



Global Examples of COVID-19 Surveillance Technologies

Flash report

16th April 2020



Authors

Dr Sanna Rimpiläinen, Jennifer Thomson, Ciarán Morrison, University of Strathclyde.

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Introduction

The fast spread of coronavirus (COVID-19) around the world has put health services under an enormous strain. Turning to digital means for collating data on the spread of the virus, the associated symptoms, as well as the routes through which it may be spreading has been a common response. The situation, the associated technologies and the practices of their use vary across the globe and evolve rapidly.

This report provides a global snapshot of the different types of technologies in use or in development for surveillance of COVID-19 at the beginning of April 2020. By the time this report is published, the situation will have developed further.

The body of the report presents short descriptions of a selection of different apps from around the world. More detailed data tables are in the Appendices and include references used.

Background

This report is not an exhaustive review but collates examples of different technologies in use around the world. The report has been prepared by the Digital Health & Care Institute in the first week of April 2020 to support the Institute's COVID-19 related project on Supported Self-Triage, now known as "COVID-19 Self-Assessment". The early findings from this report were disseminated as a presentation at a "Digital Tools for Surveillance" online workshop on the 7th April 2020. The review has looked at digital tools used for surveillance of the spread of the disease in the UK and Europe; Americas and Africa; and Asia and Australia.

Method

The report is based on desk-research carried out in the first week of April 2020.

A combination of the following search terms was used: "COVID-19", "coronavirus", "digital tool", "symptom tracking", "contact tracing", "surveillance" and the area or country in question.

The search covered information published or released during the previous 4-month period from 1st December 2019 to 3rd April 2020.

The available sources consist of news items, blog posts, government and policy statements and company or product websites. The landscape changes extremely fast, and information uncovered in the beginning of the search week often had already changed by the end of that week.

Summary and key findings

The technologies can be roughly divided into four or five main types:

- Symptom trackers;
- Contact tracing technologies;
- Combinations of the two;
- Existing apps with a new COVID-19-section;
- COVID-19 data dashboards.

Generally, it can be said that the number of apps being used or developed for COVID-19 surveillance is in direct proportion to the prevalence of the virus in the region in question.

Most countries and regions are developing their own solutions. The local political context is reflected in how pervasive the digital tool is and how much personal information these gather. The local political context also dictates the level of enforcement for the use of the tool.

In these exceptional times, many governments and national authorities have had to act on a “needs-must” basis. However, a balance has to be found between the need for surveillance of citizens’ activities to tackle the spread of the virus and the respect for citizens’ privacy and human rights.

The main issues with use of surveillance apps are:

- Privacy concerns;
- Lack of testing - the impact of surveillance apps remains limited unless COVID-19 testing is ramped up significantly;
- Not everyone has a Smartphone or tablet or can use these as required.

Key recommendations:

- Make the apps compliant with GDPR-legislation.
- Be transparent and open about the development process and what surveillance will mean for the citizens.
- Be clear that the nature of surveillance is temporary with a clear end date.
- Be clear about what data is collected, what for, who has access to it and what will happen to it in the end.

Best practice example:

- The most GDPR-compliant example available is the newly unveiled Pan-European Privacy-Preserving Proximity Tracing (<https://www.pepp-pt.org/>) project, created by a coalition of techies and scientists from across 8 European countries.
- PEPP-PT has emerged as a response to the coronavirus pandemic generating a huge spike in demand for citizens’ data, and for the EU to create an approach that avoids a “drift towards China-style state surveillance of citizens” (Lomas, 1st April 2020).
- PEPP-PT is described as “a fully privacy-preserving approach”, offering standards, technology and services strictly adherent to the European privacy and data protection laws and principles (GDPR).

The core idea behind the PEPP-PT approach is that a whole ecosystem of technologies (servers, source code, and an international data exchange) have been created, making it easy for developers to build country-specific PEPP-PT apps, then publish them for people to download and use. The approach can be adapted to the needs of the local contexts:

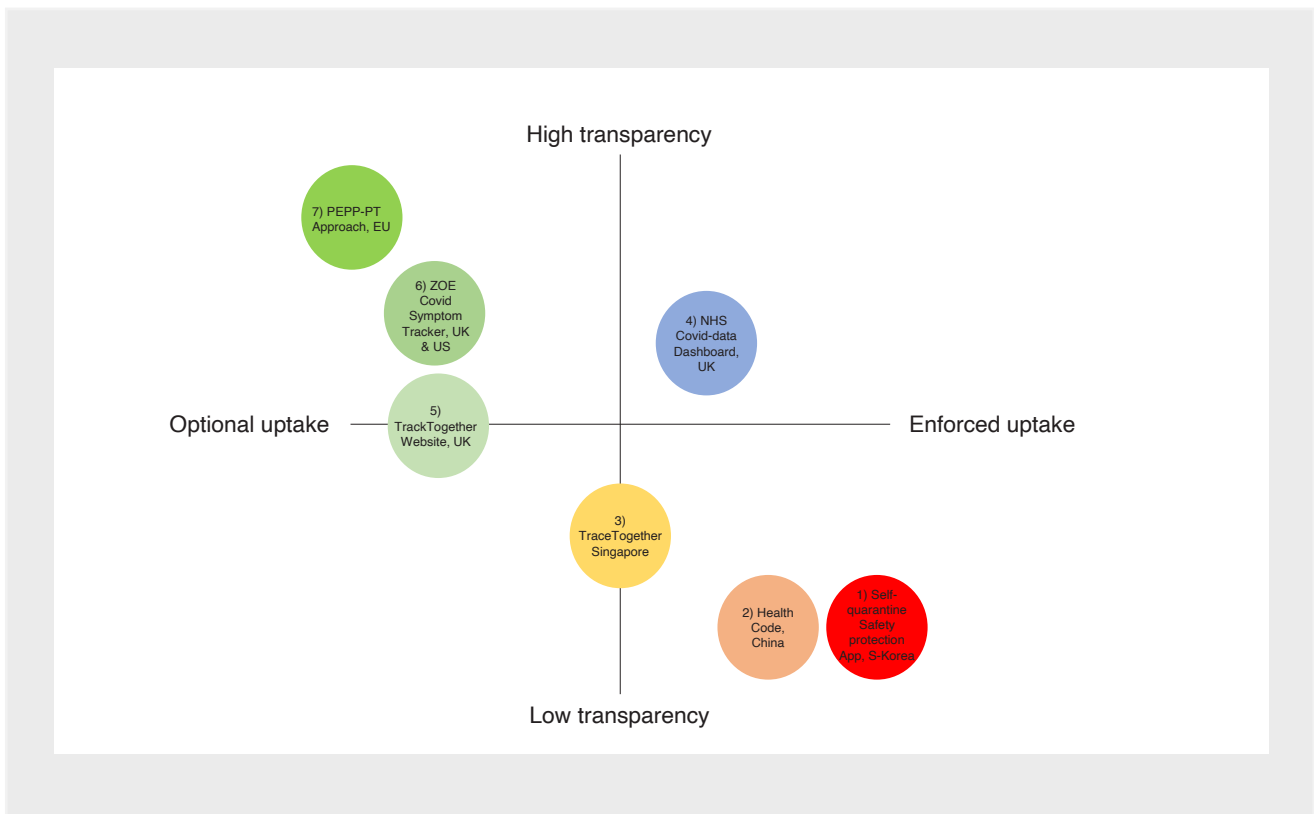
- Backend architecture and technology that can be deployed into local IT infrastructure and can handle hundreds of millions of devices and users per country instantly.
- Managing the partner network of national initiatives and providing APIs for integration of PEPP-PT features and functionalities into national health processes (test, communication, ...) and national system processes (health logistics, economy logistics, ...) giving many local initiatives a local backbone architecture that enforces GDPR and ensures scalability.



- Certification Service to test and approve local implementations to be using the PEPP-PT mechanisms as advertised and thus inheriting the privacy and security testing and approval PEPP-PT mechanisms offer.
 - National public authorities developing apps based on the approach remain free to decide how to inform persons that have been in contact with someone who has tested positive for COVID-19.
 - PEPP-PT website suggests that national cyber security and data protection agencies assess the apps created using the code.
- (Lomas, 1st April 2020; Cooper, 2nd April 2020, Mosher, 15th April 2020)

Spectrum of Apps from enforced to optional

The diagram below presents a spectrum of examples of technologies in use around the world arranged on the axis of High vs. Low transparency (of development and user privacy); and Optional vs. Enforced uptake.



The examples range from the legally enforced and now obligatory South Korean “Self-quarantine Safety Protection App” designed to support the Government Officials in monitoring COVID-19 patients, and ensuring they comply with their quarantine measures, to the fully GDPR compliant, anonymised and data secure “Pan European Privacy Protecting Proximity Tracing” software. That is available as an open source software that can be used by any nation to develop their own, often optional, tools for tracking symptoms and tracing contacts between people, in case they may be diagnosed with COVID-19, and need to notify those they have been in contact with. The local socio-political contexts are reflected in how the systems are being developed and deployed. This diagram was created to illustrate the technological situation behind each app for a DHI workshop held on the 7th April 2020.

Below, there is a short description of each example:

Self-quarantine Safety Protection App, South Korea

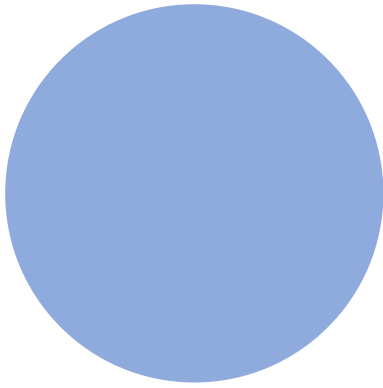
- Developer: South Korean Ministry of Interior and Safety.
- GPS-based.
- App to support officials to monitor citizens in quarantine.
- Lockdown rules: case officer to check on each patient twice a day.
- Self-reporting of symptoms by citizens.
- Alert sent to both patient and case worker, if the patient leaves their quarantine zone.
- App was made compulsory to all citizens and long-stay foreigners on the 1st April.
- Penalty for non-compliance: up to 1 year in prison or fine of 10M won; immediate deportation for foreigners.

Health Code, China

- Developer: Government of China.
- Mandatory for those who wish to travel.
- App generates a coloured QR-code to state what the person's travel status is:
 - Green – free to travel;
 - Amber – self-isolation;
 - Red – quarantine.
- Use requires the entry of vast amounts of personal data; App collects personal data.
- App collects location data and shares with police.
- Unclearity over criteria for how QR-codes are generated.
- System made possible by almost universal adoption of Smart phones and Communist party embracing Big Data for surveillance and for population control.

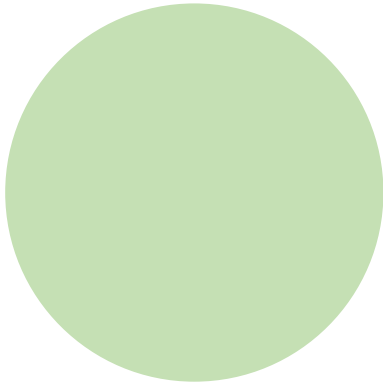
TraceTogether, Singapore

- Community-driven, open-source.
- Opt-in.
- Based on Bluetooth.
- Data is stored locally on the phone.
- Generates encrypted, temp user ID, which is transmitted between Apps in close proximity.
- If COVID-19 case confirmed, Ministry of Health requests user's data to decrypt the ID codes and alert those who have been in contact with the patient.
- Sharing of information compulsory (refusal → prosecution).
- Seems secure, but app had three in-built analytic systems feeding data into govt data bases. Now removed.



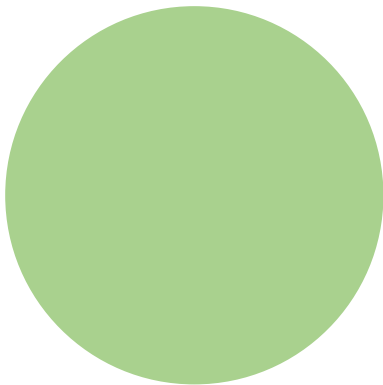
COVID-19 data Dashboard, UK

- Commissioned by UK Government.
- Developed by NHS & large tech companies.
- Data platform to provide real-time, secure, reliable data on the spread of virus and how the NHS is coping with it “Single Source of Truth”.
- To help with decision making.
- Collates data from NHS111 and COVID-19 test results.



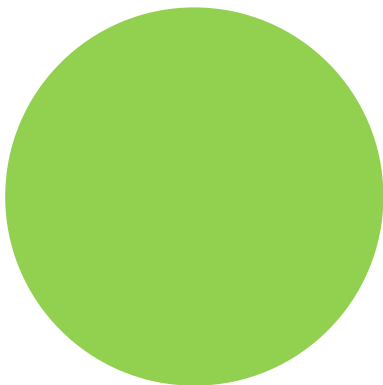
TrackTogether Website, UK

- Developed by an SME.
- Not-for profit initiative.
- Tracks the spread of the virus.
- Based on self-reporting of symptoms via a web-form.
- 7 Qs based on NHS111 advice, inc. age, postcode and country.
- Users are informed of how many cases have self-reported in their area



Zoe symptom tracker, UK

- Developed by Kings College, London and partners.
- Based on a longitudinal Twins study; tested on 5000 pairs of twins.
- Free symptom monitoring app.
- Tracks spread of disease in real-time.
- Self-reporting of symptoms.
- Live 24/3/2020 – 750k downloads in the first 24h.
- To be effective, requires high uptake combined with sufficient testing of people by the NHS.



