

PRIVACY-PRESERVING CONTACT TRACING, SYNDROMIC MAPPING AND SELF-ASSESSMENT

Existing Solutions and Challenges

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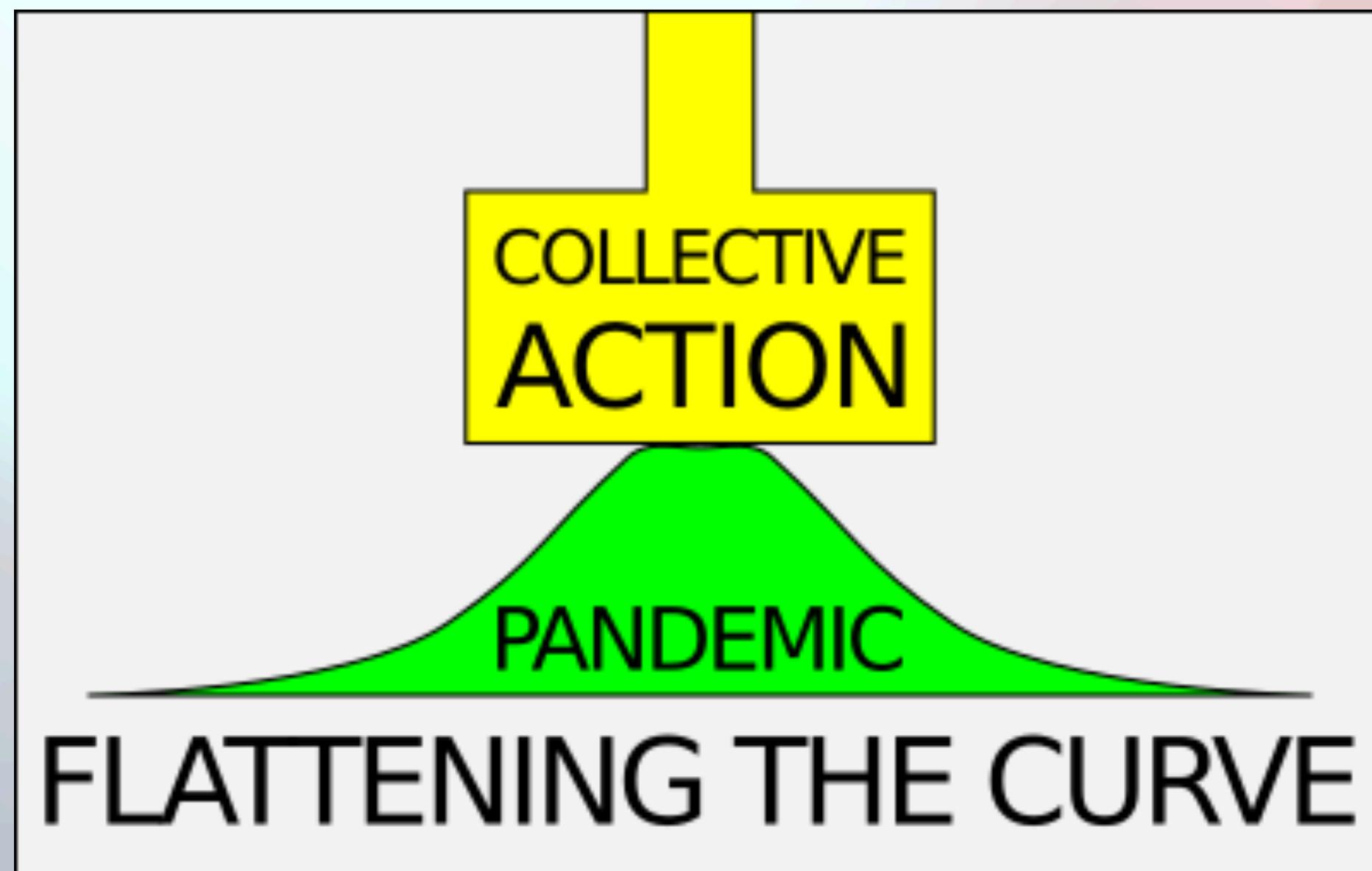
WHY ABOUT CONTACT TRACING NOW?





