

COVID-19 apps to support Public Health and the people of Washington State

ITED Committee Assembly meeting
September 30, 2020

Bill Lober, MD MS
Professor

Health Informatics and Global Health
Schools of Nursing, Medicine, and Public Health

Agenda

- Approach to technologies as part of a response to a pandemic
- Privacy aspects of BT exposure notification
- Background of our history with BT EN and GAEN
- Progress
- Related work with CC Assist



Problem

- Case investigation, contact tracing, and monitoring of/support for individuals under quarantine and isolation are critical public health functions for addressing the SARS-CoV-2 pandemic
- Challenges: traditional public health workflows carried out by experts, distributed across organizations, hard to scale, low trust blocks people from participating, unmet information needs,



Technology can support…

- Identifying Possible Exposures: privacy-preserving Bluetooth exposure notification
- Leveraging Expertise: support public health case investigators with decision support, simplified case investigation and contact tracing interviews
- Public Engagement: address people's needs for information, symptom tracking, exposure notifications, quarantine/isolation support
- Needed Scaling: offer improvements to information management, apply health data standards to support interoperability



Who is CommonCircle?

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

Microsoft

Volunteers from MS Research and Product Groups

UW Medicine
UW SCHOOL OF MEDICINE

SCHOOL OF NURSING
UNIVERSITY of WASHINGTON

BROTMAN BATY INSTITUTE

Seattle Flu Study

SCAN
GREATER SEATTLE CORONAVIRUS ASSESSMENT NETWORK STUDY



“Technology and innovation as part of a response to a pandemic”

- CommonCircle Exposures
  - Bluetooth Proximity Exposure Notification
- CommonCircle Assist
  - Engagement: address people’s needs for information, symptom tracking, exposure notifications, quarantine/isolation support
  - Scaling: offer improvements to information management, apply health data standards to support interoperability
- Together
  - Leveraging public health expertise, supporting case investigation and contact tracing, coordination of services, engage the public



Exposures: A Central Concern

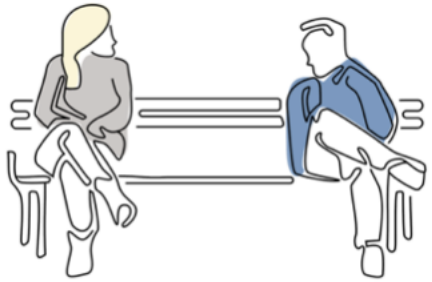


How does one identify exposures to **people they don't know?**

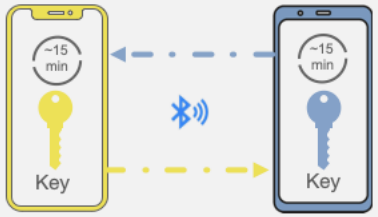
Google Apple Exposure Notification

Apple – Google Exposure Notification FAQ v1.2 July 2020

Alice and Bob don't know each other, but have a lengthy conversation sitting a few feet apart



Their phones exchange beacons with random Bluetooth identifiers (which change frequently)



A few days later…

Bob is positively diagnosed for COVID-19 and enters the test result in an app from his public health authority



With Bob's consent, his phone uploads the last 14 days of keys for his Bluetooth beacons to the server

Apps can only get more information via user consent

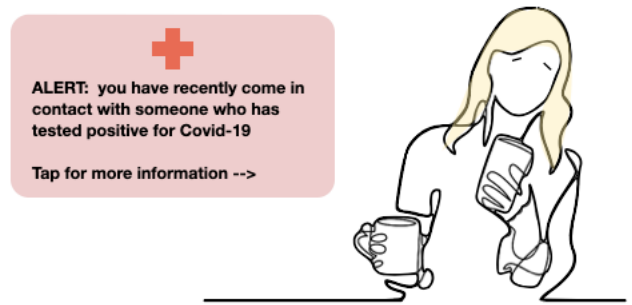


Google

Alice continues her day unaware she had been near a potentially contagious person



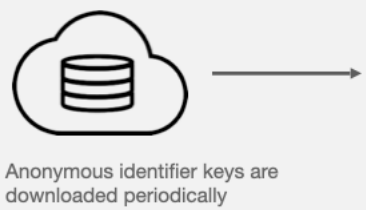
Alice sees a notification on her phone





Sometime later...