Pan-European Privacy Preserving Proximity Tracing Initiative, EU

- Developed by a consortium of 130 scientists and experts from 7-8 countries.
- Open source software code & standards.
- Fully GDPR-compliant & anonymized.
- Cross-border interoperability.
- Based on Bluetooth.
- Generates encrypted, temp user ID, which is transmitted between Apps in close proximity.
- If COVID-19 case confirmed, Health authorities send a code to the user’s phone to decrypt contacts and alert them of the situation.

COVID-19 Mobile Applications in the UK and Europe

United Kingdom

There are currently three major projects under way in England.

A free symptom monitoring app, Zoe-symptom tracker

Allows anyone to self-report COVID-19 related symptoms, including non-classical ones, such as non-persistent cough, feeling unwell, strange feeling of lack of taste or smell, chest tightness, etc. The aim of the tools is to track the spread of the disease in real-time.

On the 24th March 2020, a team at King's College London and health data company ZOE launched a new symptom-tracking app in the UK. Subsequently, they have also released a US version (in partnership with colleagues at Massachusetts General Hospital, Stanford University and the Harvard-led Nurses' Health Study).

The tool has been developed a part of a longitudinal Twins study by King's College London and partners. It has been trialled with 5000 pairs of twins. Aim of the app is to help slow the outbreak by helping researchers to identify:

- How fast the virus is spreading in different areas;
- High-risk areas in the country;
- Who is most at risk, by better understanding symptoms linked to underlying health conditions.

Data is being used both for Public Health purposes and for academic research.

The tool went live on the 24th March, amassing 750K users in 24 hours, and now more than 2.2 million people are using it to regularly track their health, generating more than 12 million individual daily reports. This is understood to be the largest collaborative health project of its kind in the world (as at 16th April 2020).

Partnering organisations:

- King's College London.
- The National Institute of Health Research Guy's Hospital, London.
- Biomedical Research Centre, St Thomas' hospital, London.
- Health data science company ZOE Global Ltd.
- CDRF charity.

Issues: for the tool to be really effective, there needs to be sufficient testing of corona cases

NHS Contact Tracing App (no official name).

The NHS will be rolling out a contact tracing app, which will let users know if they have been in close proximity to someone with COVID-19 infection. The app will be launched within the week (details correct at 16th April 2020), with beta-testing beginning in the North of England. NHSX are planning on introducing the App towards the end of the lockdown to help relax the lock-down measures.

NHSX commissioned a research group at Oxford University's Big Data Institute and Nuffield Department of Medicine to develop a contact tracing app based on mathematical simulation on how "instantaneous digital contact tracing" would influence the spread of the virus.

The app works through using Bluetooth signals, a "Bluetooth handshake", to log the proximity (defined as "a person closer than 2m for more than 15mins") of one app user to another app user. The app generates temporary user IDs which are exchanged between the apps. The data is stored on the phone.



The app would also allow people to self-diagnose their illness through filling in an on-screen questionnaire. That would reduce the need to talk to a health advisor or wait for a medical test result before self-isolating. The app would then send a cascade of alerts to people the infected individual has been in close proximity with advising them to go back into self-isolation. The health officials will give them a verification code to enter into the app, which will decrypt the temporary userIDs stored in the app and issue a red alert to all those who have been in closer proximity to the infected person. A yellow alert would be sent at the show of symptoms, and a red one at a confirmed COVID-19 diagnosis.

The research team have estimated that 56% of the general public, or 80% of all Smart phone owners, should install and use the app in order for the method to halt the outbreak. The use of the app will be voluntary, but even a lower rate of uptake will help slow down the outbreak.

COVID-19 Data Dashboard

Public Health England has produced a data dashboard that includes new cases and cases by upper tier local authority.

UK government commissioned the NHS “to develop a data platform that would provide national organisations responsible for coordinating the (COVID-19) response with secure, reliable and timely data (“a single source of truth”) - in a way that protects the privacy of our citizens - in order to make informed, effective decisions”.

NHS partnered with large tech companies: Microsoft, Palantir tech UK, Amazon Web Services, Faculty AI, Google) to develop a dashboard that would feed in data from NHS111 calls and COVID-test results to visualise the spread of the virus across the country and to reveal hotspots.

NHSX headed the effort to harness a range of data sources, with NHS England and Improvement creating a data store to bring multiple data sources into a single, secure location. This backend or initial store collates data from across the NHS and social care and from partner organisations, including NHS111 call centres, COVID-19 test results from Public Health England and data from NHS Digital to be used in combination. The data is integrated, cleaned and harmonised in order to develop reliable information dashboards that draw on the information as soon as it becomes available.

The dashboard shows:

- Total lab-confirmed cases of coronavirus in the UK and each of the four constituent countries
- Total deaths in hospital of patients who tested positive for COVID-19 in the UK and each of the four constituent countries
- Cases confirmed by NHS/PHE labs for each region and upper tier local authority (UTLA) in England
- Daily time series of cases in England confirmed by NHS/PHE labs by specimen date
- Deaths in hospital of UK patients who tested positive for COVID-19 by date reported

Babylon COVID-19 Care Assistant

Babylon Health is a private healthcare provider. COVID- 19 Care Assistant is a separate section of an existing AI-based Babylon Health App. As an existing user logs in, they are asked at the beginning of the triage if they are concerned about coronavirus. If they answer yes, they are diverted into the COVID-19 triage, which follows the same criteria of NHS 111.

The assistant provides people with updated information about coronavirus, allows them to log their symptoms, helps them get appropriate assistance and advice to help them with not spreading the virus wider. The app includes a live chat run by clinical support staff and overseen by doctors. If anyone needs to then they can book a consultation with a GP, normally within 30 minutes, according to Babylon.

TrackTogether

A website for self-reporting COVID-19 symptoms; provides a visualisation of cases in one's area.

Patients fill in a form asking seven questions based on NHS 111 advice, as well as your age, postcode and country. Users are then informed of how many cases have been self-reported in their area. www.tracktogether.co.uk

Developed by an SME; non-profit initiative to provide a clearer picture of how many people across the UK and other countries have been experiencing symptoms of COVID-19.

While no personal data beyond age and postcode are collected, there is no information on where the data is stored and who it might be shared with.

The main issues with the above presented apps are:

- Lack of testing - the impact is limited unless testing is ramped up significantly.
- Privacy concerns.
- There are various suggestions for how to take privacy aspects into account. The link I sent to you on Friday on the EU Privacy initiative focusses precisely on these issues.

Europe

PPEP-PT approach: Pan-European Privacy Preserving Proximity Tracing Initiative

- An approach that provides software code, standards and services for a “well-tested proximity tracking tech” that national authorities can use to create their own COVID-19 Apps.
- Designed to be incorporated in national COVID-19 mobile phone apps as contact tracing functionality – combining this with proactive tests and self-isolation can help to break infection chains
- Allows integration into processes of national health services in the local contexts.
- National public authorities developing apps based on this software remain free to decide how to inform persons who have been in contact with an infected individual.
- National cyber security and data protection agencies will assess apps that are created using the code released by PEPP-PT.
- Based on mobile phones' Bluetooth signals to alert users they've been in the vicinity of a COVID-19 positive person (a distance of 6 feet has been selected as that is the distance at which the virus can spread via droplets from coughing, sneezing, or breathing, according to the US Centers for Disease Control and Prevention).
- Secure data anonymisation.
- Full compliance with GDPR.
- Cross-border reach and interoperability.
- No personal or location data or user IDs will be stored or transmitted.
- Open-source, free; owned by not-for-profit organisation.
- Developed by 130 IT and policy experts and specialists from across 7-8 countries.



France - Covidom

The app is intended for monitoring patients who have passed through Paris hospitals and who are carriers (or suspected of being infected with COVID-19) who do not require hospitalization but are staying at home.

The app sends users a digital online questionnaire (the frequency of the questionnaire varies according to the risk and the period) and the patient can respond to the questionnaire from a computer or via the application. The questions are basic: respiratory and heart rate, temperature, did you have chills, feel faint, do you have difficulty breathing, do you have trouble respecting confinement? Additional data can be added if, for example, the patient has an oximeter, a device that measures the amount of oxygen in the blood.

The app is designed to anticipate any deterioration in their condition, and depending on the answers, the application can send alerts to healthcare professionals. Green means everything is fine, orange, to watch. In the event of a red alert, the patient is called back as soon as possible.

During an initial consultation, the doctor creates the patient profile in the platform by entering his administrative data and useful medical data. The patient then responds daily to a simple questionnaire online, from a computer or via the app.

Depending on the response to the questionnaire, alerts may be generated – e.g. where a high fever or significant respiratory discomfort is reported by the patient, the healthcare team is alerted and contacts the patient to adapt the follow-up and treatment.

The objective is to ensure remote monitoring of patients who do not show signs of seriousness, without overburdening health establishments/GPs.

Poland - Home Quarantine App

The app was developed and is being endorsed by the Polish government, based on a third-party solution. The system was developed in three days. The app is based on Instagram, which uses geolocation and facial recognition technology. The app randomly prompts people to upload selfies within 20 minutes of receiving an alert to prove that they are in quarantine. Failure to upload a photo within the available time window might result in a visit by the police. The use of the app is mandatory for 14 days to people returning to Poland from abroad and for those with confirmed COVID-19 diagnoses.

The app shares people's data with several government agencies and the police.

Germany - Corona Data Donation

App developed in Germany is based on wearable technology and gathers volunteers' vital signs, such as pulse, temperature and sleep. It analyses the information to see if they are symptoms of a flu-like illness.

Results are presented as an interactive online map, which would allow the authorities to follow the spread of the virus geographically.

Russia - Russian Social Monitoring app (in development)

To monitor citizens with confirmed COVID-19 but are not hospitalised. The app will be pervasive and collate a lot of information, including accessing user's calls, location, camera, storage, network information and other data. These will be transferred to the developer's database without any encryption.

The app is aimed at checking that the infected citizens do not breach their quarantines and leave their home while contagious.

Those who do not already have a smart phone, can borrow one with the app installed.

The plan is also to launch an initiative in Moscow, where the citizens have to request a fresh QR-code each time they leave their homes. The citizens will be obliged to show their status to the police on request.

COVID-19 Mobile Applications in Asia and Australia

Research covered east Asia, India and Australia and New Zealand. Research covered other areas including the Middle East, Indonesia and more but no significant results were found within the brief research window. Most applications involved the provision of national or regional guidance surrounding COVID-19, while some provided tracking functions for COVID-19 patients.

China - Health Code App

In China, the national government commissioned the 'Health Code' Application. This service runs ubiquitously across various social media platforms (including Alipay and WeChat). The application is mandatory for people wishing to travel freely as the application provides a greenlight for people to travel.

The Health Code app provides users with a designated QR code the authorities scan to determine the users' right to travel. People with green status are permitted to travel freely, yellow indicates users should be self-isolating at home and red means a person is a confirmed COVID-19 patient and should be in quarantine. The apps are specific to cities and/or provinces and have already been deployed in over 200 cities. Officials check people's mobile phones for the codes at entrances to public transport and at stations.

The coloured QR code is obtained by entering reams of personal information:

- Personal details, ID number;
- Contact details;
- Current location;
- Passport details and recent travel history;
- Relevant medical certification;
- Whether the person has been in contact with a corona patient in the past 14 days.



The App also draws on medical information including symptoms (such as fever, cough), medical treatment, isolated observation, contact information, travel history of the epidemic area, and the user's travel history including the mode of travel and what seat they sat in, and details on the vehicle and its driver. Once everything is complete, a code is automatically generated. Each code is refreshed at midnight.

Authorities have threatened that violators will be “dealt with severely,” though detailed penalties have yet to be announced.

The system is made possible by the Chinese public's almost universal adoption of smart-phones and the ruling Communist Party's embrace of “Big Data” to extend its surveillance and control over society.

Issues:

There are great concerns regarding issues surrounding breaches of privacy and data security in using the App. There is little knowledge about how exactly the designated QR and colour codes are determined for the users, which raises concerns about who is permitted to travel. There have been reports of user information being shared with local authorities (i.e. police) without their knowing.

The app collects vast amounts of personal data, which feeds into a national database. Location data can be shared with the police. At the same time, the App does not confirm the health status of the user.

South Korea - Self-Quarantine Safety Protection App

South Korean Ministry of the Interior and Safety commissioned the Self-quarantine safety protection app to help officials to monitor citizens that have been ordered to stay in quarantine.

Korean lockdown rules state that anyone, who has been in contact with a confirmed COVID-19 carrier (been in a distance of 2m or in the same room someone has coughed in) are subject to mandatory two-week quarantine. If COVID-19 diagnosis is confirmed, the person is legally prohibited to leave their quarantine areas. Each patient is assigned a local government case officer, who checks in on them twice a day to track the development of symptoms. The app was developed for citizens to report their symptoms and to ease the work of the case officers, once the number of cases proliferated so that doing this by phone became impractical.