COVID-19!!!

- Wuhan China-December 31, 2019
- Over 6000 million affected and 6 million death
- Highly contagious nature
- Uncontrollably exponential rise
- Preliminary Solution: Social distancing
- Slower vaccine development
- Digital approach : Contact tracing Apps



SO, WHY NOT?



COVID-19: A WAKEUP CALL FOR HUMANITY

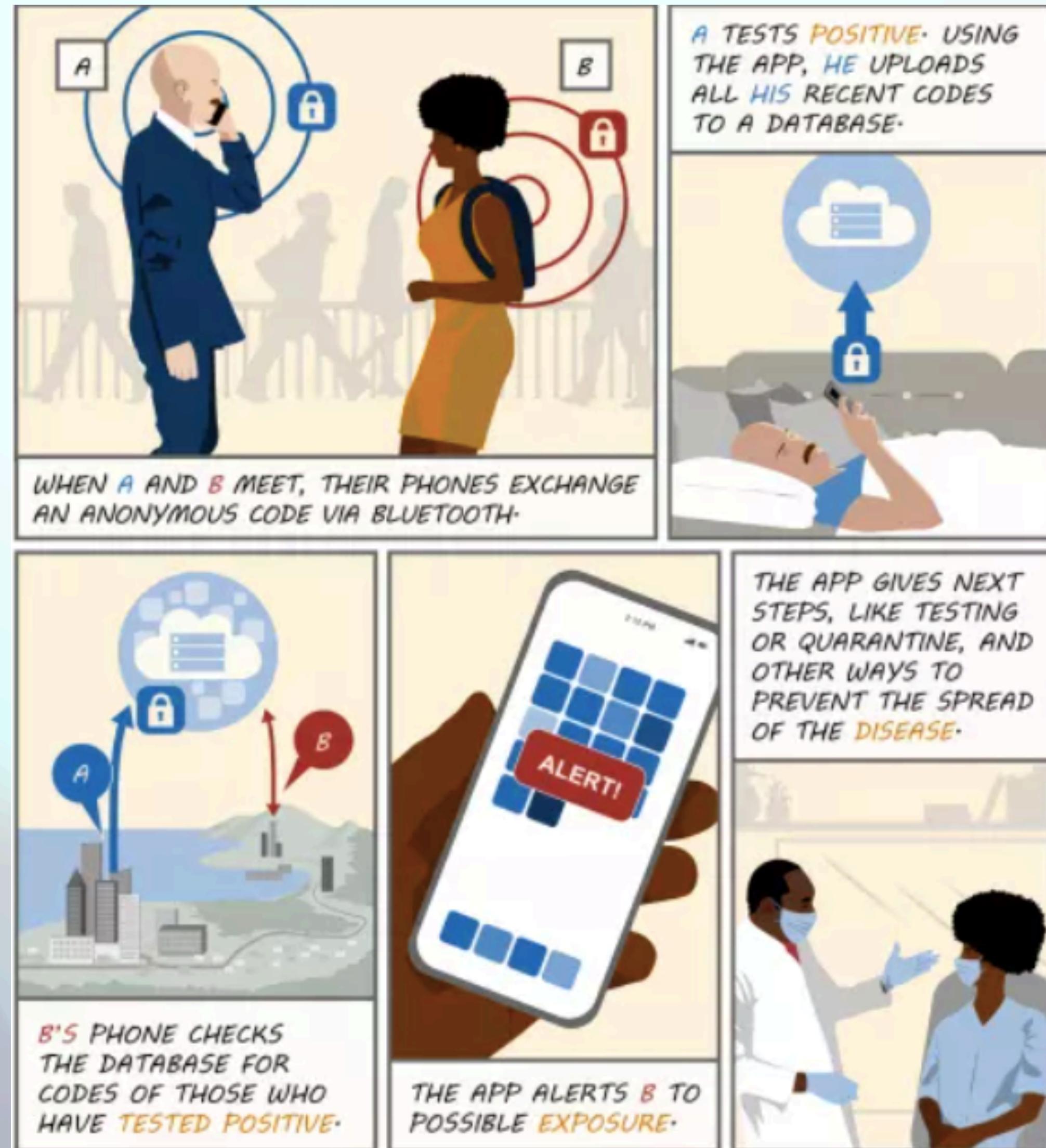


- To save humanity!
- Better to be prepared for the future
- Good to learn from the past (availability of huge data source)
- Social distancing: Best precaution for any infectious diseases
- Longer waiting for medical solutions (i.e. Vaccine)
- A collective approach is better

AGENDA

- What is a Contact tracing app?
- Different Architectures
- Existing Solutions and Challenges
- Privacy concerns and threats
- Different types of security attacks
- What do you think?

CONTACT TRACING



- Special ID is exchanged (Bluetooth)
- If infected
 - Volunteer reporting
 - Data updated by health department
- GPS based-
 - Provides live details of close proximity
- Two main designs
 - Centralized
 - Decentralized