Alice's phone periodically downloads the Bluetooth beacon keys of everyone who has tested positive for COVID-19 in her region. A match is found with Bob's random Bluetooth identifiers.



Anonymous identifier keys are downloaded periodically

Alice's phone receives a notification with information about what to do next.

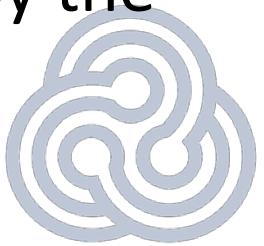


Additional information is provided by the health authority app

Google

Privacy recap

- Each user will have to make an explicit choice to turn on the technology. It can also be turned off by the user at any time.
- This system does not collect location data from your device, and does not share the identities of other users to each other, Google or Apple. The user controls all data they want to share, and the decision to share it.
- Random Bluetooth identifiers rotate every 10-20 minutes, to help prevent tracking
- Exposure notification is only done on device and under the user's control. In addition people who test positive are not identified by the system to other users, or to Apple or Google



Privacy Research

- UW work in this area
  - PACT
  - GAEN protocols
  - Exposure Notification Express
- Testing at UW…

arXiv.org > cs > arXiv:2004.03544

Search...

Help | Advanced

Computer Science > Cryptography and Security

COVID-19 e-print

Important: e-prints posted on arXiv are not peer-reviewed by arXiv; they should not be relied upon without context to guide clinical practice or health-related behavior and should not be reported in news media as established information without consulting multiple experts in the field.

[Submitted on 7 Apr 2020 (v1), last revised 7 May 2020 (this version, v4)]

PACT: Privacy Sensitive Protocols and Mechanisms for Mobile Contact Tracing

Justin Chan, Dean Foster, Shyam Gollakota, Eric Horvitz, Joseph Jaeger, Sham Kakade, Tadayoshi Kohno, John Langford, Jonathan Larson, Puneet Sharma, Sudheesh Singanamalla, Jacob Sunshine, Stefano Tessaro

The global health threat from COVID-19 has been controlled in a number of instances by large-scale testing and contact tracing efforts. We created this document to suggest three functionalities on how we might best harness computing technologies to supporting the goals of public health organizations in minimizing morbidity and mortality associated with the spread of COVID-19, while protecting the civil liberties of individuals. In particular, this work advocates for a third-party free approach to assisted mobile contact tracing, because such an approach mitigates the security and privacy risks of requiring a trusted third party. We also explicitly consider the inferential risks involved in any contract tracing system, where any alert to a user could itself give rise to de-anonymizing information.

More generally, we hope to participate in bringing together colleagues in industry, academia, and civil society to discuss and converge on ideas around a critical issue rising with attempts to mitigate the COVID-19 pandemic.

UW Pilot Testing

- **July, 2020**: The CommonCircle team Implemented a pilot in the Labor and Delivery ward at UW Medical Center to test the Bluetooth functionality
- Simulated outbreaks to understand technology characteristics and technical deployment



What *does* a Bluetooth Exposure mean?