The app has a GPS installed in order for the government to track the location of each self-quarantined patient to ensure that they stay in their respective quarantine zones. If the quarantine zone is breached, both the citizen and their case officer will be sent an alert.

Initially, the app was not mandatory, but since 1st April 2020 “all Koreans and long-stay foreigners should mandatorily install” the app. Non-compliance now carries a penalty: from the 5th April, the violators will be imprisoned for up to one year, or fined 10M won. Foreigners will be immediately deported. Previously there was an option to also choose to be monitored traditionally via a telephone. It is unclear if this option is still available.

Singapore - TraceTogether

TraceTogether is a community-driven, open-source contact tracing app aimed to help prevent the spread of COVID-19, developed by GovTech. It is widely been hailed as an exemplar app for data safety and privacy questions. However, with a closer look, things are not what they may seem. For example, on the 2nd of April, the code had reportedly not yet been released (DigitalReach 2020, 2 April).

The use of the app is optional. Users download the app and give consent during its set up. Developers have stressed the app gathers no personal data. However, IT-experts discovered that the developer team had “inadvertently” included a government data collection service wogaa.sg into its build, which had three “secret intelligence tools running in the background, feeding data into government databases”. This means the app collects more data than is necessary and compromises its supposed anonymity and 21-day data hygiene, and that other government agencies other than Ministry of Health have the technical ability to access persona information, potentially without the user’s consent. GovTech are working to remove the tool for the next iteration of TraceTogether App. (Vadaketh, 2020, April 2; DigitalReach, 2020, April 2.)

The tool relies on Bluetooth technology, which is more reliable than GPS in Urban settings. However, for the app to work, it requires the Bluetooth to be on continuously, which creates security issues of its own.

The app works by generating a random user ID every few hours to pair with the users’ mobile number. The Bluetooth on the phone scans its vicinity for about 8 sec every 40sec to look for nearby devices with the App. When found, each device sends back encrypted information, which the app decrypts and saves into a database stored in the phone. Data stored locally on the phone for 21 days, after which it is deleted. Current guidelines define “close proximity” as 2m apart or up to 5m, for 30 minutes. If the person using the app gets a positive COVID-19 diagnosis, Ministry of Health will ask the user to share the records stored on their phone so that they can contact the people they have been in the vicinity of as part of their contact tracing investigation. Refusal to share the information may result in prosecution under the Infectious Diseases Act.

India

Apps used in India vary between regions. Some provide public information such as COVA Punjab:

1. Real time dashboard for Punjab, India and global stats.
2. To check for symptoms of Corona and have a quick self-screening.
3. Corona Awareness.
4. Traveling instructions.
5. Prevention Products.
6. Corona Hospitals, Punjab.
7. FAQ.
8. Call Support.

COVID-19 Quarantine Monitor Tamil Nadu app is a tracker application for people who are under quarantine. The app, once installed and run by the individual, enables live location tracking via GPS and generate alerts and information.

The Apps in India have no underlying legal framework for privacy protections in place.



Australia and New Zealand

Australia and New Zealand predominantly provide apps that are used for providing the public of COVID-19 related information.

The Australian Government Coronavirus app is indicative of these apps, this app allows users to:

- stay up to date with the official information and advice.
- important health advice to help stop the spread and stay healthy.
- get a quick snapshot of the current official status within Australia.
- check your symptoms if you are concerned about yourself or someone else
- find relevant contact information.
- access updated information from the Australian Government.
- receive push notifications of urgent information and updates.

COVID-19 Mobile Applications in Africa and Americas

Africa

Africa as a continent appears to be behind the COVID-19 curve. In early March, the continent's COVID-19 cases by country were in single digits but those figures have jumped. The WHO in Africa is currently holding virtual hackathons and offering up to \$20,000 in seed-funds to finalists with digital solutions to stem COVID-19.

Americas

In the US, the technology focus has been more on public health surveillance to use data to predict where outbreaks might occur, rather than on contact tracing. However, many tech companies are wary of sharing large amounts of data with the US government.

In Canada, several companies/researchers are in talks with (or have put forward proposals) to various levels of government to roll out contact tracking apps that would use location or Bluetooth data.

Research focus has been mainly on the US, and three significant tracking apps have been identified from the desk research:

Private Kit: Safe Paths

- Open source, developed by MIT (also volunteer help from developers at orgs like Facebook and Uber).
- Tracks users and shares locations between them - also compares recent locations against the path of an infected person and alerts them of potential contact.
- Crucially it doesn't share identifying information.

How We Feel

- Developed by Pinterest team with help from well-regarded public health institutions (including Harvard, Stanford, MIT, University of Maryland School of Medicine, Weill Cornell, and the Howard Hughes Medical Institute).
- Only data requested by the app (apart from asking how the person is feeling) is age and zip code (doesn't collect information like name, phone number or email information) - data then aggregated and shared with researchers, public health professionals and doctors.
- Part of the team working on the project are experts in the field of differential privacy - a key goal is to ensure that people's information is used responsibly.

ZOE COVID Symptom Tracker

- The same App as in the UK (see above).
- ZOE Global Ltd and King's College London have updated the app and are recruiting users across the US in collaboration with researchers from Massachusetts General Hospital, the Harvard T.H. Chan School of Public Health, and Stanford Medical.

There are other, more localised apps such as STOP COVID NYC (developed by a team at NYC's Mount Sinai Health System in response to the fact that NY has far more infected people than any other US state.)

Interestingly, there seems to be a trend for existing apps to tweak/add to their functionality to enable COVID-19 tracking, for example:

Niagara Health Navigator

- This app lets patients use their digital identity to book appointments/register in advance at the hospital/set up reminders and notifications.
- It has updated its latest release to include 2 new features – screening/ self-assessment questions and signposting to latest public health information.

Natural Cycles

- This is a birth control/fertility monitoring app.
- It uses an algorithm that takes a woman's individual basal body temperature to determine her daily fertility status.
- Live app with > 1.5 million users in 162 countries already using the app to check their temperature every day.
- Approved by the FDA (Food and Drug Administration Agency) in the US.
- Now has a new, optional tracker within the app to help people track their symptoms if they feel sick and are experiencing potential COVID-19 symptoms.
- Users can track symptoms in real-time and share them with their healthcare provider.



Appendix 1: COVID-19 Mobile Applications in the UK and Europe

United Kingdom

Name of Application:

C-19 COVID Symptom Tracker ZOE _UK (free symptom tracking app)

Commissioned/developed by:

The app is based on the TwinsUK COVID-19 research study carried out in partnership with:

- King's College London.
- The National Institute of Health Research Guy's Hospital, London.
- Biomedical Research Centre, St Thomas' hospital, London.
- Health data science company ZOE Global Ltd.
- CDRF charity.
- In negotiation with NHSX to take the app forward and plans to launch the App in the US. (BMJ, 2020)

Status (planned/in development/developed/ live):

Live - Launched on the 24th March 2020

National COVID-19 Status:

The United Kingdom

Confirmed cases : **99,459**

Deaths: **12,868**

Source: John Hopkins Coronavirus Resource Center, **15/4/2020**

Application features and function:

Free monitoring app, which allows anyone to self-report COVID-19 related symptoms, including non-classical symptoms, such as non-persistent cough, feeling unwell, strange feeling of lack of taste or smell, chest tightness, etc.

- Trialled on 5000 pairs of twins
- Tracks the spread of the disease in real-time
- Aim is to help slow the outbreak by helping researchers to identify:
 - o How fast the virus is spreading in your area
 - o High-risk areas in the country
 - o Who is most at risk, by better understanding symptoms linked to underlying health conditions.

The project lead, Prof of Genetic Epidemiology, Tim Spector describe the app as “an early warning radar device”. Researchers believe that the data from the study will reveal important information about the symptoms and progress of the COVID-19 infection in different people, and why some go on to develop more severe or fatal disease while others have only mild symptoms. (Spector, 24 March 2020)

Method of user activation

- Available free of charge to the public in the UK.
- 700 000 people signed up in the first 24h of the launch of the app.
- Issues: for the tool to be really effective, there needs to be sufficient testing of corona cases!

Data security and privacy policy: Live - Launched on the 24th March 2020

The data collected will be anonymised and made available every 24h as an open source resource strictly to public health or other non-profit research institutions carrying out research on COVID-19, including the NHS. The data will not be used commercially or sold. (Spector, 24 March 2020).

Full details on data security and privacy policy:

<https://covid.joinzoe.com/post/how-is-your-data-secured-uk>

- Data is protected under “General Data Protection Regulation” (GDPR), which means personal data can only be used for the purpose the user consents to. That means it can only be used to help medical science and healthcare providers to better understand Coronavirus.
- Minimal amount of personally identifiable information is collected (e.g. year of birth is required, but not date of birth, and postcode, but not street address), while recognizing that the research does require some basic demographic info.

Data security tech used by ZOE:

Project Galileo by Cloudflare

As a public interest group conducting vital research our services are kindly protected by Cloudflare for free under Project Galileo. This helps us fight distributed denial of service (DDoS) attacks - from individual hackers as well as adversary groups or governments - to keep our service online. Cloudflare’s technology is used by IBM, Thomson Reuters and Zendesk amongst others.

Sqreen

We use Sqreen to protect accounts from hacking and other malicious activities. Their services help us to prevent data breaches, stop account takeovers, and block service logic attacks.

Pentest

We partner with Pentest to uncover and remedy security vulnerabilities within our infrastructure.

Encryption

We encrypt any user data we store or transfer. Encryption is a way of scrambling data so that only authorized parties can understand the information. In simple terms, encryption takes readable data and alters it so that it appears random. Data is transferred over HTTPS to our servers, this is the same transfer protocol that would be used if you enter your credit cards details on a website. Data is also encrypted at rest by our database.

Digital Shadows

In the unlikely event that our security is compromised – we have partnered with Digital Shadows who monitor the regular web and the dark web to detect data leakage.



Is application used for research purposes or as public health intervention (and how?):

Both, see above.

The app will be widely available to health staff and the general public who wish to contribute to this research. It will also be used by other large population studies in the UK and US.

Link(s) to Source:

Product website: <https://covid.joinzoe.com/>

Spector, T. (2020, March 24). New symptom tracking app aims to slow spread of coronavirus. King's College News Centre. <https://www.kcl.ac.uk/news/new-symptom-tracking-app-aims-to-slow-spread-of-coronavirus>

Davis, N. (2020, March 24). UK app aims to help researchers track spread of coronavirus. The Guardian. <https://www.theguardian.com/science/2020/mar/24/uk-app-aims-to-help-researchers-track-spread-of-coronavirus>

Want to tackle COVID-19? The key could be in your smartphone data. (2020, March 31). Evening Standard. <https://www.standard.co.uk/tech/coronavirus-apps-data-software-a4402561.html>

Mayor, S. (2020). COVID-19: Researchers launch app to track spread of symptoms in the UK. The BMJ, 368. <https://www.bmj.com/content/bmj/368/bmj.m1263.full.pdf>

Volpicelli, G. (2020, March 26). The inside story of the UK's biggest coronavirus symptom tracker app. Wired UK. <https://www.wired.co.uk/article/covid-symptom-tracker-app-coronavirus-uk>

Name of Application:

NHS Contact tracing app - UK

Commissioned/developed by:

- Commissioned by NHSX;
- Being developed by:
 - a team at the University of Oxford's Big Data Institute
 - Nuffield Department of Medicine
 - Based on a mathematical simulation on how "instantaneous digital contact tracing" would influence the spread of the virus.

Status (planned/in development/developed/ live):

At advanced stage of evaluation, weeks away from being ready to be deployed
(Guardian, 31 March 2020)

National COVID-19 Status:

The United Kingdom

Confirmed cases : **99,459**

Deaths: **12,868**

Source: John Hopkins Coronavirus Resource Center, **15/4/2020**

Application features and function:

- A contact-tracing App, which builds a memory of proximity contacts and immediately notifies contacts of positive cases
- It can achieve epidemic control if used by enough people.
- By targeting recommendations to only those at risk, epidemics could be contained without need for mass quarantines ('lock-downs') that are harmful to society .
- Phones log their own locations; when the owner of a phone tests positive for COVID-19, a record of their recent movements is shared with health officials; owners of any other phones that recently came close to that phone get notified of their risk of infection and are advised to self-isolate.
- If a person starts feeling ill, it is suggested they use the app to request a home test. And if it comes back positive for COVID-19, then an instant signal would be sent to everyone they had been in close contact with over recent days.
- Those people would be advised to self-isolate for a fortnight, but would not be told who had triggered the warning.
- In addition, the test subject's workplace and their transport providers could be told to carry out a decontamination clean-up.
- To encourage take-up, it is suggested the app also acts as a hub for coronavirus-related health services and serves as a means to request food and medicine deliveries.



- The academics note that similar smartphone software has already been deployed in China. It was also voluntary there, but users were allowed to go into public spaces or on public transport only if they had installed it.
- Furthermore, the service could be extended to deliver stay-at-home alerts even to 2nd and 3rd degree contacts.