CENTRALIZED ARCHITECTURE

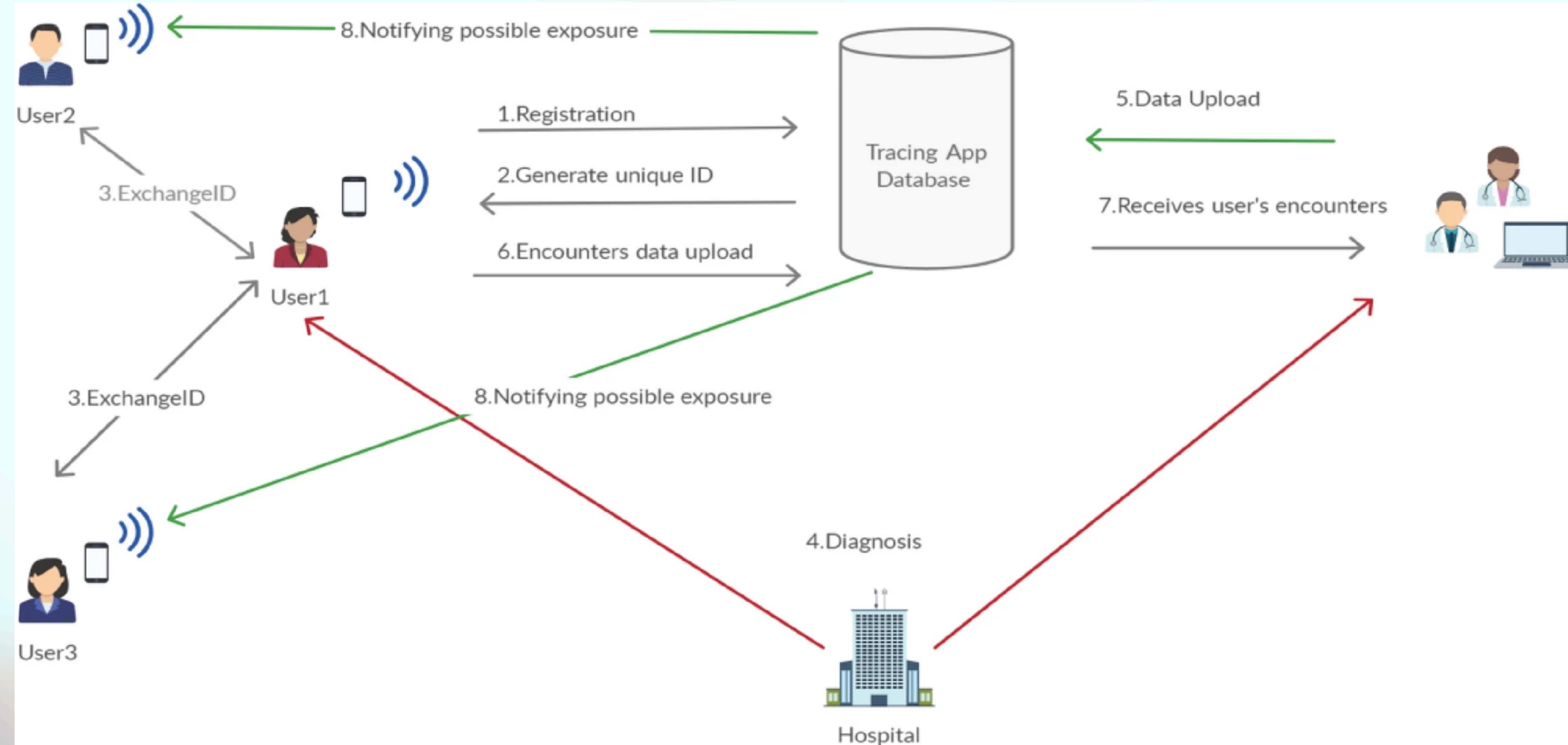


