COVID-19: The Internet of Things and Cybersecurity

Prepared by Fredrik Skippervold and Dr Catherine Wheller

The COVID-19 pandemic has inspired a range of Internet of Things (IoT) innovations to help stop the spread of the virus. This is the ninth edition of COVID-19: IoT and Cybersecurity.

Past editions are found on the PETRAS website.

NHSX updates

The NHSX contact tracing app is taking longer than expected to be released. The BBC has reported that its release is 'unlikely to be before 15 June and could be as late as the start of July'.[1] The Guardian has reported, however, that the test-and-trace system is 'not expected to work at full speed until September or October'. The Chief Operating Officer of the NHS scheme is hoping that the system will be operational 'at a world-class level within three to four months'.[2]

The second version of the NHSX app is reportedly being trialled at a 'secret location' in London. This version will feature five questions about symptoms (previously two) and will integrate the testing process.[3]

The Tony Blair Institute has prepared a briefing[4] on 9 June on digital identify infrastructure. The briefing sets out how digital identify can help tackle COVID-19; what an optimal system should look like; the fault lines for public consent; and what's needed to move from debate to delivery. The briefing then provides recommendations to government.

Overview:

- The latest estimate for wide-scale public release of an NHSX COVID-19 contact tracing app is mid-June to early July
- Uptake level of the app below 60% of the total population still has a protective effect on the population, and it is important to correct this often-quoted statistic in the media
- More than 1600 digital devices to help connect and protect vulnerable people during the pandemic were disseminated by the DevicesDotNow initiative
- Questions have been raised whether data from the NHSX contact tracing app will feed into the NHSX Data Store following information published in the NHS Data Store DPIA
- Singapore plans to distribute wearable sensors to all of its residents to aid contact tracing
- More studies are finding that digital inequalities are being exacerbated by the current pandemic
- *'Cyberattacks and data fraud due to a sustained shift in working patterns'* ranked 9th for 'most likely fallout for the world' in a survey of professionals who participated in a COVID 19 Risks Perception Survey
- Sensor data is being used to monitor the 'busyness' of London

The Ada Lovelace Institute also present six issues policymakers must consider[5] up front while deliberating digital immunity certification.

User uptake

An often-quoted statistic is that 60% of the total UK population must use the digital contact tracing app in order for it to be effective. No nation so far has reached this level of adoption according to the MIT Technology Review's Covid Tracing Tracker.[6] The team behind the study[7] where this figure has appeared are trying to correct the 60% assumption

because a widespread belief that any participation below that threshold will result in failure could be a fatal mistake[8]. The team has stated that the app 'starts to have a protective effect' at 'much lower levels' of adoption.[9]

The Open Data Institute (ODI) is helping the team behind the symptom-tracker TrackTogether ensure that the data is anonymised, open and interoperable[10]. As part of its COVID-19 involvement, ODI is participating in Newspeak House's Coronavirus Tech Handbook[11] and GovLab's repository of Data Collaboratives in Response to Covid-19[12], and is asking teams to get in touch to receive guidance on collecting data and making it open.

Big data and COVID-19

NHS England and the NHSX are developing an NHS COVID-19 Data Store that will collect data to help the UK government monitor the spread of the virus and implement services and support to patients.

Contracts between the NHS and several private companies to support NHSX in efforts to tackle COVID-19 have been released following threats of legal action. These include contracts with Faculty for 'provision of strategic support to the NHSX AI Lab'[13] and a contract worth £1 with Palantir for 'provision of data management platform services'.[14]

Questions have been raised about the inclusion of the US firm Pivotal and the NCC Group (Cyber Security Experts) which are developing the NHSX contact tracing app in the DPIA[15] of the supposedly unrelated NHS data store. There are questions on how the two systems will interact, and whether data from the contact tracing app will feed into the data store.[16]

The privacy notice[17] for the NHS COVID-19 Data Store has also been released.

Singapore plans to distribute wearable sensors

Singapore has been using the TraceTogether app for digital contact tracing. However, there have been problems with uptake, due in part to Bluetooth being disabled when the app runs in the background on Apple devices.

As a solution, Singapore now plans to provide a small device that can be worn on a lanyard or in a bag to each of its 5.7 million residents. These devices do not require a phone, however a digital privacy expert warns that 'users will likely find it hard to scrutinise what the device is actually doing, or what information the back-end server uses or links'. Private industry believes that governments in Asia will begin to adopt affordable wearable devices with location or proximity sensors for contact tracing.[18]

French StopCOVID app

The French StopCOVID contact tracing app was meant to be released at midday last Tuesday. A delay, which was only explained by last-minute 'technical adjustments', consequently led many people to mistakenly download a Catalan health information app with a similar name, Stop Covid19 CAT. Nevertheless, a day later the French Digital Minister announced that its contact tracing app had already been downloaded 600,000 times.[19]

Digital inequalities are being exacerbated by the current pandemic

A paper by Canadian researchers explores the reciprocal impacts of the COVID-19 crisis and digital inequalities. It is argued that low-income households 'suffer from the immediate and long-term economic consequences of the COVID-19 crisis more severely' as it is presumed they are 'less well equipped in terms of technological devices both in numbers and in quality'. A set of 'multi-layered strategies focusing on actionability that can be implemented at multiple structural levels, ranging from government to corporate and community levels', is proposed.[20]

An interim impact report[21] on the DevicesDotNow initiative, which provided 1600+ digital devices to help connect and protect vulnerable people in the UK during the pandemic is now available. The report details case studies and the future direction to combat digital exclusion.

