Effectiveness of Technology Assisted Contact Tracing (Tact) Software and the Perceived Privacy Implications in Covid – 19 Era

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Abstract

The COVID 19 pandemic has put countries, economies, governments and organizations under unprecedented strain, calling for innovative approaches. Among the public health measures or comprehensive strategies used to mitigate and contain the wide spread of the deadly disease (COVID 19) is the Technology Assisted Contact Tracing (TACT) Software. These apps help in the rapid tracing and notification of potentially infected persons. The expected advantages of TACT over the manual method of contact tracing include speed, specificity and mass reach. However, the effectiveness of these apps depends strongly on their ability to ensure that individual information is not used for surveillance purposes and user privacy will be maintained. This research, therefore, is an opinion paper in which the researcher explores the ethical challenges presented by TACT and as well as solutions to the issues raised. It examines issues such as public trust, data privacy and technology design. The study recommends that software vendors should ensure proper implementation and deployment of TACT technologies while considering confidentiality and integrity of collected data.

Keywords: *COVID 19, Pandemic, Technology Assisted Contact Tracing (TACT), Biometric Technologies*

Introduction

Contact tracing technologies are heralded as an effective way of containing SARS-CoV-2 faster than it is spreading, thereby allowing the possibility of easing draconic measures of population-wide quarantine. The SARS-CoV-2 disease (COVID-19) is the most current threat that challenges health and economic sectors in the world. COVID-19 is a member of a family of viruses called coronaviruses. The WHO named the illness COVID-19 — "co" and "vi" for coronavirus, "d" for disease, and "19" for the year when the disease emerged. The WHO declared that the virus is a pandemic.

According to Kaplan et al. (2020) as cited in Klenk and Duijf (2020), COVID-19 pandemic has forced almost a third of the world's population into some form of quarantine, causing severe rights-restrictions, as well as drastic economic, social, and psychological harms. The disruption occasioned by the health pandemic (COVID-19) has adversely affected various aspects of global

activities. One Centre for Disease Control and Prevention (CDC) projection suggests that between 160 to 214 million people will eventually be infected with COVID-19 in the US and that between 200,000 and 1.7 million could die (Wetsman, 2020a) of the virus. This pandemic is highly contagious and spreads by respiratory droplets from a sick person when they cough or sneeze. The virus is capable of surviving on surfaces for hours and maybe days. People in close contact with someone who is infected with the virus are at higher risk of becoming infected themselves, and of potentially further infecting others.

The most damning aspect of the virus is the ability of an asymptomatic infected person to infect another person (Ololuo, 2020).The ability to reduce the transmission of this syndrome has become a global priority. As the pandemic worsens, most governments and organizations across the world are seeking for effective ways to return to normalcy, track infected persons and curb its spread. Contact tracing technologies was proposed as an effective solution to manage pre-symptomatic infections by alerting individuals and others they have come into contact with in real-time of high-risk exposures, imposing quarantine on the full contact chain, Ololuo further observed.

Contact tracing uses technology to track and trace contacts of an infected person. It monitors people using data from smartphones and real-time phone-location to track the movements of virus carriers and the people they come in contact with thereby creating a public map of coronavirus patients. Data from mobile devices have proved to be effective in tracking coronavirus infection vectors and helps get outbreaks of COVID-19 under control (Wetsman, 2020b).The goal of contact tracing is to develop a better sense of where infections are flaring up, how they are spreading and when authorities need to enforce quarantines to limit the spread of the virus without resorting to lockdown, which in turn creates economic problems. China has been very successful at controlling the spread of COVID-19 using this tracing technology (Abuhammad et al., 2020). South Korea says automatically tracking the contacts of fresh infections, using mobile technology, gets results in ten minutes instead of 24 hours (Gbenga, 2020).

While Contact Tracing systems by nature need to collect personal data about their users, there are technical and administrative safeguards the system vendors and authorities can take to assuage user concerns and reduce privacy risks to build the trust in the system that it requires to succeed (Howell & Talbert, 2020).