Issues with development and deployment:

- Designers of a tracking system will have to work out key details: how to determine the proximity among phones and the health status of users, where that information gets stored, who sees it, and in what format.
- The lack of testing is slowing down the impact these types of apps might have.
- Privacy concerns: spying by the Government a worry.
- Singapore's TraceTogether could be used as a template for NHS app: collects minimum of data, uses Bluetooth to record your proximity to other app users, so that they can be alerted if you later test positive to the virus.
- The use of the app would be optional, but could be vital to those who want to return to work.
- The app would not need to access location data, but could log users' proximity to each other through Bluetooth. Once a user reports symptoms or a positive test result, the app would trace back through close contacts over the past seven days and alert those calculated to be at risk. Once deployed, developers would use data on who is actually infected to optimise the app's performance and gain further insights into how transmission occurs.

Method of user activation

- The NHS app would be an opt-in system and that it would not be required to access NHS testing services, or to get permission to return to work, for instance. Instead, people would be encouraged to sign up as part of a collective effort to bring the pandemic under control.
- Around 60% of the adult population would need to sign up and engage with the app by registering their symptoms or positive test results for it to be effective.
- Their proximity to other users would be logged, and they would follow advice given in alerts to self-isolate – even in cases where they were not aware of having been in contact with someone infected.

Data security and privacy policy:

Assumption is that it ought to be possible to roll out the contact-tracing app without breaching data protection laws. "In emergency situations, there are all sorts of things that are allowable that wouldn't be otherwise and that seems appropriate,"

Prof Michael Parker, director of the Wellcome Centre for Ethics and Humanities at the University of Oxford said. "The most important thing is there's public trust and confidence and clarity of what's happening."

Oversight of the app development needed, as well as clear "stop rules" about what happens to data after the pandemic is brought under control and careful attention paid to ensure those without smartphones would not be disadvantaged.

A lot of discussion in the press on how the same model as used in China and South Korea could not be used in the UK. That kind of tracking “could easily swing towards a privacy violation that isn’t justified by the potential public health benefit” (Servick, 2020); and how it would be more ethical to allow people to donate their data if they receive a positive diagnosis for corona, or just because they choose to do so.

For example, in Germany, which has some of Europe’s strictest data privacy protections, the government can compel a technology company to share location data on an individual in the interest of national security. However, legislative change specifying how data collection would be restricted to a certain population, for a certain time, and for a certain purpose will be required in order to track people who have or might have coronavirus. (E.g. the Infection Protection Act in Germany, reported on 21 March 2020, allow tracking of people, who have been in contact with those infected with coronavirus.)

Such laws could be on the way. On 21 March, Frankfurter Allgemeine Zeitung reported that the German health ministry had drafted changes to a law called the Infection Protection Act to allow, among other things, the tracking of people who were in contact with those infected with the coronavirus. (<https://www.faz.net/aktuell/wirtschaft/bundesregierung-will-lae-nder-in-der-corona-bekaempfung-entmachten-16689784.html>)

Is application used for research purposes or as public health intervention (and how?):

Public health intervention.

Link(s) to Source:

Kelion, L. (2020, March 31). UK considers virus-tracing app to ease lockdown. BBC News. <https://www.bbc.com/news/technology-52095331>

The related academic study:

Ferretti, L., Wymant, C., Kendall, M., Zhao, L., Nurtay, A., Abeler-Dörner, L., Parker, M., Bonsall, D., & Fraser, C. (2020). Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing. *Science*. <https://doi.org/10.1126/science.abb6936>

Servick. (2020, March 22). Cellphone tracking could help stem the spread of coronavirus. Is privacy the price? *Science | AAAS*. <https://www.sciencemag.org/news/2020/03/cellphone-tracking-could-help-stem-spread-coronavirus-privacy-price>

Health Correspondent, H. D. S. (2020, March 31). NHS developing app to trace close contacts of coronavirus carriers. *The Guardian*. <https://www.theguardian.com/uk-news/2020/mar/31/nhs-developing-app-to-trace-close-contacts-of-coronavirus-carriers>

Clarke, L. (2020, April 2). How will the NHS Covid-19 contact-tracing app work and when will it go live? [New Statesman]. *NS Tech*. <https://tech.newstatesman.com/security/nhs-covid-19-contact-tracing-app-rollout>



Kelion, L. (2020, April 16). Coronavirus: NHS contact tracing app to target 80% of smartphone users [Yahoo news]. BBC News. <https://news.yahoo.com/coronavirus-nhs-contact-tracing-app-110013373.html>

Pegg, D., & Lewis, P. (2020, April 13). NHS coronavirus app: Memo discussed giving ministers power to 'de-anonymise' users. The Guardian. <https://www.theguardian.com/world/2020/apr/13/nhs-coronavirus-app-memo-discussed-giving-ministers-power-to-de-anonymise-users>

Name of Application:

NHS COVID-Data Dashboard _UK

Commissioned/developed by:

Commissioned by UK Govt “to develop a data platform that will provide those national organisations responsible for coordinating the response with secure, reliable and timely data - in a way that protects the privacy of our citizens - in order to make informed, effective decisions”.

Developed by NHS England, NHS improvement and NHSX in collaboration with leading tech firms.

- **NHSX** along with **NHS England and Improvement** are leading on this project working with multiple partners leveraging internal skills and also skills from the wider NHS family. The team is being led by the Director of AI, Indra Joshi, and Ming Tang, Director of Data/Analytics, NHS England/Improvement.
- **Microsoft** is supporting NHSX and NHS England’s technical teams, who have built a back-end data store on Microsoft’s cloud platform, Azure, to bring multiple data sources into a single, secure location. A G-cloud data processing contract is in place.
- **Palantir Technologies UK** is providing the software, Palantir Foundry, that powers the front end data platform. Palantir Foundry, which has been primarily developed in the UK, enables disparate data to be integrated, cleaned, and harmonised in order to develop the single source of truth that will support decision-making. Foundry is built to protect data by design. A G-cloud data processing contract is in place. Palantir is a data processor, not a data controller, and cannot pass on or use the data for any wider purpose without the permission of NHS England.
- **Amazon Web Services (AWS)** is helping to provide infrastructure and technologies that are enabling NHSX and its partners to quickly and securely launch the new COVID-19 response platform for critical public services at a time when it is important for public and private sector organisations to work together to combat this crisis. AWS has the highest score awarded by the NHS Data Security & Protection (DSP) Toolkit.
- **Faculty** is a London-based AI technology specialist that has an existing partnership with NHSX and is now supporting the development and execution of the data response strategy. This includes developing dashboards, models and simulations to provide key central government decision-makers with a deeper level of information about the current and future coronavirus situation to help inform the response.
- **Google:** The NHS is exploring the use of tools in the G Suite family to allow the NHS to collect critical real-time information on hospital responses to COVID-19. Data collected would be aggregated operational data only such as hospital occupancy levels and A&E capacity. It will not include any form of identifiable patient data.



Status (planned/in development/developed/ live):

Expected to be made available to govt decision makers “next week” (w/C 30 March?)

National COVID-19 Status:

UK Confirmed cases : 99,459

UK Deaths: 12,868

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

- Creation of a computer dashboard screens to show the spread of the virus and the healthcare system’s ability to deal with it.

Drawing in data gathered via 111 calls and COVID-19 results.

NHSX heading the effort to harness a range of data sources, so that these could be used in combination.

The aim is to create dashboards that draw on the information as soon as it becomes available in order to help the government and health chiefs to:

- Understand how the virus is spreading and identify risks to particularly vulnerable groups of people.
- Proactively increase resources in emerging hot spots.
- Ensure critical equipment is supplied to hospitals and other facilities in greatest need.
- Divert patients to the facilities best able to care for them based on demand, resources and staffing capacity.

NHS England and Improvement will create a data store to bring multiple data sources into a single, secure location. This is what we are calling the backend or initial store. Data needed to inform the COVID-19 response will come from across the NHS and social care and from partner organisations. It will include data such as 111 online/call centre data from NHS Digital and COVID-19 test result data from Public Health England.

To provide a single source of truth about the rapidly evolving situation, data will then be integrated, cleaned, and harmonised in order to develop the single and reliable information that is needed to support decision-making. The results will be presented as dashboards that give a live view of the metrics needed to track and understand the current spread of the crisis, and the capacity in the healthcare system to deal with it.

- The academics note that similar smartphone software has already been deployed in China. It was also voluntary there, but users were allowed to go into public spaces or on public transport only if they had installed it.
- Furthermore, the service could be extended to deliver stay-at-home alerts even to 2nd and 3rd degree contacts.

Method of user activation

Data gathered from NHS111 calls and Covid-results

Data security and privacy policy:

- All the data in the data store is anonymous, subject to strict controls that meet the requirements of data protection legislation and ensure that individuals cannot be re-identified. The controls include removing identifiers such as name and address and replacing these with a pseudonym. GDPR principles will be followed, for example the data will only be used for COVID-19 and not for any other purpose and only relevant information will be collected. Any request to access data will be reviewed through a single process controlled solely by NHS England and NHS Improvement and NHSX.
- Essential data governance procedures and established principles of openness and transparency remain at the core of the development work. The developers follow “the same rules for information governance that underpin our day-to-day work.”
- The data brought into the back end datastore held by NHS England and NHS Improvement will largely be from existing data sources e.g. data already collected by NHS England and NHS Improvement, Public Health England and NHS Digital.
- All NHS data remains under NHS England and NHS Improvement control.
- **Once the public health emergency situation has ended, data will either be destroyed or returned in line with the law and the strict contractual agreements that are in place between the NHS and partners.**
- The Data Processing agreements put in place with the organisations listed above include the steps which need to be taken to cease processing and to either destroy or return data to NHS England and NHS Improvement once the public health emergency situation has ended.

Is application used for research purposes or as public health intervention (and how?):

Public health intervention.

Link(s) to Source:

Kelion, L. (2020, March 26). NHS uses tech giants to plan coronavirus response. BBC News. <https://www.bbc.com/news/technology-52053565>

Kelion, L. (2020, March 28). NHS turns to big tech to tackle COVID-19 hot spots. BBC News. <https://www.bbc.com/news/technology-52079287>

Gould, M., Joshi, I., & Tang, M. (2020, March 28). The power of data in a pandemic—Technology in the NHS. GOV.UK. <https://healthtech.blog.gov.uk/2020/03/28/the-power-of-data-in-a-pandemic/>



Name of Application:

Babylon COVID-19 Care Assistant UK

Commissioned/developed by:

Babylon Health

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

UK Confirmed cases : 99,459

UK Deaths: 12,868

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

- COVID 19 Care Assistant is a separate section of an existing AI-based Babylon Health App.
- **As a user login, they are asked at the beginning of the triage if they are concerned about coronavirus.** If they answer yes, they are diverted into the COVID-19 triage, which follows the same criteria of that of NHS 111.
- **Babylon has launched a new service to provide people with updated information about coronavirus, check symptoms and help them get appropriate assistance.**
- Care Assistant allows users to log their symptoms and offers advice to those who may have contracted coronavirus to keep them safe and prevent them from spreading the illness further.
- For most people, who will have fairly mild symptoms, it's about getting information on self-isolation, hygiene or caring for others, but there's also the option to have a live chat with one of our team.
- People who are ill are offered treatment plan based on the latest NHS guidance and encouraged to log their symptoms so they can record how quickly they're getting better or worse.
- This includes information on self-isolating, recommended to everyone who displays symptoms of COVID-19 or lives with someone else who does.
- Anyone who is more seriously ill is fast-tracked to a GP or hospital as needed.
- Live chat is run by clinical support staff and overseen by doctors. If anyone needs to then they can book a consultation with a GP, normally within 30 minutes, according to Babylon.

Method of user activation

Existing customers

Data security and privacy policy:

Is application used for research purposes or as public health intervention (and how?):

Public health intervention.

Link(s) to Source:

Want to tackle COVID-19? The key could be in your smartphone data. (2020, March 31). Evening Standard. <https://www.standard.co.uk/tech/coronavirus-apps-data-software-a4402561.html>

<https://letsbeatcovid.net/>



Name of Application:

TrackTogether UK

Commissioned/developed by:

SME

TrackTogether is a non-profit initiative built to provide a clearer picture of how many people across the UK and other countries have been experiencing symptoms of COVID-19, as well as how many are following the advice to self-isolate. The more responses we collect from people, whether sick or healthy, the more we can learn together.

Guy Nakamura, 28, a digital product development leader from Fulham who built the service remotely with a team of three over a “sleepless” weekend.

Status (planned/in development/developed/ live):

Live – over 7000 users

National COVID-19 Status:

UK Confirmed cases : 99,459

UK Deaths: 12,868

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

Website for reporting covid symptoms Patients fill in a form asking seven questions based on NHS 111 advice, as well as your age, postcode and country. Users are then informed of how many cases have been self-reported in their area. tracktogether.co.uk. It takes 20 seconds to use.

Method of user activation

Voluntary

Data security and privacy policy:

Is application used for research purposes or as public health intervention (and how?):

Link(s) to Source:

Link to webpage: <http://www.tracktogether.co.uk/>

Want to tackle COVID-19? The key could be in your smartphone data. (2020, March 31). Evening Standard. <https://www.standard.co.uk/tech/coronavirus-apps-data-software-a4402561.html>



Name of Application:

Let's Beat COVID-19 UK

Commissioned/developed by:

MedShr, NHS doctors and Leeds University Institute of Data Analytics

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

UK Confirmed cases : 99,459

UK Deaths: 12,868

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

Comprehensive COVID-19 symptom diagnosis app from start-up MedShr. The focus is on educating the public about symptoms and social distancing. If you report that you're only leaving the house once a day, it asks how many days you've been doing this for, providing the NHS, Public Health England and the Department of Health with crucial data. letsbeatcovid.net

- A mobile-based symptom tracker.
- Attracted 23,300 users in 48 hours.
- Also provides curated COVID-19 content daily through the MedShr Open resource (letsbeatcovid.net).