Fig. 1. The centralized architecture of Covid Tracing Apps

DECENTRALIZED ARCHITECTURE

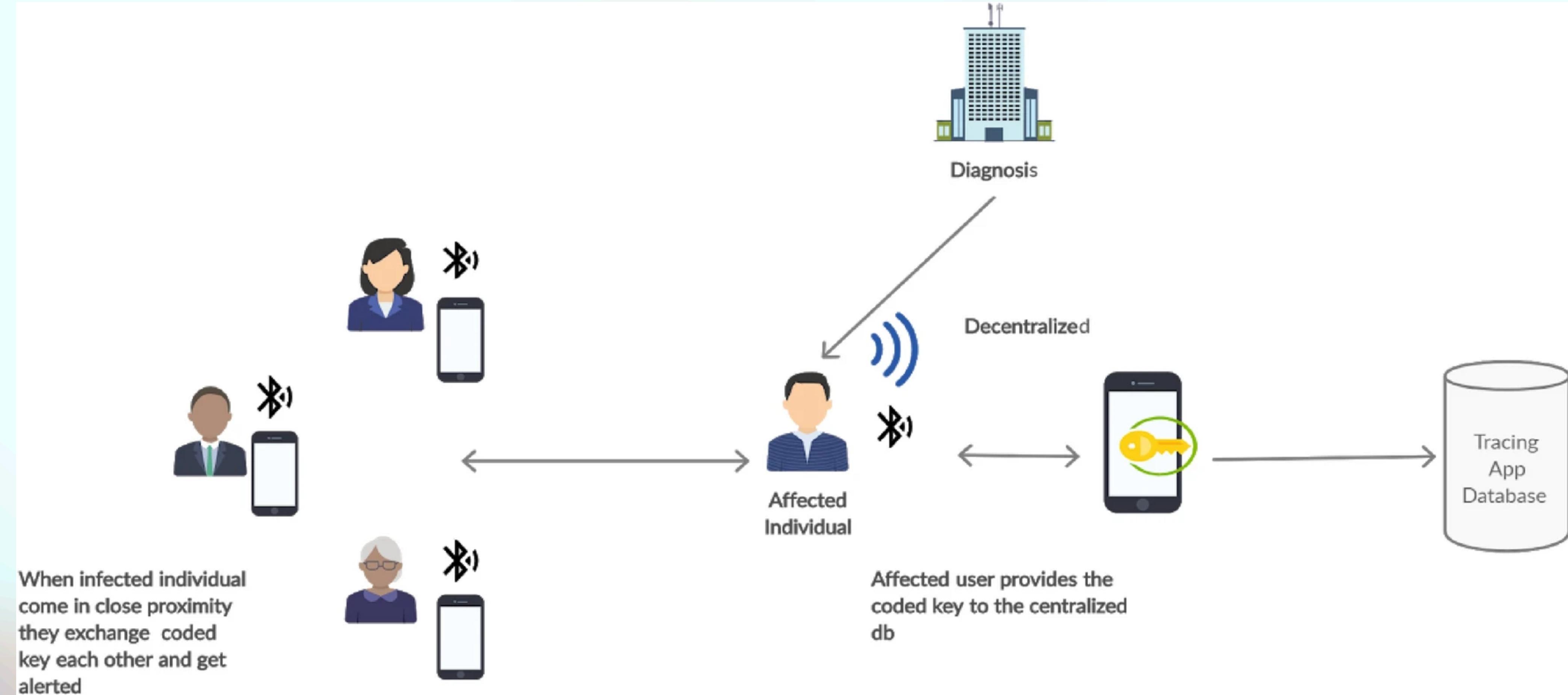
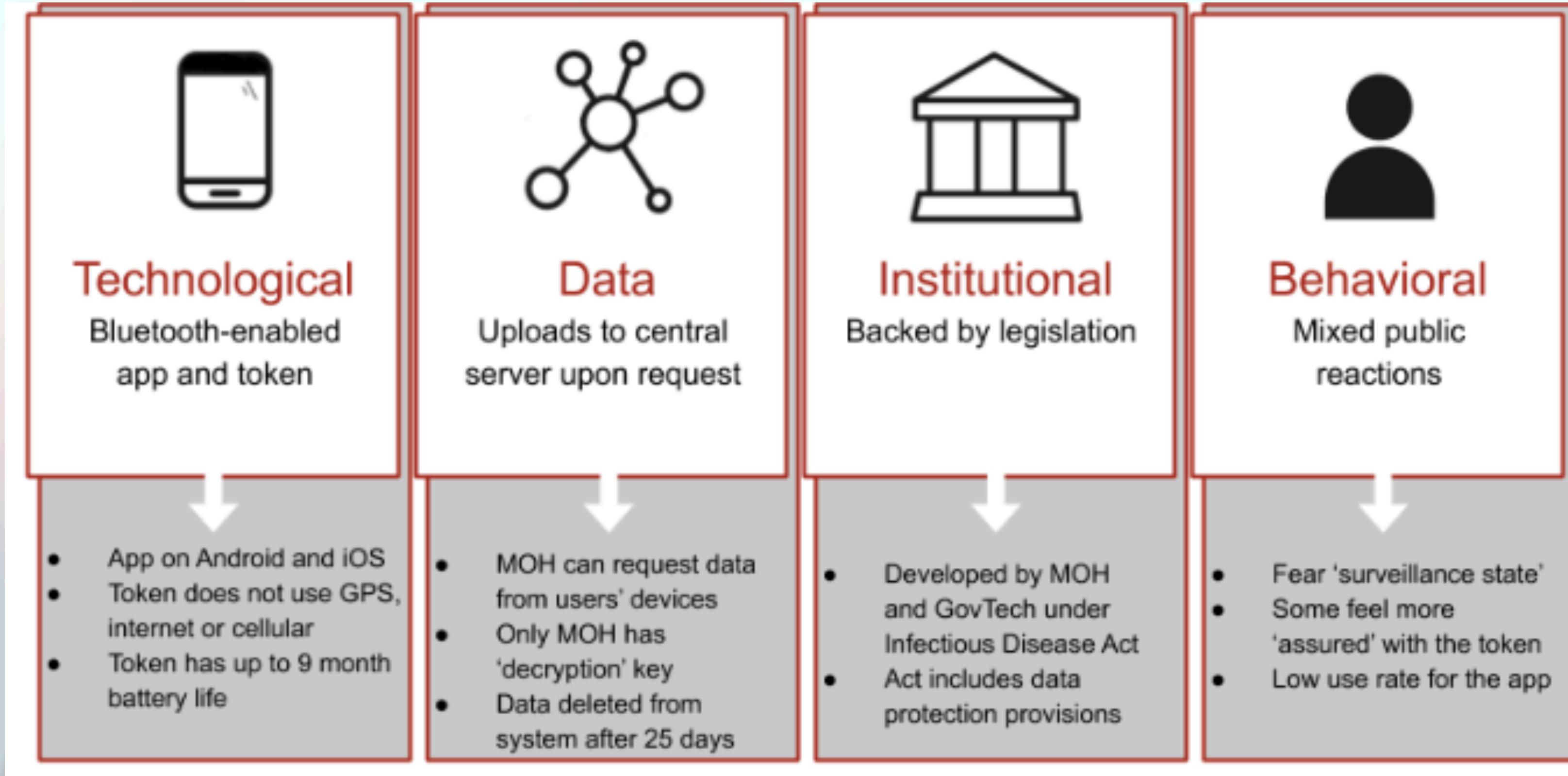