Given the above therefore, this paper introduces the effectiveness of contact tracing technology, the steps in contact tracing and devices used in contact tracing. Some of the privacy implications and risks associated with Contact Tracing and those protective measures that government and organizations should consider implementing in connection with any Contact Tracing system to help mitigate those vulnerabilities and protect user privacy are also outlined.

Conceptual Framework

The key concept in the topic of discussion is Contact Tracing Technology and the risks associated with it. It is, however, important to begin the discussion with the clarifications of this concept in order to present a platform for articulation of the researcher's views on the subject matter.

Contact Tracing

In response to the COVID-19 pandemic, one of the most effective ways to decrease the spread of this infection is tracing the primary and secondary contacts of confirmed cases using contact-tracing technology and devices (Abuhammad et al., 2020).

Contact tracing is the practice of identifying and monitoring individuals who may have had contact with an infectious person as a means of controlling the spread of a communicable disease ("Contact Tracing," n.d.).World Health Organization (WHO) also defines it as the process of identifying, assessing, and managing people who have been exposed to the disease to prevent onward transmission.

An infected person can spread COVID-19 starting from 48 hours (or 2 days) before the person has any symptoms or tests positive for COVID-19.To control the spread of COVID-19, interventions need to break the chains of human-to-human transmission, ensuring that the number of new cases generated by each confirmed case is maintained below 1 (effective reproduction number < 1). Therefore, when systematically applied, contact tracing will break the chains of transmission of COVID-19 and is an essential public health tool for controlling the virus.

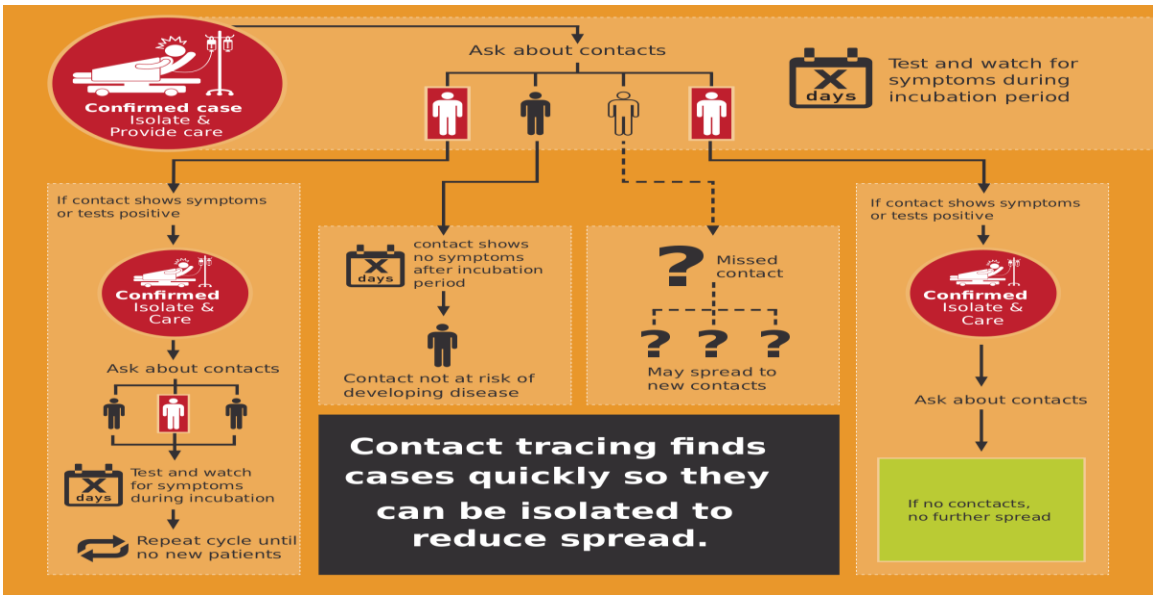
How Contact Tracing Works

However, with the prospect of a vaccine still mired in uncertainty, contact tracing can be a powerful tool to help reduce the spread of the COVID-19 virus and help control the COVID-19 outbreak (William,2020).