Method of user activation

Voluntary

Data security and privacy policy:

Is application used for research purposes or as public health intervention (and how?):

Link(s) to Source:

Want to tackle COVID-19? The key could be in your smartphone data. (2020, March 31). Evening Standard. <https://www.standard.co.uk/tech/coronavirus-apps-data-software-a4402561.html>
<https://letsbeatcovid.net/>

Name of Application:

App for Corona virus infection tracking - Ireland

Commissioned/developed by:

The government of Ireland has commissioned Ireland's Health Authority to develop a special app to track real-time symptoms of COVID-19, and digitally trace contacts of those infected. The app could be launched within the next 10 days (By Easter 2020).

Intensive work has been underway, between the Department of Health, the Health Service Executive and direct support from the office of the government chief information officer, and other technical expertise across the public service, and elsewhere.

Status (planned/in development/developed/ live):

Under development; should be out before Easter

“The implementation timeline will be determined by the technical progress and result of intensive testing that is currently taking place.” (McCurry, 31 March 2020, the Irish News)

National COVID-19 Status:

Ireland Confirmed cases: 12,547

Ireland Deaths: 444

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The app will use Bluetooth to keep track of phones potentially coming into close contact with phones belonging to those who have contracted COVID-19.

“It will alert people close to them. It will also provide really important information for people and it will feed back important information where people can. If they choose, provide information about their general state of well-being at a particular time and that will be fed back in for our epidemiological assessment as we go along.

It is expected that members of the general public and those who are sick could be asked to use the phone or computer facility in a bid to restrict the spread of the virus and even contain possible clusters. Nonetheless, it is expected to be an opt-in service.

Method of user activation

Opt-in.

Members of the general public and those who are sick will be asked to use the app, on a phone or computer, to alert the public if they have been infected.



Data security and privacy policy:

Concerns raised:

- Privacy consultancy Castlebridge suggests that the scope of what was described by the HSE goes beyond a basic contact tracing app, and includes clinical monitoring functions and the sending of push notifications.
- Simon McGarr, a solicitor and privacy expert, said the State should clarify:
 - Where data is stored;
 - Exactly what information is being gathered;
 - Are users are anonymised or identifiable?
 - Who can have access to that data?
 - How data is distributed?
 - How long data is retained?
 - What happens to the data after the crisis?

Developers are working very closely with a number of agencies, incl. Data Protection Commissioner, to align with GDPR regulations.

Is application used for research purposes or as public health intervention (and how?):

Link(s) to Source:

Irish Central Staff. (2020, March 31). Coronavirus: Ireland to launch app to trace infections. IrishCentral.Com. <https://www.irishcentral.com/news/coronavirus-ireland-app>

EURACTIV. (2020, March 30). Ireland to roll out voluntary phone tracker app to tackle coronavirus. Www.Euractiv.Com. <https://www.euractiv.com/section/digital/news/ireland-to-roll-out-voluntary-phone-tracker-app-to-tackle-coronavirus/>

First McEnroe, J. (2020, March 31). App to track and trace COVID-19 infections being developed. The Irish Examiner. <https://www.irishexaminer.com/breakingnews/ireland/app-to-track-and-trace-COVID-19-infections-being-developed-991213.html>

Horgan-Jones, J. (2020, March 29). Coronavirus: Smartphone app to facilitate contact tracing to be rolled out, HSE says. The Irish Times. <https://www.irishtimes.com/news/ireland/irish-news/coronavirus-smartphone-app-to-facilitate-contact-tracing-to-be-rolled-out-hse-says-1.4215036>

Related news: Gorey, C. (2020, March 30). HSE announces coronavirus contact-tracing app, but privacy concerns remain. Silicon Republic. <https://www.siliconrepublic.com/enterprise/hse-coronavirus-contact-tracing-app>

McCurry, C. (2020, March 31). Work underway to develop coronavirus app. The Irish News. <http://www.irishnews.com/coronavirus/2020/03/31/news/work-underway-to-develop-coronavirus-app-1885724/>

Name of Application:

**Pan-European Privacy Preserving Proximity Tracing Initiative
(Approach, not an app) - PEPP-PT**

Commissioned/developed by:

EU-consortium of 130 techies and scientists from 8 countries; led by Germany's Fraunhofer Heinrich Hertz Institute for telecoms (HHI).

Status (planned/in development/developed/ live):

Live since 1st April 2020

National COVID-19 Status:

n/a

Application features and function:

Europe has a patchwork of COVID-19 tracing apps. The purpose of the PEPP-PT initiative is to offer a set of “standards, technology, and services” to countries and developers to plug into to get a standardized COVID-19 contacts-tracing approach up and running across the bloc. The approach complies with European privacy laws: “Enforcement of data protection, anonymization, GDPR [the EU’s General Data Protection Regulation] compliance, and security” are baked in.

PEPP-PT “is an anonymous and privacy-preserving digital contact tracing approach, which is in full compliance with GDPR and can also be used when traveling between countries through an anonymous multi-country exchange mechanism. No personal data, no location, no Mac-Id of any user is stored or transmitted. PEPP-PT is designed to be incorporated in national corona mobile phone apps as a contact tracing functionality and allows for the integration into the processes of national health services. The solution is offered to be shared openly with any country, given the commitment to achieve interoperability so that the anonymous multi-country exchange mechanism remains functional.”

The core idea is to leverage smartphone technology to help disrupt the next wave of infections by notifying individuals who have come into close contact with an infected person — via the proxy of their smartphones having been near enough to carry out a Bluetooth handshake.

PEPP-PT’s approach means apps aligning to this standard would generate only temporary IDs — to avoid individuals being identified. Two or more smartphones running an app that uses the tech and has Bluetooth enabled when they come into proximity would exchange their respective IDs — saving them locally on the device in an encrypted form, according to the report



PEPP-PT explains the approach thus:

Mode 1

If a user is not tested or has tested negative, the anonymous proximity history remains encrypted on the user's phone and cannot be viewed or transmitted by anybody. At any point in time, only the proximity history that could be relevant for virus transmission is saved, and earlier history is continuously deleted.

Mode 2

If the user of phone A has been confirmed to be SARS-CoV-2 positive, the health authorities will contact user A and provide a TAN code to the user that ensures potential malware cannot inject incorrect infection information into the PEPP-PT system. The user uses this TAN code to voluntarily provide information to the national trust service that permits the notification of PEPP-PT apps recorded in the proximity history and hence potentially infected. Since this history contains anonymous identifiers, neither person can be aware of the other's identity.

Trust service operations are country dependent: "The anonymous IDs contain encrypted mechanisms to identify the country of each app that uses PEPP-PT. Using that information, anonymous IDs are handled in a country-specific manner."

While on healthcare processing is suggests: "A process for how to inform and manage exposed contacts can be defined on a country by country basis."

Among the other features of PEPP-PT's mechanisms the group lists in its manifesto are:

- Backend architecture and technology that can be deployed into local IT infrastructure and can handle hundreds of millions of devices and users per country instantly.
- Managing the partner network of national initiatives and providing APIs for integration of PEPP-PT features and functionalities into national health processes (test, communication, ...) and national system processes (health logistics, economy logistics, ...) giving many local initiatives a local backbone architecture that enforces GDPR and ensures scalability.
- Certification Service to test and approve local implementations to be using the PEPP-PT mechanisms as advertised and thus inheriting the privacy and security testing and approval PEPP-PT mechanisms offer.

Method of user activation

Approach relies on EU citizens voluntarily downloading one of the aligned contacts tracing apps — and carrying their smartphone everywhere they go, with Bluetooth enabled.

Issues:

Contact tracing apps are facing scepticism over their ability to contribute to the fight against COVID-19. Not everyone carries a smartphone, nor knows how to download an app, for instance. There's plenty of people who would fall outside such a digital net.

Data security and privacy policy:

Fully GDPR-compliant. Trust service operations are country dependent:

“The anonymous IDs contain encrypted mechanisms to identify the country of each app that uses PEPP-PT. Using that information, anonymous IDs are handled in a country-specific manner.”

While on healthcare processing is suggests: “A process for how to inform and manage exposed contacts can be defined on a country by country basis.”

Is application used for research purposes or as public health intervention (and how?):

Public Health Intervention; maybe research?

Link(s) to Source:

Lomas, N. (2020, April 1). An EU coalition of techies is backing a ‘privacy-preserving’ standard for COVID-19 contacts tracing. TechCrunch. <https://social.techcrunch.com/2020/04/01/an-eu-coalition-of-techies-is-backing-a-privacy-preserving-standard-for-COVID-19-contacts-tracing/>

Cooper, D. (2020, April 2). COVID-19 Apps and Websites—The “Pan-European Privacy Preserving Proximity Tracing Initiative” and Guidance by Supervisory Authorities. Inside Privacy. <https://www.insideprivacy.com/COVID-19/COVID-19-apps-and-websites-the-pan-european-privacy-preserving-proximity-tracing-initiative-and-guidance-by-supervisory-authorities/>

Privacy Protecting Proximity Tracing to fight Corona – Fraunhofer Heinrich Hertz Institute. (2020, April 1). Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI. <https://www.hhi.fraunhofer.de/en/press-media/news/2020/privacy-protecting-proximity-tracing-to-fight-corona.html>

Pan-European Privacy-Preserving Proximity Tracing PEPP-PT. (2020, March). Pepp Pt. <https://www.pepp-pt.org>



Name of Application:

France - Covidom

Commissioned/developed by:

The app was developed by Assistance Publique – Hôpitaux de Paris (AP-HP - the organisation running Paris public hospitals) in partnership with Nouveal e-health (a Lyon company specialising in remote monitoring).

Status (planned/in development/developed/ live):

Live (operational since 9th March 2020)

National COVID-19 Status:

France Confirmed cases: 131,365

France deaths: 17,167

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The app is intended for monitoring patients who have passed through Paris hospitals and who are carriers (or suspected of being infected with COVID-19) who do not require hospitalization but are staying at home.

The app sends users a digital online questionnaire (the frequency of the questionnaire varies according to the risk and the period) and the patient can respond to the questionnaire from a computer or via the application. The questions are basic: respiratory and heart rate, temperature, did you have chills, feel faint, do you have difficulty breathing, do you have trouble respecting confinement? Additional data can be added if, for example, the patient has an oximeter, a device that measures the amount of oxygen in the blood

The app is designed to anticipate any deterioration in their condition, and depending on the answers, the application can send alerts to healthcare professionals. Green means everything is fine, orange, to watch. In the event of a red alert, the patient is called back as soon as possible.

Method of user activation

During an initial consultation, the doctor creates the patient profile in the platform by entering his administrative data and useful medical data. The patient then responds daily to a simple questionnaire online, from a computer or via the app.

Depending on the response to the questionnaire, alerts may be generated – eg, where a high fever or significant respiratory discomfort is reported by the patient, the healthcare team is alerted and contacts the patient to adapt the follow-up and treatment.

The objective is to ensure remote monitoring of patients who do not show signs of seriousness, without overburdening health establishments/GPs.

Data security and privacy policy:

At the outset, a doctor will include the patient in the process (connection to the platform, patient registration by entering his administrative data and useful medical data) .

Is application used for research purposes or as public health intervention (and how?):

This tool will feed the work in progress concerning the accompaniment of the care of patients in the city.

Discussions are underway with provincial hospitals to develop the system.

Link(s) to Source:

<http://www.rfi.fr/en/france/20200327-covidom-app-developed-in-record-time-to-help-monitor-french-COVID-19-cases-coronavirus-e-health>

<https://www.aphp.fr/contenu/covidom-une-solution-de-telesuivi-domicile-pour-les-patients-porteurs-ou-suspectes-COVID-19>

<https://www.service-public.fr/particuliers/actualites/A13927>

<https://www.lefigaro.fr/sciences/coronavirus-covidom-une-application-mobile-qui-suit-les-patients-20200327>



Name of Application:

Poland - Home Quarantine

Commissioned/developed by:

This app has been developed for and endorsed by the Polish government. It was developed in three days based on out-of-the-box third party solution.

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

Poland Confirmed cases: 7,582

Poland deaths: 286

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

This is an Instagram-based app which uses geolocation and facial recognition technology. The app randomly prompts people to upload selfies by means of an alert.

The recipient has 20 minutes from receiving this alert to upload the selfie from their quarantine space. This enables officials to pinpoint their location – if this is not done within the timeframe the authorities are alerted and there will be a police check and potentially fines handed out (\$118).

Method of user activation

The app is aimed at people who are under mandatory 14-day quarantines after returning to Poland from abroad.

Data security and privacy policy:

Data collected: selfies, location data, reams of personal information.

Once phone number entered, data is automatically uploaded from other government databases.

All data will stay with the government for six years.

Is application used for research purposes or as public health intervention (and how?):

Shares people's data with several government agencies and the police.

Tracking system checks they have remained indoors, based on the GPS location data.

