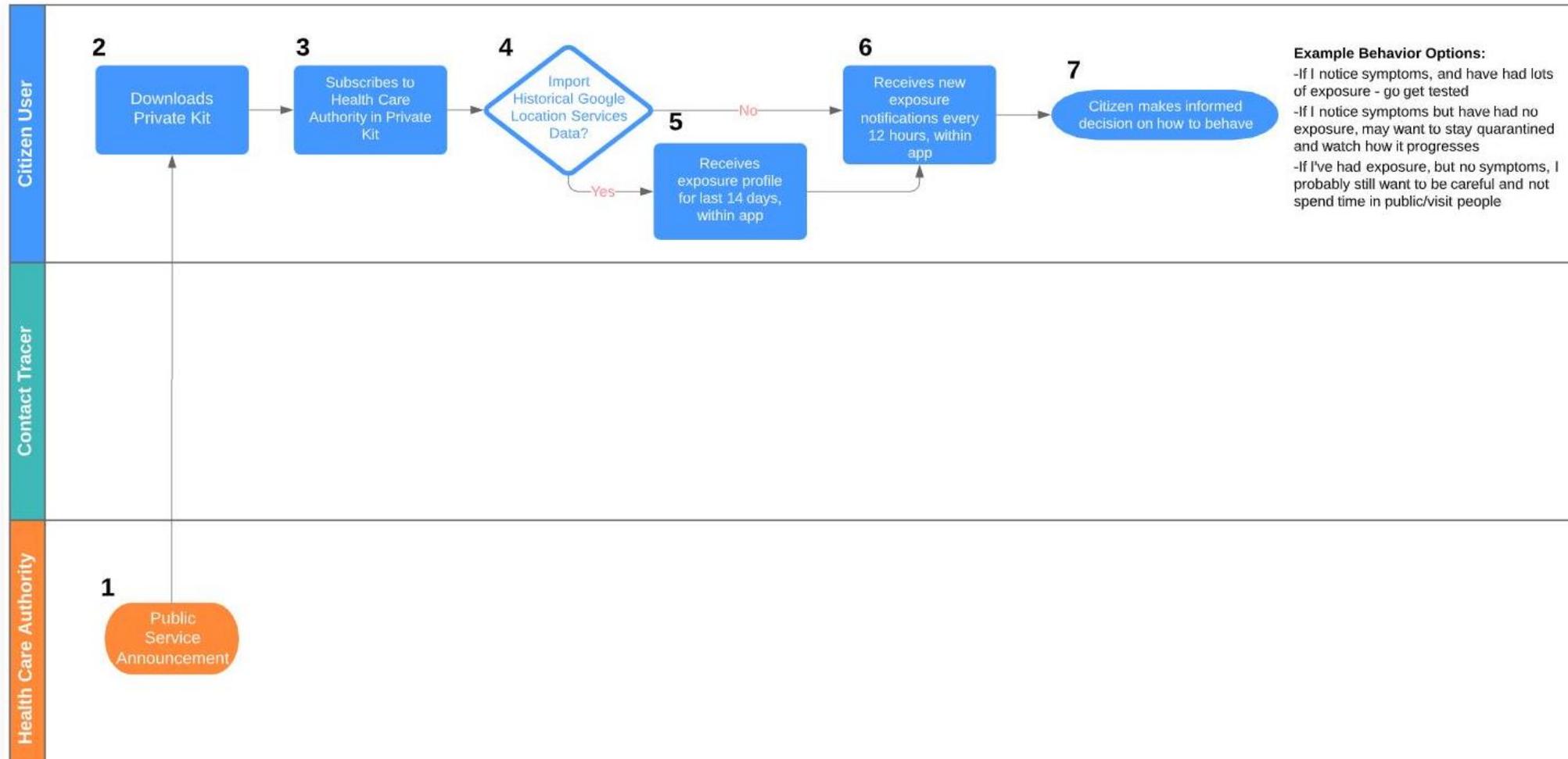## 11. Where is the location data stored?