In communities using manual contact tracing, clinics, labs and hospitals send the names of people who have recently been diagnosed with COVID-19 to their local health department. The health department asks each person with COVID-19 about people with whom they've recently had close contact. Health department officials then quickly (usually within 24 hours) alert people who are close contacts that they may have been exposed to the COVID-19 virus. A close contact is someone who's been within 6 feet (2 meters) of a person with COVID-19 within two days of the person's diagnosis and they can include family, friends, co-workers and health care providers (William, 2020). The health department evaluates close contacts and requests that they be tested for the virus that causes COVID-19. They generally give them several instructions. These steps can help them reduce the risk of unknowingly spreading the COVID-19 virus to others.

Officials don't share the name of the person who may have exposed them. This makes the contact tracing process anonymous and confidential. The sooner health officials can alert close contacts, the lower the risk of the COVID-19 virus spreading further.

Diagram to Explain how Contact Tracing works



https://images.app.goo.gl/inMjuuPy5N1SK1ih6

If the number of COVID 19 contacts is much, Health department officials will not be able to alert these close contacts as quickly as possible. Therefore, there is need for a technology assisted contact tracing (TACT). TACT often will involve apps, reporting channels, proximity-based communication technology and monitoring through personal items such as ID badges, phones and computers (Howell & Talbert, 2020).

STEPS IN CONTACT TRACING

According to WHO, contact tracing is broken down into the following steps;

- **Contact identification:** Once someone is confirmed as infected with a virus, contacts are identified by asking about the person's activities and roles of the people around them since onset of illness. Contacts can be anyone who has been in contact with an infected person: family members, work colleagues, friends, or health care providers.

- **Contact listing:** All persons considered to have contact with the infected person should be listed as contacts. Efforts should be made to identify every listed contact and to inform them of their contact status, what it means, the actions that will follow, and the importance of receiving early care if they develop symptoms. Contacts should also be provided with information about prevention of the disease. In some cases, quarantine or isolation is required for high risk contacts, either at home, or in hospital.

- **Contact follow-up:** Regular follow-up should be conducted with all contacts to monitor for symptoms and test for signs of infection.

TECHNOLOGIES AND DIGITAL DATASETS USED IN CONTACT TRACING

Many digital tools have been developed to assist with contact tracing and case identification (Berman et al., 2020). These tools include mobile phone tracking, biometric technologies, and data scraping, which can be combined into one instrument or used as stand-alone tools. These technologies may also be used in addition to traditional manual contact tracing and surveillance approaches.

Mobile phone tracking: Mobile phones and mobile data are one of the key sources of information being adopted for digital contact tracing. In some instances, mobile phone tracking requires the voluntary download of a contact-tracing application (including giving consent to share individual information with the database). In other instances, governments are strongly urging or requiring populations to use such applications. Mobile phones are also being used for surveillance, with location data from mobile network operators used to determine whether and where people are congregating and whether social distancing measures are working.

Biometric technologies: These technologies use unique and permanent physical traits or characteristics such as face shape or fingerprints to identify an individual. When the individual is enrolled in the system – for example, a national identification system – the biometric trait is captured and converted to a digital template to be stored in the system for future reference. Matching involves using an algorithm to assess the similarity between the reference template and a new image captured by a sensor. Matching can be carried out either against a group of records to identify a 'person of interest' (such as in active street camera surveillance) or against a specific record to verify that an individual is indeed who she/he claims to be (such as when verifying a cash payment against an intended recipient). While a range of biometric traits can be used for identification and verification, facial recognition is the most widespread and relevant technology for contact tracing and public health surveillance. Accuracy of the matching is affected by the quality of the camera, the age of the individual it is being used to identify, environmental conditions, the trait itself and biases in the algorithm, among many other factors. The permanent nature of biometric identifiers makes these particularly sensitive identifiable data.