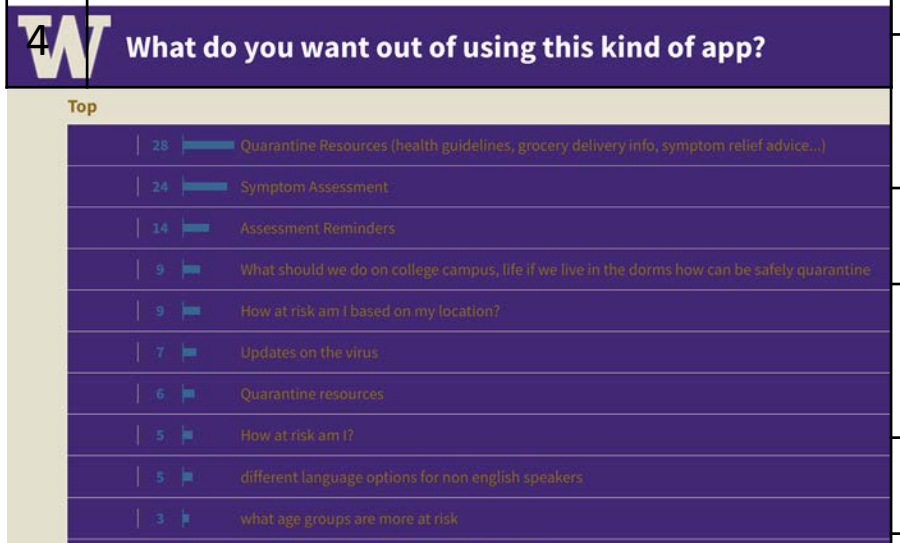
- How does it correspond to ”6 feet, 15 mins”?
- How does that correspond to disease transmission?
- Bank tellers, and nursing home caregivers…
- Value of a negative result
- Utility as a positive predictor, and a negative predictor, changes with population use



What do people want? (PollEV results, early in pandemic)

Prepopulated options

28	Quarantine Resources (health guidelines, grocery delivery info, symptom relief advice…)
24	Symptom Assessment
14	Assessment Reminders



9	What should we do on college campus, like if we live in the dorms how can we be safely quarantine
9	How at risk am I based on my location?
9	Quarantine Resources
7	Updates on the virus
5	How at risk am I?
5	Different language options for non english speakers
3	what age groups are more at risk
3	General signs, symptoms and risks of the virus
2	resources available nearby

What do you worry about in using an app like this?

Top

	10	personal/private information being leaked
	5	Anonymity
	4	How accurate the information is
	3	How do I know how much of this advice applies to me?
	3	How relèvent the data is
	3	The accuracy
	1	Add stress
	1	fake scare
	0	creating fear by providing too much information
	0	How will it be able to access me correctly
Hide	0	Data relevance
	0	Accuracy/credibility
	0	Miscommunication and lack of updates on whether we're at risk or not.
	0	Would this app create a large population of too many self diagnosis



What is privacy-preserving, assisted contact tracing?

Allison is going about her daily life and the app is collecting her location history.



A few days later...

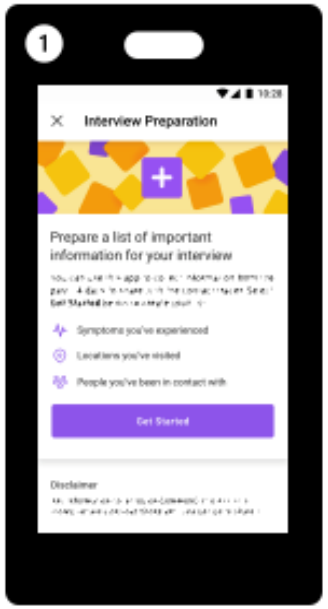
She tests positive and prepares her data in CommonCircle Assist in anticipation of a contact tracer interview.

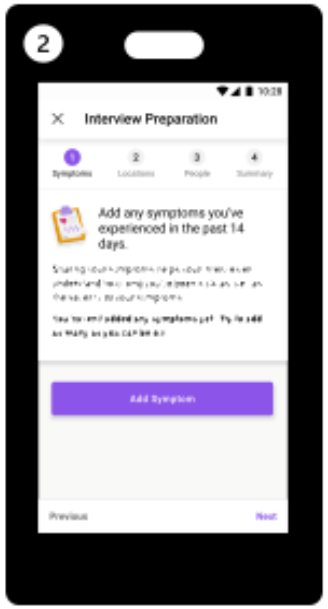


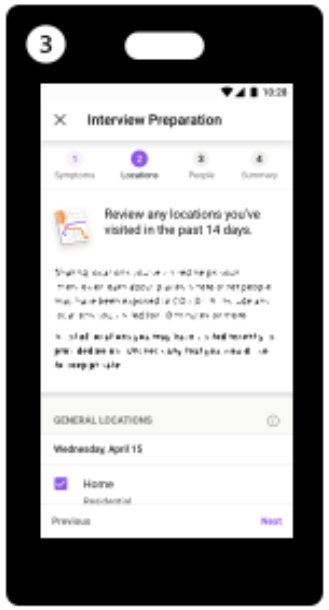
If, at any time, Allison does not want a location or contact shared, she can modify or delete that information.