Safe Places does not store user data in order to protect privacy. Each public health team determines where to store the data they collect - on hardware, a secure server, or in a cloud based secure system. Teams generally choose to store data the same way they store other Protected Health Information (PHI).
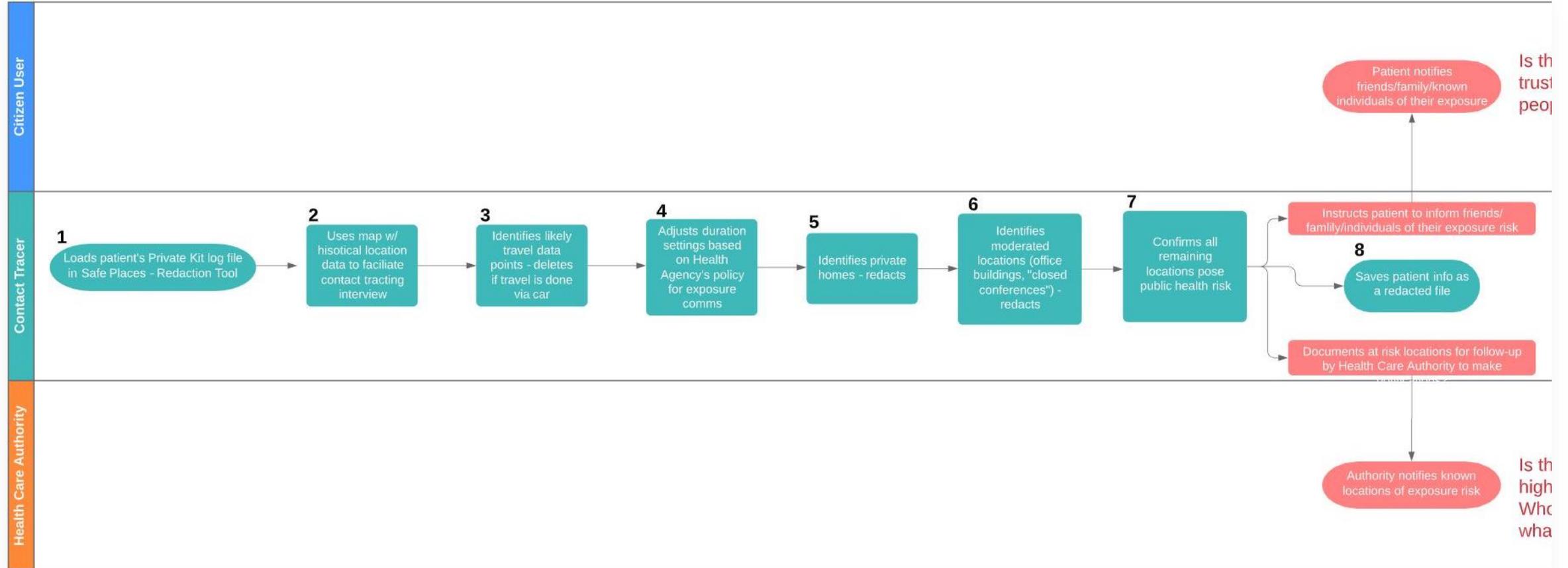
Sample Scenario 1 – Diagnosed Citizen*
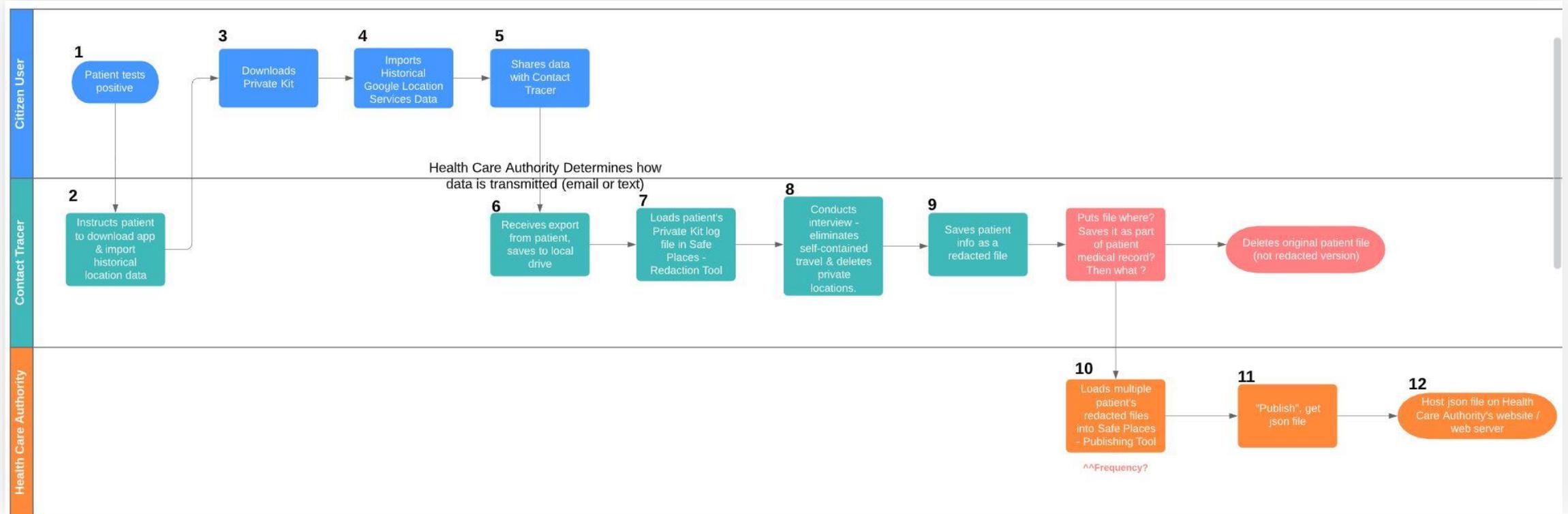
For illustration purposes only – workflow is subject to change

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Sample Scenarios 2 – Undiagnosed Citizen*

Sample Scenarios 3 – Contact User Story*