Data scraping/collation (artificial intelligence): Data are also being mined from social media posts for mentions of specific symptoms to predict the spread of the disease (surveillance).
To understand the concerns that have been raised, a number of issues need to be understood in relation to the technology.

LIMITATIONS OF CONTACT-TRACING TECHNOLOGIES

Berman et al.,(2020), also went on to state a number of limitations to contact-tracing technologies. The limitations include:

- An inability to account for other factors, usually included in manual tracing, that are specific to the environment, such as wind direction or presence of ventilation

- GPS and Bluetooth technologies may be able to determine proximity but cannot establish safety per se, given that barriers between people, such as walls or windows, will not automatically be factored into risk profiles when using Bluetooth data, or people may be spatially distanced but occupy the same GPS coordinate, as noted above.

- Dependence on self-enrolment and downloading of the application. This not only requires trust in the government and the platform, but also a belief in the value and importance of contact tracing. As researchers have noted, the high level of uptake required for contact tracing to be effective in suppressing COVID-19 is unrealistic in many countries.

- Dependence on self-isolation. Where individuals retain their own data and/or are anonymous, they must be prepared to self-isolate when notified of contact with someone with the virus. If not, the contact-tracing process is ineffectual.
- An inability to capture asymptomatic carriers, who are unaware that they are infected

- Data bias resulting from the exclusion of people who do not have access to the technologies necessary for contact tracing to work (mobile phone, internet, etc.). For instance, the most vulnerable are least likely to own a smart device and only about 50 per cent of the world population has access to the internet (essential for the technologies to work).

- Without mass testing campaigns to determine who is infected, digital tools will not help as the technologies used for contact tracing aim to determine proximity to those carriers who have been diagnosed. If a significant proportion of the population is untested and cases go undetected, contact tracing is unlikely to contain the spread of the virus.

RISKS ASSOCIATED WITH CONTACT TRACING AND THE SOLUTIONS

Howell & Talbert (2020), outlines some of the privacy implications and risks associated with TACT that users are wary of, and those protective measures that organizations and communities should consider implementing in connection with any TACT system to help mitigate those vulnerabilities and protect user privacy.

- **Scope of Data Collection: TACT Systems May Be Collecting Too Much Data**

A common concern raised by privacy experts and consumers alike is the scope of data being collected by TACT systems, with location of data being a particular point of concern. Location of data raises special privacy concerns not only because it is often difficult or impossible to anonymize with the potential to reveal detailed personal information (even without intentional use of names) about a user's movements and associations, but also because it is not actually necessary for effective contact tracing. Effective contact tracing typically identifies whether two users have been in close contact, not where they met. TACT systems like Apple-Google's joint solution use Bluetooth technology, measuring the strength of Bluetooth signal between the two user's devices to determine whether two users have come in close contact with each other, to

track potential contact between users without having to track their locations. Therefore, contact tracing app providers should put that into consideration in order to reduce the risk of privacy violations.

- **Centralization vs. Decentralization: Storing and Sharing Data with a Central Authority May Make Data Collected Through TACT More Vulnerable**

Another privacy concern rose by privacy experts and as cited by Howell & Talbert (2020), is the centralization of data collected through TACT. This becomes a concern for users when TACT data is centralized in the control of an authoritative entity like a government, employer or university, which may have particular power over the individual. Further, centralization, even in the hands of a good actor, makes data more vulnerable to attack by bad actors, as it creates one point of access, allowing the breach of a single source to result in the data of all users being compromised. TACT systems like the Apple-Google joint solution rely on minimal centralization, storing data collected through the solution locally on user devices until and unless a user voluntarily elects to push information, i.e. to report a positive test result, out to a central authority. This decentralized approach gives users more control over the use of their information, and reduces the risk of wide-reaching breach or abuse.