Link(s) to Source:

<https://www.cbsnews.com/news/coronavirus-update-poland-quarantine-app-asks-selfies-to-prove-isolation-social-distancing-police-patients/>

<https://www.politico.eu/article/poland-coronavirus-app-offers-playbook-for-other-governments/>

<https://nypost.com/2020/03/24/polish-residents-can-send-government-selfies-to-prove-quarantine-compliance/>



Name of Application:

Germany - Corona-Datenspende (Corona Data Donation)

Commissioned/developed by:

Germany's public health authority launched a smartwatch app on March 7 in partnership with healthtech startup Thryve to help monitor the spread of COVID-19 and analyse whether measures to contain the novel coronavirus pandemic are working.

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

Germany Confirmed cases: 133,456

Germany deaths: 3,592

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The Corona-Datenspende (Corona Data Donation) app gathers vital signs from volunteers wearing smartwatches or fitness trackers — including pulse, temperature and sleep — to analyse whether they are symptomatic of the flu-like illness.

Results will be represented in an interactive online map that would make it possible — together with other data inputs — for the health authorities and the general public to assess the prevalence of infections down to postcode level.

Method of user activation

User download

Data security and privacy policy:

Has a privacy and data security policy that users have to agree with to use the app

Is application used for research purposes or as public health intervention (and how?):

Link(s) to Source:

<https://corona-datenspende.de/>

Russian Social Monitoring app

Name of Application:

Russia - N/A

Commissioned/developed by:

Moscow

Status (planned/in development/developed/ live):

In development

National COVID-19 Status:

Russia Confirmed cases: 4,490

Russia deaths: 198

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

A Social Monitoring app will initially be limited to citizens who have already tested positive for COVID-19 but not been kept in hospital.

The app will request access to the user's calls, location, camera, storage, network information and other data. The intention is to check they do not leave their home while contagious.

The local government's IT chief, Eduard Lysenko, said the app was being made available on Google's Play and Apple's iOS stores. He said those affected who did not own a smartphone could borrow one with the software pre-installed, for a fortnight.

Mr Lysenko also revealed plans to launch a related scheme for Moscow's wider population, in which residents will request a fresh QR (quick response) code each time they want to leave their home.

The square barcodes would be issued via email or an app, he added, to allow people to go out for shopping and dog-walking, among other tasks.

Citizens would be obliged to show the police their code if requested, he said

Method of user activation

User download



Data security and privacy policy:

“We’d be concerned about the possibility of this app being used to track the movements of millions of people as well proving to be a tool for social control,” said Privacy International senior researcher Tom Fisher.

The app will collect user data from smartphones and then forward it without encryption to the servers of the app’s developers.

While the developers claim the app will help ensure public safety, some critics are concerned about how much private data and access it will give on private individuals to officials.

Is application used for research purposes or as public health intervention (and how?):

Public health intervention

Link(s) to Source:

<https://www.bbc.co.uk/news/technology-52121264>

Appendix 2: COVID-19 Mobile Applications in Asia and Australia

Name of Application:

Health code

Commissioned/developed by:

Chinese Government and Alipay chat services / WeChat

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

China Confirmed cases: 83,356

China deaths: 3,346

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

As millions of people in China emerge from weeks of lockdown, their freedom of movement is largely dependent on phone apps.

The “health code” service – run on the ubiquitous platforms Alipay and WeChat and developed for the Chinese government – give users colour-coded designations based on their health status and travel history, and a QR code that can be scanned by authorities.

The apps are specific to each city or province, but generally people given a green code are allowed to travel relatively freely. A yellow code indicates that the holder should be in home isolation, and a red code says the user is a confirmed COVID-19 patient and should be in quarantine.

Exactly how companies designed the app and the criteria they use to categorize people remain unclear. The Zhejiang provincial government has promulgated a set of standards for the Health Code app, outlining broad and ambiguous criteria for categorization. “Having been to affected areas recently” and “belonging to groups relevant to the epidemic” are two of seven criteria that can turn a user’s code red. Other local governments are authorized to establish rules for carrying out these criteria in their districts. Without further insight into the inner workings of the app it is hard for people to make sense of the color they are assigned, or what circumstances might trigger a change in color. (www.hrw.org)

Times 2 April 2020: The system is made possible by the Chinese public’s almost universal adoption of smartphones and the ruling Communist Party’s embrace of “Big Data” to extend its surveillance and control over society.



People with red or yellow codes “are definitely not running around outside,” said Wu, 51. “I feel safe.”

Intensive use of the health code is part of the efforts by authorities to revive China’s economy while preventing a spike in infections as workers stream back into factories, offices and shops.

A statement by the city government of Tianjin, a port city of 16 million people adjacent to Beijing, said the health codes were temporary but offered no indication when use might end. The codes are issued through the popular WeChat messaging service of internet giant Tencent Ltd. and the Alipay electronic payments service of Alibaba Group, the world’s biggest e-commerce company.

Some 900 million people use the system on WeChat, according to the newspaper Beijing Youth Daily and other outlets. No total for Alipay has been reported.

Obtaining a health code is simple: Users fill out an electronic form with their identity details, address and whether they have a cough or fever. The system includes no steps to confirm whether a user is healthy.

Authorities have threatened that violators will be “dealt with severely,” though detailed penalties have yet to be announced.

Issues: (Guardian 1- April 2020):

Concerns about the tech reaching into people’s private lives and data.

Lack of transparency over how the app works and what data it is storing

Sometimes problems with unable to change erroneous red status and questions about reliance on internet connection.

The apps rely on a combination of self-reporting by the user and government information, including a person’s medical records, their travel history and if they have been in contact with someone diagnosed with COVID-19.

Collects reams of personal information:

- Personal details, ID number
- contact details
- passport details and recent travel,
- relevant medical certification.
- It draws on medical information including “symptoms (such as fever, cough), medical treatment, isolated observation, contact information, travel history of the epidemic area”, and the user’s travel history including the mode of travel and what seat they sat in, and details on the vehicle and its driver.
- The app collects also location data, and shares that with the police

Method of user activation

N/A

Data security and privacy policy:

N/A. There are great concerns surrounding privacy issues and personal data

Is application used for research purposes or as public health intervention (and how?):

Public health prevention

Link(s) to Source:

<https://www.theguardian.com/world/2020/apr/01/chinas-coronavirus-health-code-apps-raise-concerns-over-privacy>

Associated Press. (2020, April 2). Inside China's Smartphone 'Health Code' System Ruling Post-Coronavirus Life. Time. <https://time.com/5814724/china-health-code-smartphones-coronavirus/>

China's coronavirus health code apps raise concerns over privacy. (2020, April 1). The Guardian. <http://www.theguardian.com/world/2020/apr/01/chinas-coronavirus-health-code-apps-raise-concerns-over-privacy>

Avenue, H. R. W. | 350 F., York, 34th Floor | New, & t 1.212.290.4700, N. 10118-3299 U. I. (2020, April 1). China: Fighting COVID-19 With Automated Tyranny. Human Rights Watch. <https://www.hrw.org/news/2020/04/01/china-fighting-COVID-19-automated-tyranny>



South Korea

Name of Application:

Self-quarantine safety protection

Commissioned/developed by:

South Korean Ministry of the Interior and Safety

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

South Korea Confirmed cases: 10,591

South Korea deaths:225

TSource: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

An app designed for officials to monitor citizens that have been ordered to stay in quarantine. Allows them to keep in touch with their case officers and report on their progress. A GPS is installed in the app for the government to track the location of each self-quarantined patient to ensure that they stay in their respective zones, whether done intentionally or accidentally.

Lockdown rules: Anyone, who has been in contact with a confirmed COVID-19 carrier (been in a distance of 2m or in the same room someone has coughed in) are subject to mandatory 2 week quarantine. Once their diagnosis is confirmed, they are legally prohibited to leave their quarantine areas.

Those in lockdown are assigned a local govt case officer, who check in twice a day by phone to track the development of symptoms. Now those in quarantine can also use the app to report their symptoms. If the citizen leaves their quarantine zone, both the citizen and the case officer are alerted. There is a communication process between users and officials. A twice-a-day check in is required for patients to report their current symptoms, an assigned government official then monitors these updates and tracks if there is any change to see if progress is being made.

It is intended to help manage the increasing case load and prevent cases of “super spreaders,” who have been blamed for significant numbers of infections.

Issues: Wealth of data has led to online witch hunts and created an atmosphere of social fear. Leaks of patient information have also occurred.

No information on data security or privacy policies.

Method of user activation

Initially seems to have been optional, User downloaded; but since 1st April “All Koreans and long-stay foreigners should mandatorily install “Self-quarantine Safety Protection App”.
 -Penalty: from April 5th the violators will be imprisoned for up to one year or fined 10M Won. Foreigners will be immediately deported. (Guardian 3rd April 2020)

Data security and privacy policy:

N/A

Is application used for research purposes or as public health intervention (and how?):

Used as public health prevention

Link(s) to Source:

<https://www.technologyreview.com/s/615329/coronavirus-south-korea-smartphone-app-quarantine/>

Bodenstein, Z. (2020, March 9). NEW coronavirus app developed to assist South Korean government with self-quarantine—680 NEWS [680 News]. <https://www.680news.com/2020/03/09/new-coronavirus-app-developed-to-assist-south-korean-government-with-self-quarantine/>

Guide on the Installation of ‘Self-quarantine Safety Protection App’. (April, 2020). Central Disaster and Safety Countermeasures Headquarters. http://ncov.mohw.go.kr/upload/ncov/file/202004/1585732793827_20200401181953.pdf

McCurry, J. (2020, April 3). South Korea bars entry to foreign nationals who refuse to self-isolate. The Guardian. <https://www.theguardian.com/world/2020/apr/03/south-korea-bars-entry-foreign-nationals-refusing-self-isolate>



South Korea

Name of Application:

The Corona 100m

Commissioned/developed by:

N/A

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

South Korea Confirmed cases: 10,591

South Korea deaths:225

TSource: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The Corona 100m app, as its name implies, alerts users if they breach a 100-meter radius of the latest tracked whereabouts of the coronavirus patient. The app uses Government provided data about the spread of COVID-19.

Method of user activation

User download

Data security and privacy policy:

N/A

Is application used for research purposes or as public health intervention (and how?):

The app provides a map to track the spread of COVID-19

Link(s) to Source:

<https://edition.cnn.com/2020/02/28/tech/korea-coronavirus-tracking-apps/index.html>

Singapore

Name of Application:

TraceTogether

Commissioned/developed by:

Commissioned Singapore government Technology Agency (GovTech) in collaboration with Ministry of Health (MOH)

Developed by: Nanyang Polytechnic; Institute for InfoComm Research; Gov Tech.

Status (planned/in development/developed/ live):

Live and available to download in Singapore

National COVID-19 Status:

Singapore Confirmed cases: 3,699

Singapore deaths: 10

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

(Edits: SR 6 April)

Trace Together is a community-driven, open-source (but the code has not been released yet! Digital Reach, 2 April 20) contact tracing app aimed to help prevent the spread of COVID-19.

The App relies on Bluetooth rather than on GPS, as Bluetooth is more consistently reliable in urban settings. “By relying on Bluetooth – which has a shorter signal length than GPS – it focuses more on “the who rather than the where”. For example, you could be in the same building as someone with COVID-19 but several floors away. GPS wouldn’t pick up on that difference, but Bluetooth would alert you if you were within a much closer distance (signals usually range around 10m).” (Wong, 2020)

“According to Meshead (24 March 2020) employing runtime analysis, when TraceTogether runs, the phone scans its vicinity for about 8 seconds every 40 seconds to look for nearby devices running TraceTogether. When the devices are found, it queries each of them. Each device sends back encrypted information, which the app decrypts and saves into a database stored in the phone. Each record consists of the following;

- A timestamp.
- Temporary ID of the sender.
- The sender’s phone model.
- The signal strength of the connection to estimate the distance.
- Miscellaneous information including protocol version, organization (set to SG_MOH) and ‘expected transmission power at 1m’ for distance estimation.

The app also records the start and end time of the scan into another table within the database.” (DigitalReach 2 April 2020)”



The app is based on BlueTrace protocol, which informs “decentralised and centralised models of contact tracing”.

After giving consent during the set-up of the app, users will need to turn on their Bluetooth, as well as enable push notifications and location permissions.

The developers stress no personal data is gathered by the App. The App generates a random ID every few hours to pair with the user’s mobile number. The ID is changed between the phones, and the data is stored locally on the mobile phone for 21 days.

If someone using the App is infected with COVID-19, they upload their data to the Ministry of Health database. Only Ministry of Health is able to decrypt the user’s information, linking the random IDs and phone numbers together, and to contact all the TraceTogether App users in the infected person’s contact list.

The app works by exchanging automated short-distance Bluetooth signals between mobile phones with the app installed to detect other users of the app who are in close proximity. Current Ministry of Health (MOH) guidelines define close proximity as two metres apart, or up to five metres, for 30 minutes. Records of these encounters will be stored locally in the users’ phones and will not be sent to the authorities.

Users are asked to share these records only when contacted by MOH as part of investigation regarding contact tracing. Those who refuse can be charged under the Infectious Diseases Act.

Users will only be asked to share these records when contacted by MOH as part of contact tracing investigations. If they refuse, they may be prosecuted under the Infectious Diseases Act.