Fig. 2. The decentralized architecture of Covid Tracing Apps

EXISTING SOLUTIONS

- Singapore's TraceTogether
 - (NUMi, MoH, IDi,K)
 - MoH stores (NUMi, IDi) pair
 - 2 user within bluetooth range exchanges Encapsulated ID (TIDs)
 - If infected —>MoH gets info
 - > decrypts(TIDi,K) and informs NUMj
 - No GPS, Centralized
 - Access to location, camera, storage, WiFi, Bluetooth, and media



EXISTING SOLUTIONS CONT... .

- India's Aarogya Setu- Mandatory by Govt
 - Flow events
 - Registration, Self-assessment, Use, Contact, Testing, Contact tracing and containment
 - Using its database and algorithms - locate and notify nearby cellphones
 - Not open source, Govt handles database
 - Both bluetooth and GPS(to find and allow user mov.), Centralized
 - Location access(Not uploaded to the server continuously) and Bio data
- Others: CovidWise(US), CovidRadar(Netherland), NHS Covid-19(UK)
- (

PRIVACY CONCERNs AND THREATS

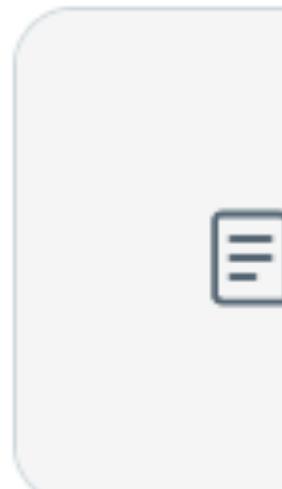
No System is threat proof!!

← Tweet



The Quint @TheQuint

French hacker 'Elliot Alderson' has claimed that a security vulnerability in [#AarogyaSetuApp](#) exposes health data in any location. He tweeted he was able to find "unwell" & "infected" people at PMO & MHA.
[@Maha_Shunya](#) brings you the story.



thequint.com

Aarogya Setu Security Issue Exposed PMO, MHA Employee
Aarogya Setu app is a contact tracing application for COVID-19 developed by the government of India.

2:10 PM · May 6, 2020 · Twitter Web App



← Thread



Baptiste Robert
@fs0c131y ...

A mobile application that sends your GPS coordinates regularly to a server owned by a government is a surveillance system.



Ref: 1) <https://www.gosecure.net/blog/2020/04/07/privacy-concerns> 2) <https://twitter.com/fs0c131y/status/1258679680888188928>

3) <https://week99er.com/new/why-gps-technology-is-a-curse-and-a-boon-that-also-raises-privacy-issues/>

PRIVACY CONCERNs AND THREATS CONT..

- Privacy Concerns
 - Information Collection and destruction
 - Transparency
 - Data Storage
 - Location Privacy
- Security Threats
 - Denial of Service
 - Phishing Attacks
 - Tracking Wireless Device
 - Playback Attack
 - Man-in-the-middle attack

Ref: 1) "Tracetogther." [Online]. Available: <https://www.tracetogther.gov.sg/>

2) S. Bassi and A. Chaudhary, "Cloud computing data security–background and benefits," *International Journal of Computer Science & Communication*, vol. 6, no. 1, pp. 34–40, 2015.

CONCLUSION

- So how to make a fail proof approach ? What about,
 - Contact tracing is the vital solution to containing the spread.
 - Further attention for more reliable and secure and be ready
 - Using more secure data encryption methods implementation,
 - Bluetooth low energy technology,
 - secure data storage (preferably cloud storage) for protecting the data.

SECURITY ATTACKS



ANY
QUESTIONS

Thank
You