- **Commitment to Transparency and a Minimum Necessary Principle**

A lack of clarity as to how data being collected through TACT systems will be used is also important for contact tracking app. There is need for clarity as to use of the TACT data, since there is no central privacy scheme guaranteeing protections for users or outlining permissible use of such information. This creates uncertainty both for individuals, who cannot be sure of what privacy rights or protections they may have, if any, with respect to their TACT data.

TACT system vendors and designers, as well as organizations and authorities looking to implement TACT systems, may want to take a cue from Apple and Google, who have publicly committed to minimizing data used by their joint solution and not monetizing the project. This kind of transparency and limitation on usage to the minimum necessary for contact tracing may both help build trust in users and reduce the risk of an entity's use of data running afoul of privacy regulation.

Conclusion

In as much as data is collected, disseminated and used in combating COVID-19, there is need to ensure that these are done while respecting ethical best practices and complying with data privacy laws (Ololuo, 2020). TACT apps are double-edged sword in the fight against COVID-19, as the same data that can reduce a community's vulnerability to the virus can increase the data subjects' vulnerability to privacy violations. The information collected by TACT is not just protected as personal information, like health status and personal health information, but is also the type of information particularly vulnerable to abuse and stigmatization.

Therefore, data collected and processed should be the requisite ones to combat COVID-19 and should be disclosed solely to persons directly involved in the fight. It should be safeguarded effectively and erased as soon as it is no longer needed. These data should not be monetized as well.

Recommendation

The study recommends that software vendors should ensure proper implementation and deployment of TACT technologies while considering confidentiality and integrity of collected data.

References

Abuhammad S, Khabour O. F, &Alzoubi K. H. (2020). COVID-19 Contact-Tracing Technology: Acceptability and Ethical Issues of Use. *Patient Prefer Adherence*. 2020;14:1639-1647 https://doi.org/10.2147/PPA.S276183

Berman, G., Carter, K., García-Herranz, M. &Sekara, V. (2020). Digital contact tracing and surveillance during COVID-19:General and Child-specific Ethical Issues. Retrieved from https://www.unicef-irc.org/publications/pdf/WP2020-01.pdf

Contact Tracing.(n.d.).In *Merriam-Webster.com dictionary*. Retrieved from https://www.merriam-webster.com/dictionary/contact%20tracing

Gbenga, A. M. (2020). Smartphones, surveillance and the fight against COVID-19 pandemic Retrieved From http://venturesafrica.com/smartphones-surveillance-and-the-fight-against-covid-19-pandemic/

Howell, C. T. & Talbert, C. B. (2020).Privacy Risks and Implications of Contact Tracing App and Related Technologies. *The National Law Review*, X(238). https://www.natlawreview.com/article/privacy-risks-and-implications-contact-tracing-apps-and-related-technologies

Klenk, M. &Duijf, H. (2020). Ethics of digital contact tracing and COVID-19: who is (not) free to go? https://doi.org/10.1007/s10676-020-09544-0

Ololuo, F. (2020).Nigeria: COVID-19 Pandemic And The Data Privacy Implications. Retrieved from https://www.mondaq.com/nigeria/privacy-protection/929530/covid-19-pandemic-and-the-data-privacy-implications.

Wetsman, N. (2020a). Everything you need to know about the coronavirus. Retrieved from https://www.theverge.com/2020/4/10/21216550/contact-tracing-coronavirus-what-is-tracking-spread-how-it-works

Wetsman,N. (2020b). What is contact tracing? Retrieved from https://www.theverge.com/2020/1/23/21078457/coronavirus-outbreak-china-wuhan-quarantine-who-sars-cdc-symptoms-risk

William F. M. (2020). Contact tracing and COVID-19: What is it and how does it work? Retrieved From https://www.mayoclinic.org/diseases-conditions/coronavirus/expert-answers/covid- 19-contact-tracing/faq-20488330

World Health Organization. Contact tracing in the context of COVID-19 (Interim Guidance). (WHO-2019-nCoV-Contact_Tracing-2020.1-eng.pdf, accessed 30th Oct, 2020)