Method of user activation

Opt-in. Application is downloaded by user and Bluetooth must be activated.

Data security and privacy policy:

The app also has several layers of security and privacy safeguards in place. For example, users will submit only their mobile numbers after downloading the app. Each phone will then be assigned a user ID.

This user ID is then used to generate temporary IDs at regular intervals. It is this temporary ID that is exchanged between the phones of TraceTogether users.

Such regular generation of temporary IDs protect users from eavesdropping and tracking overtime by malicious actors, according to GovTech.

Issues: (edit SR 6 April 2020)

- While the App seems to be fairly secure, it was discovered that the developer team had inadvertently included a government data collection service wogaa.sg into its build. This means the app collects more data than is necessary and compromises its supposed anonymity and 21-day data hygiene. GovTech are working to remove the tool for the next iteration of TraceTogether App. (Vadaketh 2020, April 2)
- DigitalReach (2020, April 2) found that the App has three in-built analytic systems feeding data into wogaa.sg. Problem: “Storage of data on state databases in Singapore may allow state agencies other than the Ministry of Health the technical ability to access key personal information, potentially without a user’s prior, informed consent. As the app cannot be examined easily, it raises concerns about safety and security of activists and government critics if the app has turned out to be a surveillance app given the human rights record in Singapore.”.
- A blogger called Kevin Chu suggests he has verified with the developers that Wogaa.sg has been removed in v 1.0.40 of TraceTogether. Chu, K. (2020, April 3). Privacy. Kevin Chu. https://splira.com/2020-03-28/?fbclid=IwAR3nWqUorb3gXUp7cHlKj5eqghRCh-awE60J_4TifxtCcCglvyzN7QQKH84
- Security issues related to Bluetooth, which is required to be on 24/7 for the App to work. (See DigitalReach 2002, April 2).
- The main concern in Singapore centres round Trust and incremental social conditioning on citizen surveillance. The Singaporean socio-political context will highlight the validity of these concerns. Vadaketh (2020, April 2) points to the need for accountability and transparency: the need for surveillance but under what conditions? Can we trust the app providers that the heightened levels of surveillance and data gathering are temporary? Can the citizen remove their own data if they so wish?
- A team of techies had tried to reverse engineer the app to verify the government’s privacy claims. A lot of the code is “obfuscated”, which often “conceals unspecified functions, like backdoor access and tracking, security weaknesses or trade secrets.”
- You will need at least 60% usage of the App for it to be reliable. 22% of the UK population doesn’t own a Smart phone.

Is application used for research purposes or as public health intervention (and how?):

App is used as a public health intervention to prevent the spread COVID-19

Link(s) to Source:

<https://www.tech.gov.sg/media/technews/tracetogether-behind-the-scenes-look-at-its-development-process>



Vadaketh, S. T. (2020, April 2). Why I have yet to install TraceTogether, Singapore's COVID-19 contact tracing app. Musings from Singapore. <https://sudhirtv.com/2020/04/02/why-i-have-yet-to-install-tracetoegether-singapores-COVID-19-contact-tracing-app/>

DigitalReach. (2020, April 2). TraceTogether: Not Easy to Verify the State's Privacy Claims. DigitalReach. <https://digitalreach.asia/tracetoegether-disassembling-it-wasnt-easy-to-confirm-the-governments-claims-on-privacy/>

Wong, H. (2020, April 1). Coronavirus: How a Bluetooth tracking app could slow the spread of virus. Design Week. <https://www.designweek.co.uk/issues/30-march-5-april-2020/coronavirus-bluetooth-app-tracetoegether/>

Meshead. (2020, March 24). TraceTogether: A Technical Look. Medium. <https://medium.com/@meshead/tracetoegether-a-technical-look-e48360d4a4a9>

India

Name of Application:

Corona Kavach

Commissioned/developed by:

India's Union Ministry of Electronics and Information Technology and the Union Ministry of Health & Family Welfare

Status (planned/in development/developed/ live):

National COVID-19 Status:

India Confirmed cases: 12,322

India deaths: 405

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The user's location is mapped through GPS on the app to assess whether they are at a high-risk geographical zone or not. Data experts believe that this could be beneficial for a country like India that has a large number of cellphone users.

Method of user activation

User download

Data security and privacy policy:

The app has no underlying legal framework for privacy protections being in place.

Is application used for research purposes or as public health intervention (and how?):

Public health prevention

Link(s) to Source:

<https://www.businesstoday.in/latest/trends/corona-kavach-this-app-tells-if-you-have-crossed-COVID-19-positive-person/story/399930.html>



Name of Application:

COVA Punjab

Commissioned/developed by:

Government of Punjab

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

India Confirmed cases: 12,322

India deaths: 405

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

COVA Punjab (Corona Virus Alert) App has been developed by Government of Punjab to provide citizens with preventive care information and other government advisories. The app has following main sections for citizens:

1. Real time dashboard for Punjab, India and global stats.
2. To check for symptoms of Corona and have a quick self-screening.
3. Corona Awareness.
4. Traveling instruction..
5. Prevention Products.
6. Corona Hospitals, Punjab.
7. FAQ.
8. Call Support.

You will receive updates from government, advisories and instructions from time to time via PUSH notification on the App. It will provide quick information and help to you. You should definitely visit nearest hospital / doctor in-case you develop novel corona virus symptoms.

Method of user activation

User download

Data security and privacy policy:

The app has no underlying legal framework for privacy protections being in place.

Is application used for research purposes or as public health intervention (and how?):

Public health prevention

Link(s) to Source:

<https://play.google.com/store/apps/details?id=in.gov.punjab.cova>

Name of Application:

COVID-19 Quarantine Monitor Tamil Nadu

Commissioned/developed by:

Pixxon AI solutions

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

India Confirmed cases: 12,322

India deaths: 405

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

This Application is ONLY for people who are quarantined as per the official database. This will help the Department of Health and Tamil Nadu Police for effective tracking and information management.:

User friendly Mobile App to be downloaded on to the quarantined individual's mobile phone.

The app once installed and run by the individual, enables live location tracking via GPS and generate alerts and information.

Method of user activation

User download

Data security and privacy policy:

The app has no underlying legal framework for privacy protections being in place.

Is application used for research purposes or as public health intervention (and how?):

Public health prevention

Link(s) to Source:

<https://play.google.com/store/apps/details?id=com.pixxonai.covid19>



Name of Application:

Corona Watch

Commissioned/developed by:

The Karnataka State Remote Sensing Applications Centre

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

India Confirmed cases: 12,322

India deaths: 405

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

This App is for showing the locations of Corona Affected Patients and their movement history of 14 days. General Public can use this to identify their movements in those area. If found to be in such locations, they are requested to call help lie numbers 104, 080-46848600, 080 66692000

Also, facilitates citizens to identify the nearest hospitals which can treat for corona virus including the sample collection centres and testing labs.

Method of user activation

User download

Data security and privacy policy:

The app has no underlying legal framework for privacy protections being in place.

Is application used for research purposes or as public health intervention (and how?):

Public health prevention

Link(s) to Source:

<https://play.google.com/store/apps/details?id=com.ksrsac.drawshapefile>

Australia and New Zealand

Name of Application:

Coronavirus Australia app

Commissioned/developed by:

Australian Government Department of Health

Status (planned/in development/developed/ live):

National COVID-19 Status:

Australia Confirmed cases: 6,440

Australia deaths: 63

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

You can use the Australian Government Coronavirus app to:

- stay up to date with the official information and advice
- important health advice to help stop the spread and stay healthy
- get a quick snapshot of the current official status within Australia
- check your symptoms if you are concerned about yourself or someone else
- find relevant contact information
- access updated information from the Australian Government
- receive push notifications of urgent information and updates

Method of user activation

User download

Data security and privacy policy:

All information in the Australian Government Coronavirus app is sourced from Australia's leading health organisations and has undergone a quality assurance process so people can know it is safe, appropriate and relevant for Australians.

App doesn't ask for GPS or data entry on part of the user

Link(s) to Source:

<https://www.health.gov.au/resources/apps-and-tools/coronavirus-australia-app>



Appendix 3: COVID-19 Mobile Applications in Americas

Name of Application:

Private Kit: Safe Paths

Commissioned/developed by:

Developed by MIT (Massachusetts Institute of Technology) with volunteer help coming from developers at the likes of Facebook and Uber.

According to Forbes magazine, previous reports indicated the app was to get the approval of the White House as the de facto COVID-19 tracking app, but MIT is now saying it's still under development (27th March 2020) with the developers "engaging" with the Trump administration and in contract negotiations with the World Health Organisation.

Wired magazine reported that Ramesh Raskar (part of the team at MIT) has "been in contact with WHO, the US Centers for Disease Control and Prevention, and the US Department of Health and Human Services. "They are giving us guidance on what will work," he says, although none has yet endorsed the idea." (15th March 2020)

Status (planned/in development/developed/ live):

Prototype released mid-March

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The app tracks users and shares locations between them, the aim being to let them know if they've been close to infected individuals, using (what developers claim is) a private and secure channel. Over time, users would be asked whether they are infected, providing a way to identify potential transmissions.

The app also compares a user's recent locations against the path of an infected person and alerts them of potential contact. However, the app only downloads the trail of infected patients, with no identifying information sent out. These GPS trails are never released in the public domain in raw form – only encrypted and in redacted versions. In other words, users wouldn't learn anything else about the infected person—not their age, their sex, or their geographic path, only areas of high risk.

Forbes magazine reported that "response has been comparatively lukewarm, though, with under 50,000 downloads on the Android app store, hundreds of thousands less than the Israeli and British apps."

Method of user activation

People can download the free app, but crucially, this app will only work as a comprehensive tracking tool if enough people use it.

“The user-adoption strategy will leverage network effects,” Ramesh Raskar, associate professor at MIT Media Lab, told Digital Trends. “We are not building a stand-alone app, but also a web tool for health authorities to disseminate privatized trails. So we will use this two-sided network effect to first push the health players in focused localized sites, and then let users nudge their acquaintances so collectively they have a ‘peace-of-mind.’”

Finally, we have deeply engaged large influential organizations who can push their captive user base for their own survival.” <https://www.digitaltrends.com/cool-tech/coronavirus-tracking-app-must-go-viral/>

Data security and privacy policy:

Describes itself as the “next generation of secure location logging”, and a “citizen-centric, privacy first solution”.

The location log generated by Private Kit cannot be accessed from outside the user’s device. It requires user’s consent for data sharing, and data transfer occurs only if the user chooses to share it with the researcher using a QR code. This means when users download the Private Kit app, they are in charge, and third parties (such as governments) cannot access individual location trails.

Is application used for research purposes or as public health intervention (and how?): With consent, diagnosed carriers of the virus can share an accurate location trail with health officials, replacing a process that historically has been conducted only through memory. Governments are equipped to redact location trails and thus broadcast location information with privacy protection for diagnosed carriers and local businesses.

Is application used for research purposes or as public health intervention (and how?):

With consent, diagnosed carriers of the virus can share an accurate location trail with health officials, replacing a process that historically has been conducted only through memory. Governments are equipped to redact location trails and thus broadcast location information with privacy protection for diagnosed carriers and local businesses.

Link(s) to Source:

<http://safepaths.mit.edu/>

<https://www.sciencemag.org/news/2020/03/cellphone-tracking-could-help-stem-spread-coronavirus-privacy-price>

<https://www.forbes.com/sites/thomasbrewster/2020/03/27/two-at-2-million-guinea-pigs-and-counting-the-remarkable-rise-of-self-monitoring-in-the-time-of-coronavirus/#5b6656cf3112>

<https://www.wired.com/story/phones-track-spread-covid19-good-idea/>



Name of Application:

STOP CVID NYC

Commissioned/developed by:

A team of data scientists, physicians and engineers at New York City's Mount Sinai Health System has created an app that aims to track the spread of COVID-19 in the city, considered the epicentre of the nation's outbreak.

(NB Mount Sinai Health System is New York City's largest academic medical system, encompassing eight hospitals, a medical school and a vast network of ambulatory practices throughout the greater New York region)

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

In New York City, there have been 7,905 deaths, the largest number of any US state, and COVID-19 has infected far more people in New York than any other state in the US.

Application features and function:

To sign up, the hospital is encouraging residents to text "COVID" to 64722. Users will need to complete an initial survey with questions about demographics, exposure and symptom history, followed by short daily surveys about their symptoms through text messages sent to their phones.

Everyone is encouraged to participate, the app is collecting information and tracking symptom development from all NYC residents, whether a person is healthy (and has no symptoms from COVID-19), healthy but experiencing symptoms, or have recovered from COVID-19.

Method of user activation

People text "COVID" to 64722 to enroll in the app – they are then prompted to complete an initial survey.

Data security and privacy policy:

No information

Is application used for research purposes or as public health intervention (and how?):

The data could alert health care providers about growing clusters of cases in the specific communities in the city, which would help them better allocate resources throughout the five boroughs.

Link(s) to Source:

<https://www.mountsinai.org/about/newsroom/2020/mount-sinai-launches-covid19-app-to-track-spread-of-virus-across-new-york-city-pr>



Name of Application:

Apple COVID-19

Commissioned/developed by:

The website and corresponding app serve as both a screening tool and information platform, and was born out of a collaboration with Apple, the CDC (US Centers for Disease Control and Prevention), the White House Coronavirus Task Force and FEMA (Federal Emergency Management Agency).