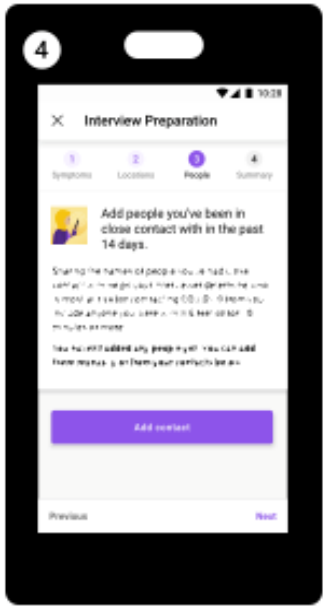
She has control over what is stored and shared with public health officials.

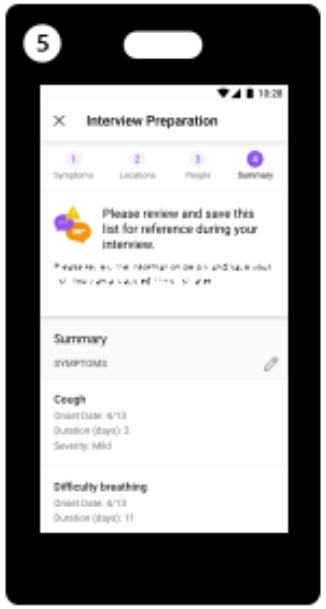
1) Allison starts by opening the app
2) She adds her symptoms
3) Reviews pre-populated locations and adds any not included
4) She adds people she has been in contact with in the last 14 days
5) She saves the summary
6) She can continue to use the app for her daily I&Q monitoring

