Position Statement – Evaluating the Efficiency of Contact Tracing Technologies

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Israel was one of the first countries to start using, in March 2020, advanced technology for contact tracing as part of the campaign to curb the spread of the coronavirus. The General Security service (GSS) was chosen for the task[1] as it has even in routine times, a direct access to the cellular infrastructure in Israel.[2] This access clearly constitutes a severe, broad, and unprecedented infringement of Israeli citizens' right to privacy.

Israel's success in dealing with the first wave of the coronavirus pandemic was attributed in part to its use of the GSS tool. When the nationwide lockdown ended and the economy returned to normal activity, the GSS tool was retained as the principal tool for tracking possible Covid-19 infections and the Government held back on investing resources in a system of human epidemiological investigations and testing. And then the second wave struck Israel viciously, at a level that required the foisting of a second national lockdown, of three weeks' duration, in September 2020, despite the continuing use of the GSS tool. Is it possible that the GSS tool was not the reason for success in the first wave, as was proved from its failure in the second wave?

In this paper, we argue that the Israeli experience can be seen as a test case for evaluating the effectiveness of contact-tracing technologies.[3] If the technology is an extremely effective tool, one can argue that its contribution to reducing mortality serves as a counterweight to the infringement of privacy. But if its effectiveness as a sole tool is limited, the violation of privacy is clearly unjustified.

The difficulty in assessing the effectiveness of contact-tracing apps stems from the fact that most of them are based on a decentralized architecture that leaves the information on users' individual devices.[4] So, it is impossible to estimate the effectiveness of the app as judged by its rate of error -- both false positives (mistakenly sending a notice of a contact though it didn't takeplace) and false negatives (not sending a notice although a contact did take place).

Indeed, contact-tracing apps are based on Bluetooth signals, whereas the GSS method relies on GPS, whose accuracy is limited, notably in closed spaces. But in contrast to the apps, which are voluntary and decentralized, the GSS' tool was imposed involuntarily on all residents of the country, and the information collected was managed on a centralized basis by the Ministry of Health. For this reason, the data that have been published about the use of the GSS tool provide the most readily available information in the world today that can help

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[1] Tehilla Shwartz Altshuler & Rachel Aridor Hershkovitz, *How Israel's COVID-10 Mass Surveillance Operation Works*, TECH STREAM (July 6, 2020); Tehilla Shwartz Altshuler & Rachel Aridor Hershkovitz, Digital Contact Tracing and the Coronavirus: Israeli and Comparative Perspectives, BROOKINGS (Aug. 2020).

[2] Ronen Bergman and Ido Schwarztuch, *"The Tool" is Exposed: The GSS's Secret Database that Collects Your Text Messages, Calls, and Location,"* YEDIOTH AHRONOTH (March 27, 2020) (Hebrew).

[3] Andrew Crocker, Kurt Opsahl & Bennett Cyphers, The Challenge of Proximity Apps for COVID-19 Contact Tracing, EFF (April 10, 2020).

[4] In Switzerland, it was proposed to study the app's effectiveness on the basis of the number of times it was download, the number of perons who reported that they were confirmed COVID-19 patients according to the code they received from the Health Ministry, and the number who responded to a message sent by the app. See Marcel Salathe et al., *Early Evidence of Effectiveness of Digital Contact Tracing for SARD-CoV-2 in Switzerland* (September. 2020). Another research group claimed that 56% of the population would have to install the app in order for it to serve as the sole tool for contact tracing; but this conclusion was based on a mathematical model rather than actual data. See: Digital Contact Tracing Can Slow or Even Stop Coronavirus Transmission and Ease Us Out of Lockdown, BIG DATA INSTITUTE (April 16, 2020); Patrick Howell O'Neill, *No, Coronavirus Apps Don't Need 60% Adoption to Be Effective*, MIT TECHNOLOGY REVIEW (June 5, 2020).

answer the question of the effectiveness of digital contact-tracing technology as a main tool for contact tracing in the battle against the coronavirus pandemic.

An Analysis of the Data on the Effectiveness of the GSS Tool

1. Identification of confirmed COVID-19 patients by the GSS tool only

In the second wave of contagion which erupted in Israel, from July to early September 2020, 96,760 confirmed cases of COVID-19 were identified, including 25,432 purely on the basis of the GSS cellphone location tool (26.2%). An examination of the figures going back to the start of the pandemic in the spring reveals that 30.87% of those infected were identified only by the GSS; 31.19% were identified only by human epidemiological studies; 17% were identified by both, and the others slipped under the radar.[5] One reason why human epidemiological investigations have the same capacity as the GSS tool is the high rate of infection among family members, which are detected by human investigations but not by digital tracking. In addition, ordering people to go into quarantine on the basis of technology, without an extensive testing system (only 20.7% of those who received quarantine text messages had been tested for the virus) is another factor in the lack of effectiveness. In any case, the GSS tool alone has identified fewer than a third of all confirmed cases since the start of the second wave of the pandemic,[6] even though it has been the main mechanism employed for contact tracing.

2. The Rate of False Positives for Quarantine Orders

From July through early September 2020, 486,622 persons were instructed to enter quarantine because of contact with a confirmed COVID-19 case, as reported by solely the GSS tool; 226,027 were so identified by human epidemiological investigation only; 69,620 were identified by both; and 196,229 were identified on the basis of information from some other source.[7]

If the percentages of confirmed cases detected by human epidemiological studies and the GSS tool are almost identical, as noted above, but more than twice as many persons were instructed to enter quarantine on the basis of the GSS information the conclusion is that the error level of the latter is much higher than that of human investigations.

Another finding supporting this conclusion is the number of those who were ordered to enter quarantine via text messages based on the GSS tool as compared to the number who were released from quarantine after their appeal was accepted. For example, according to the figures published in the first week of July 2020, the percentage of appeals which were accepted indicates a false positive rate of between 17% and 24% for the GSS tool, depending on the week when the data were published. In other words, tens of thousands Israelis were sent into quarantine needlessly.

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[5] Legal Staff of the Knesset Foreign Affairs and Defense Committee, Analysis of the Health Ministry Data: Identification of COVID-19 Patients in advance of the Debate on Sept. 6, 2020.

[6] Report pursuant to the Law Empowering the General Security Service to Assist the National Effort to Reduce the Spread of the Novel Coronavirus (ad hoc provision) 5780-2020, No. 1 (July 9, 2020).

[7] Report pursuant to the Law Empowering the General Security Service to Assist the National Effort to Reduce the Spread of the Novel Coronavirus and Promote the Use of Civilian Technology to Identify those who were in Close Contact with those Infected (ad hoc provision) 5780-2020, No. 9 (Sept. 3, 2020).

Conclusion

The conclusion to be drawn from the Israeli experience is that contact-tracing technology, even when applied to the entire population (so the fear of false negatives is very low), is not effective as the sole means for combating the spread of the virus, both because of the high rate of false positives and because of the low proportion of confirmed patients it identifies. Human epidemiological investigations, which reflect a "surgical" and focused infringement on the right to privacy, are just as effective. Therefore, because the principle of using digital-contact tracing to break the infection chain is the same, other countries can learn, with appropriate caution, from the Israeli case.

The effectiveness of digital contact tracing for breaking the chain of infection has a decisive impact on the appropriate balance that countries should adopt between infringement of the fundamental right to privacy and acting in the public interest in making the battle against the pandemic more efficient. The Israeli experience indicating that this tool can make only a limited contribution to minimizing the spread of the virus should be taken into consideration when balancing its use against the right to privacy.