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

When users access the site, they are asked a list of questions including symptoms, risk factors and exposure. At the end of the survey users are given a directive about possible next steps. For example, “self-isolate” or “contact your work’s occupational health provider.” People can also tap into resources about how to socially isolate, when to get a test, how to monitor symptoms, and are also able to ask Siri about coronavirus symptoms and get a guidance resources from the CDC and directions to telehealth apps.

The contact information and links are geared towards US users, but anyone can make use of the tool.

Method of user activation

Anyone aged 18 years or older can access the screening tool and resources by downloading the COVID-19 app on the App Store.

The (roughly 6MB) app runs on iPhones, iPads and other iOS devices running iOS 13.1 or later, while the website at www.apple.com/covid19 is accessible via any standard browser.

Data security and privacy policy:

From Apple’s press release: “Consistent with Apple’s strong dedication to user privacy, the COVID-19 app and website were built to keep all user data private and secure. The tools do not require a sign-in or association with a user’s Apple ID, and users’ individual responses will not be sent to Apple or any government organisation.”

Is application used for research purposes or as public health intervention (and how?):

It seems to be predominantly aimed at providing information/ signposting.

Users are asked about current symptoms, any health issues they might be living with, and where they've travelled to/from in the last few weeks. Then, they are guided towards the most appropriate next steps, like getting tested. Even if it seems unlikely that they have been affected by the virus the app will still offer people information about how to protect themselves (practising social distancing, washing hands etc).

Link(s) to Source:

<https://apps.apple.com/us/app/id1504132184>

<https://www.apple.com/newsroom/2020/03/apple-releases-new-COVID-19-app-and-website-based-on-CDC-guidance/>



Name of Application:

How We Feel

Commissioned/developed by:

App has been developed in part by Pinterest co-founder/ CEO Ben Silbermann (and a team from Pinterest) with the help of a long list of well-regarded public health, computer science, therapeutics, social science and medical professors from institutions including Harvard, Stanford, MIT, University of Maryland School of Medicine, Weill Cornell, and the Howard Hughes Medical Institute.

Status (planned/in development/developed/ live):

Live (since 2nd April)

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The app asks for information about whether or not a person has been tested for COVID-19, and whether they're in self-isolation, and for how long. The amount of interaction required is purposely streamlined to make it easy for anyone to contribute daily, and to do so in a minute or less.

It is available for both iOS and Android, is free to download, and is designed to make it very easy to self-report whether or not a person feels well/ unwell (if they're feeling unwell, it probes for what symptoms they're experiencing).

Method of user activation

Interestingly, the app developers are motivating use through positive means —providing a donated meal to non-profit Feeding America every time a person downloads and uses the app for the first time, up to a maximum of 10 million meals.

Data security and privacy policy:

The only data requested by the app (apart from asking how the person is feeling) is their age and zip code – it doesn't ask for, or collect, information like name, phone number or email information.

It includes an up-front request that users agree to donate their information, and the data collected will be aggregated and then shared with researchers, public health professionals and doctors, including those who are signed on as collaborators with the project, as well as others (and the project is encouraging collaborators to reach out if interested).

Part of the team working on the project are experts in the field of differential privacy, and a key goal is to ensure that people's information is used responsibly.

Is application used for research purposes or as public health intervention (and how?):

Research purposes. As stated above, the data will be shared with researchers, public health professionals and doctors, and the project is encouraging collaborators to reach out if interested).

“Our analysis could uncover epidemiological characteristics of the outbreak and how the disease spreads through communities, identify outbreak hotspots, study the time course of symptoms as the disease spreads, estimate region-specific testing needs and strategies for setting up testing prioritization and new testing sites, and evaluate whether interventions such as social distancing have effects on reducing transmission. Our analysis could help policymakers and public health leadership to tune their response.” <https://finance.yahoo.com/news/pinterest-ceo-ben-silbermann-partners-190000124.html>

Link(s) to Source:

<https://techcrunch.com/2020/04/02/pinterest-ceo-and-a-team-of-leading-scientists-launch-a-self-reporting-COVID-19-tracking-app/>

<https://www.howwefeel.org/>



Name of Application:

Covid Symptom Tracker – NB American version of UK app

Commissioned/developed by:

The app was developed by a King's College London team in association with the Guy's and St Thomas' NHS Foundation Trust, NIHR Biomedical Research Centre and a healthcare start-up ZOE Global LTD.

Status (planned/in development/developed/ live):

In collaboration with researchers from Massachusetts General Hospital, the Harvard T.H. Chan School of Public Health (both MA, USA), Stanford Medical (CA, USA), the healthcare science company Zoe Global Ltd and King's College London have updated the app and are recruiting users across the US, including healthcare professionals and members of the general public.

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The COVID Symptom Tracker asks contributors to answer a few simple questions about themselves and their current health, then check-in every day to say whether they're feeling fine or have noticed any new symptoms.

Method of user activation

The US version of the app is to initially recruit healthcare workers and participants in the Harvard-led Nurses' Health Studies as users, however, is also available to members of the general public in the US who download the app.

Data security and privacy policy:

The app privacy policy mentions that anonymised data might be shared with US-based organisations including Harvard University, Stanford University, Massachusetts General Hospital, Tufts University, and Berkeley University.

Apparently, the company has also been in touch with American hospitals.

One paragraph in the app's privacy policy underlines that the data will be handled in accordance with GDPR, but that they might not enjoy similar levels of protection when transferred to countries like the US.

Is application used for research purposes or as public health intervention (and how?):

Anonymised user data from the app will be securely made available to academic researchers and policymakers, on a strictly non-commercial basis. Zip code-level data and real-time updates from the app could help policy and decision makers predict when and where the next wave of the virus may hit, enabling them to plan and allocate public health resources more efficiently and monitor the impact of policy measures, such as social distancing.

Link(s) to Source:

<https://www.wired.co.uk/article/covid-symptom-tracker-app-coronavirus-uk>

<https://www.evidencebaseonline.com/posts/64001-real-time-symptom-tracking-app-launched-to-curtail-COVID-19-spread>



Name of Application:

Niagara Health Navigator

Commissioned/developed by:

Niagara Health Foundation (Ontario, Canada)

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

Ontario Confirmed cases: 8,447

Ontario deaths: 385

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

This was a pre-existing app that has been developed to include two new features related to COVID-19:

- COVID-19 Updates - this feature provides patients and the community with the most recent information related to Niagara Health's response to COVID-19 and directives of public health officials; and
- Ontario COVID-19 Screening - this feature links directly to the provincial government's self-assessment tool.

Method of user activation

The Niagara Health Navigator app can be downloaded free from the App Store or Google Play. If people have already downloaded the Niagara Health Navigator, they can update the app in the App Store or Google Play to view the newest release.

Data security and privacy policy:

No specific information found

Is application used for research purposes or as public health intervention (and how?):

Information/signposting only

Link(s) to Source:

<https://www.niagarahealth.on.ca/site/news/2020/03/25/-niagara-health-navigator-COV-19-update>

<https://www.niagararegion.ca/health/COVID-19/default.aspx?topic=1>

<https://www.covid-19canada.com/>

Name of Application:

CoronApp-Colombia

Commissioned/developed by:

Endorsed by the Colombian National Government and developed by the National Health Institute (INS)

Status (planned/in development/developed/ live):

Live

National COVID-19 Status:

Colombia Confirmed cases: 2,979

Colombia deaths: 127

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

The app is available for both Android and iOS users and allows people to register friends/family members to report news about their health status and receive news and prevention advice. It also contains various phone numbers people can reach out to in case of an emergency.

Users are asked for some basic information and asked to say if they have participated in any mass events in the prior eight days (perhaps a controversial question because of the recent protests across the country).

The app also provides safety tips, an updated map of drugstores and health institutions, and a daily control intended to identify symptoms.

Method of user activation

The app will also be promoted through text messages in which individuals will find advice about hygiene measures to prevent the virus.

Data security and privacy policy:

“The app is a version of one made for the Rio de Janeiro Olympics, adapted in 2017 to strengthen surveillance of public health risks, and has bugs that make it unusable. None of the functions, not even the safety information, are accessible without filling out the registration form, which requires full name, sex, data of birth, ethnicity, and email, with no clarity in the terms and conditions about how the information will be protected and used. Finally, 20 million Colombians do not have internet access, and many of those who do access it through low-end smartphones.”

<https://privacyinternational.org/examples/3435/colombia-coronapp-fails-public-information-purpose>



Is application used for research purposes or as public health intervention (and how?):

The data is monitored in real time by the Emergency Operations Center of the National Institute of Health (INS) who can then provide support in coordination with local, departmental and national authorities.

Link(s) to Source:

<https://apps.apple.com/bf/app/coronapp-colombia/id1502037648>

<https://www.aa.com.tr/en/americas/colombian-president-launches-app-to-track-COV-19/1759011>

Name of Application:

Natural Cycles

Commissioned/developed by:

The Natural Cycles app has been approved by the Food and Drug Administration Agency in the US. The ability to detect COVID symptoms is an optional service of the app and will enable women to track a negative or positive COVID-19 test.

Status (planned/in development/developed/ live):

Live (over 1.5 million users in 162 countries are already using the app to check their temperature every day – 27th March)

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

Natural Cycles is a birth control/fertility monitoring app which uses an algorithm that takes a woman's individual basal body temperature to determine her daily fertility status. Users are already taking their temperature each morning with their Natural Cycles thermometer and combining this temperature tracking already taking place with the COVID-19 symptom trackers will provide an opportunity in real time to follow the development of the virus.

The company has reported seeing a spike in temperature data being added over the past few weeks (coronavirus symptoms can include a fever and a new continuous cough, according to the NHS).

The app has added a new, optional tracker within the app to help people track their symptoms if they feel sick and are experiencing potential COVID-19 symptoms. This will allow them to track symptoms in real-time and share them with their healthcare provider, and also allow Natural Cycles scientists to be able to study the data in an anonymized form to better understand the spread and the effects of the virus in different parts of the world.

Method of user activation

Natural Cycle said the tracker, which must first be enabled by the user, will join existing functionality that has proved useful for users during the outbreak.



Data security and privacy policy:

Natural Cycles has “received inquiries from renowned third-party institutions looking for data of this kind to help support further research around the coronavirus pandemic”. (<https://www.independent.co.uk/life-style/health-and-families/health-news/coronavirus-symptoms-app-tracker-natural-cycles-fertility-COVID-19-a9429581.html>)

Is application used for research purposes or as public health intervention (and how?):

According to news reports, “the trackers are provided for temporary documentation purposes only and are in no way intended to replace a professional medical diagnosis or treatment” (<https://www.med-technews.com/news/fertility-app-adds-new-features-to-track-COVID-19-symptoms/>)

Link(s) to Source:

<https://www.independent.co.uk/life-style/health-and-families/health-news/coronavirus-symptoms-app-tracker-natural-cycles-fertility-COVID-19-a9429581.html>

<https://help.naturalcycles.com/hc/en-us/articles/360006936758-I-tested-positive-for-COVID-19-Coronavirus->

Name of Application:

No name yet – Contact tracing app US

Commissioned/developed by:

Palantir

Status (planned/in development/developed/ live):

In development

National COVID-19 Status:

US Confirmed cases: 614,482

US deaths: 27,085

Source: John Hopkins Coronavirus Resource Center, 15/4/2020

Application features and function:

Not clear from desk research.

Palantir is also providing the NHS with COVID-19 data analysis through the company's Foundry software. In a blog post that mentioned the partnership, the UK Government said that it will use Foundry "which has been primarily developed in the UK" to "[enable] disparate data to be integrated, cleaned, and harmonised in order to develop the single source of truth that will support decision-making."

(NB, according to a new report from Bloomberg, Palantir is also pitching its analytics software to government officials in France, Germany, Switzerland and Austria).

Method of user activation

Not clear from research

Data security and privacy policy:

In mid-March, The Wall Street Journal reported that Palantir was working with the CDC to model the potential spread of the virus. Forbes reports that CDC staffers are now regularly using Palantir's web app to visualize the spread of the virus and to anticipate hospital needs. According to that report, Palantir is eschewing dealing with sensitive personally identifying information in its coronavirus efforts, instead providing analysis of anonymized hospital and healthcare data, lab results and equipment supplies through a platform called Palantir Foundry.



Privacy activists have raised concerns about Palantir’s involvement. In the past, the company has received funding from the CIA and worked on a number of controversial US projects including predictive policing, the tracking of migrants and the development of an AI warfare platform for the military. However, Palantir is apparently acknowledging the privacy implications of its new work. In a statement provided to The Wall Street Journal, the company asserted that privacy and civil liberty must be taken as “guiding concentrations” in any data-driven COVID-19 response, “not as afterthoughts.” Palantir has worked with the US federal government on infectious health threats for years. In 2010, the CDC used Palantir to monitor an outbreak of cholera in Haiti.

Is application used for research purposes or as public health intervention (and how?):

Seems likely to be used for public health intervention

Link(s) to Source:

<https://techcrunch.com/2020/04/01/palantir-coronavirus-cdc-nhs-gotham-foundry/>

<https://tech.newstatesman.com/cloud/nhsx-palantir-google-amazons-role-in-COVID-19-data-platform>