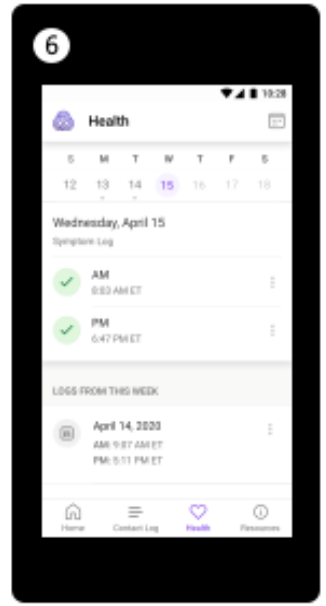




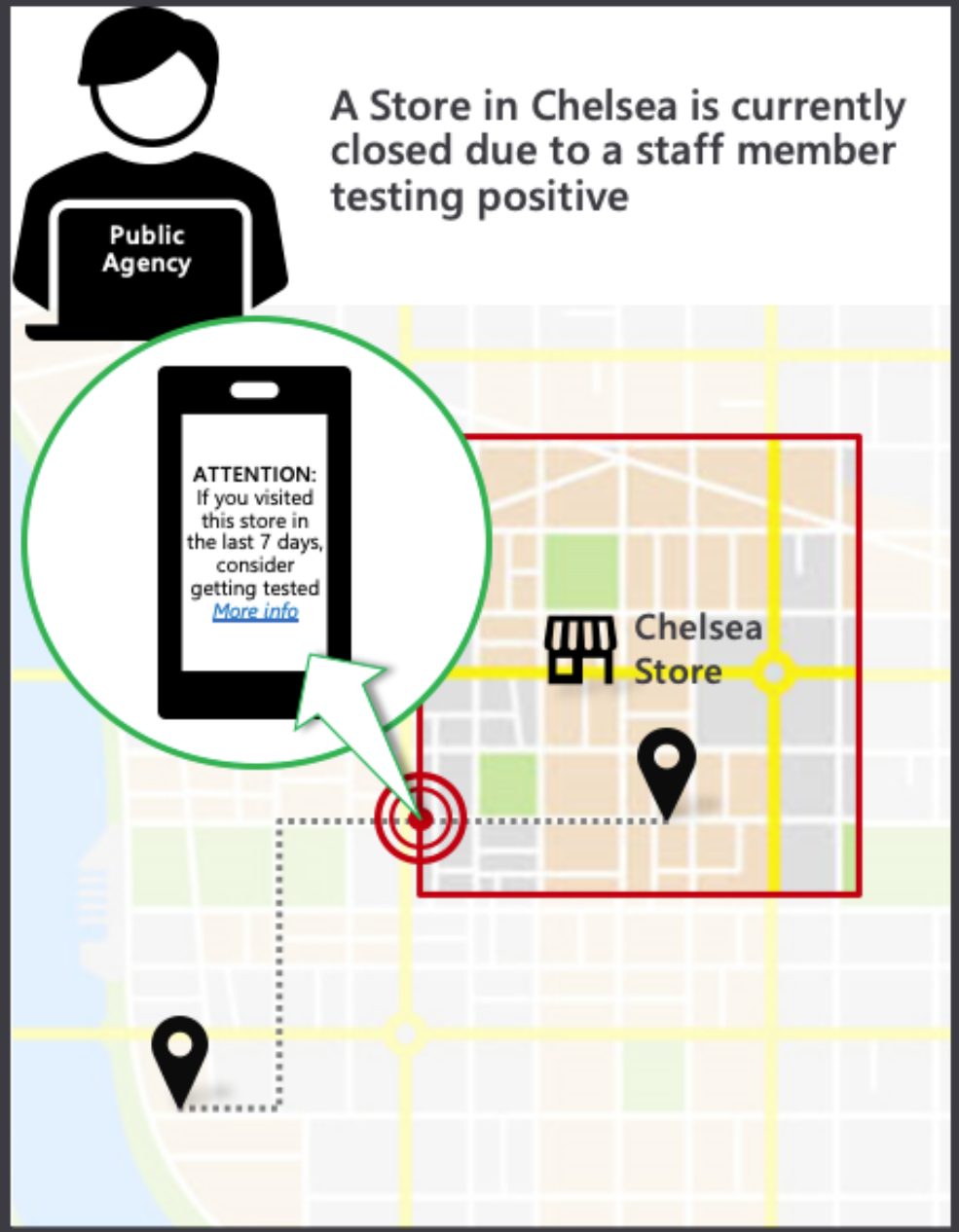








Privacy-preserving focussed Public Health announcements



I am a local public official and need to issue a warning notification to my community.