More studies on the need for privacy with public digital contact tracing during the COVID-19 pandemic

An International Digital Accountability Council investigation has reviewed[22] 108 COVID-19 mobile apps to understand whether personal data is being used responsibly. For contact tracing apps, they looked at 23 private and government developed apps from 16 countries.

A team developing a COVID-19 risk awareness application in Canada published recommendations for a privacy-protecting approach to digital contact tracing. The team maintains that a 'privacy-protecting approach must be central in the development of (such) a contact-tracing application'.[23]

Coronavirus-related cyberattacks have increased

A World Economic Forum (WEF) report, The COVID-19 Risks Outlook, published in May 'seeks to provide a preliminary picture of which familiar risks may be amplified by the crisis and which new ones may emerge'. The report captures the views of nearly 350 risk professionals who participated in the COVID 19 Risks Perception Survey.[24]

Among answers for 'most likely fallout for the world', *'Cyberattacks and data fraud due to a sustained shift in working patterns'* ranked 9th with 37.8% responses. The report details that 'necessity has pushed aside hesitations about the adoption of some technological solutions' and that these sudden changes are increasing the risk of 'infrastructure overload and breakdown, cybercrime, privacy violations and inequality'.

Working from home arrangements have led to a 'blurring of the line separating corporate and personal systems.' The risk of exposing sensitive information is heightened as a result of employees not securing their personal devices appropriately. This is problematic as coronavirus-related cyberattacks have dramatically increased between 31 December and 14 April.[25] The WEF report highlights that the concerns about 'employer intrusion into home networks may be rising.' Moreover, as employees are laid off or are faced with cost cutting measures, 'insider risks (…) could intensify as security controls come under stress from a remote working set-up.'

Using sensor data to monitor the 'busyness' of London

The Alan Turing Institute is currently undertaking a project to bring together datasets capturing mobility, transportation and traffic activity over the city of London. Data is sourced from JamCam cameras[26], traffic intersection monitors, and GPS activity from the Turing's London air quality project[27] utilising city-wide air quality sensors. This will help policy makers to better understand 'busyness' and 'enable

targeted interventions and effective policy-making'.

The end product 'will be an application program interface (API) with which the Greater London Authority, Transport for London, London Data Commission, and the Office for National Statistics may query for access to both the data sources and the analysis outputs from the algorithms and statistical models developed.' This project could potentially help authorities in London to better understand 'the extent to which people are staying home' and serve as an 'early warning system' that can trigger necessary interventions.[28]

Endnotes

1 https://www.bbc.co.uk/news/technology-52905448
2
https://www.theguardian.com/society/2020/jun/04/nhs-track-and-trace-system-not-expected-to-be-operating-fully-until-septem-
ber-coronavirus
3 https://www.bbc.com/news/technology-52938660
4 https://institute.global/policy/digital-identity-missing-piece-governments-exit-strategy
5 https://www.adalovelaceinstitute.org/something-to-declare-surfacing-issues-with-immunity-certificates/

6 https://www.technologyreview.com/2020/05/07/1000961/launching-mittr-covid-tracing-tracker/
7 https://pubmed.ncbi.nlm.nih.gov/32234805/
8 https://www.research.ox.ac.uk/Article/2020-04-16-digital-contact-tracing-can-slow-or-even-stop-coronavirus-transmission-and-
ease-us-out-of-lockdown
9 https://www.technologyreview.com/2020/06/05/1002775/covid-apps-effective-at-less-than-60-percent-download/
10 https://theodi.org/article/tracktogether-and-the-odi-covid-19-project/
11 https://coronavirustechhandbook.com/
12 https://docs.google.com/document/d/1JWeD1AaIGKMPry_EN8GjIqwX4J4KLQIAqP09exZ-ENI/edit
13 https://cdn-prod.opendemocracy.net/media/documents/Faculty_Agreement.pdf
14 https://cdn-prod.opendemocracy.net/media/documents/Palantir_Agreements.pdf
15 https://www.england.nhs.uk/wp-content/uploads/2020/06/202004-DPIA-NHS-COVID19-data-store-v1.3-1.pdf
16 https://tech.newstatesman.com/coronavirus/nhs-covid-19-data-store-doc-raises-questions-about-links-with-contact-tracing-
app
17 https://www.england.nhs.uk/contact-us/privacy-notice/how-we-use-your-information/covid-19-response/nhs-covid-19-data-
store/
18 https://uk.reuters.com/article/uk-health-coronavirus-singapore-tech/singapore-plans-wearable-virus-tracing-device-for-all-
idUKKBN23C0FE
19 https://www.bbc.co.uk/news/technology-52905448
20 https://www.sciencedirect.com/science/article/pii/S0747563220301771
21 https://www.goodthingsfoundation.org/sites/default/files/interim_impact_report_1_devicesdotnow_19_may_2020.pdf
22 https://digitalwatchdog.org/wp-content/uploads/2020/06/IDAC-COVID19-Mobile-Apps-Investigation.pdf
23 https://www.sciencedirect.com/science/article/pii/S2589750020301333
24 http://www3.weforum.org/docs/WEF_COVID_19_Risks_Outlook_Special_Edition_Pages.pdf [Chapter 4]
25 https://blog.checkpoint.com/2020/04/20/coronavirus-update-as-economic-stimulus-payments-start-to-flow-cyber-attackers-
want-to-get-their-share-too/
26 https://www.tfljamcams.net/
27 https://www.turing.ac.uk/research/research-projects/london-air-quality
28 https://www.turing.ac.uk/research/research-projects/project-odysseus-understanding-london-busyness-and-exiting-lockdown