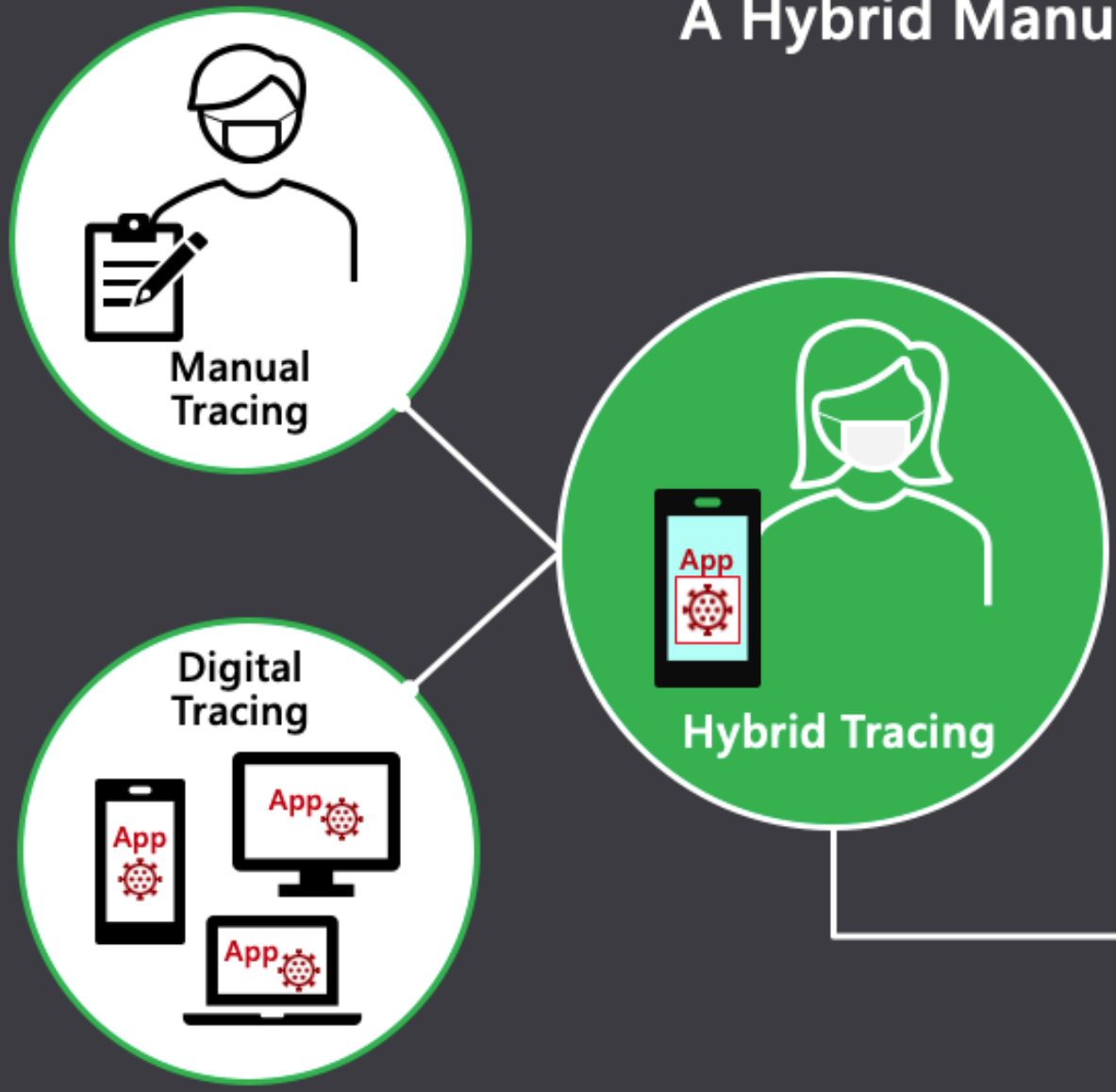
I specify the area, time and send the message.

The CommonCirle Assist app will monitor messages from a message server and filter those relevant to the user based on their location or other criteria



Better Together – Assisted and Manual for Contact Tracers

A Hybrid Manual + Digital Contact Tracing Process



May be:

1. Faster
2. More complete
3. User-controlled

Increase speed, decrease work, support PH

- Isolate + Test
- Social Distance
- Disinfect

CommonCircle Assist enables users to voluntarily assist contact tracers to speed up the process and make it less error prone

Protect Others

Protect those in their community by improving speed and accuracy of contact tracing

Do their part to reduce exposures and flatten the curve

Protect Themselves

Get notified by public health officials about hot spots

Symptom tracking/Decision support

Self-educate with self care tips and resources

Help Case Investigation

Collect symptom and contact information

Share case investigation information with healthcare agency interviewers



User Control

We start from a foundation of privacy and control by the user over all their data.

Transparent

Users should be clearly informed about who is collecting their data, how it will be used and why.

Trust

System needs to be secure and all data on the device must be encrypted.

Inclusive

Design elements should account for wide range of abilities and backgrounds, including alternative languages.

Data Minimization

Only data that is absolutely needed is collected.

Open Source

Community driven project, built by a multidisciplinary group of volunteers.



Localized Public Health Announcements

Public messages are filtered on users' phones and only what's relevant to them is displayed.

Daily Symptom Tracking

Users can log their daily symptoms or other isolation questions.

Contact and Location Logging

Users can keep track of their daily locations and interactions.

Interview Preparation

Users can aggregate information they need to assist them during a case investigation.

Submission to Case Management System

Optional connection to a contact tracing case management system.

Features customizable based on public health needs

Questions?

Learn more at commoncircle.us

commoncircle@uw.edu

