

COVID-19 Apps



What's inside?

A comprehensive analysis of the use of mobile phone applications in the fight against the COVID-19 pandemic.

COVID-19 Apps



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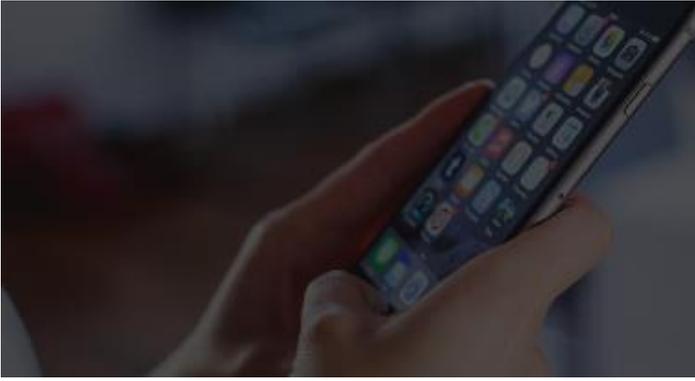
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EXECUTIVE SUMMARY	4
1 INTRODUCTION	5
2 FRAMEWORKS	5
3 CATEGORIES OF COVID-19 APPS	7
3.1 INFORMATIONAL APPS	7
3.2 SELF-ASSESSMENT/MEDICAL REPORTING APPS	10
3.3 CONTACT TRACING APPS	18
3.4 MULTIPURPOSE APPS	27
3.5 OTHER RELATED COVID-19 APPS	28
4 FAKE APPS, MALWARES AND DISINFORMATION	30
5 EUROPEAN COMMISSION POSITION	31
CONCLUSIONS	33
BIBLIOGRAPHY	34



EXECUTIVE SUMMARY

During these challenging times, in which we live the COVID-19 outbreak, the digital world is increasingly becoming our reality.

Now that we are confined to our homes, technology is an ally to keep us connected and a refuge from a world that is shaken.

COVID-19 led countries to adopt different strategies to deal with the outbreak.

The implementation of mobile software applications in order to monitor people and carry out contact tracing has been a trend adapted on a global scale. This document comprises 108 applications in 73 countries worldwide.

Some concerns regarding citizens' privacy have been raised.



This document maps different COVID-19 apps and categorises them into five clusters: informational apps; self-assessment/medical reporting apps; contact tracing apps; multi-purpose apps and other COVID-19-related-apps.



During the COVID-19 pandemic, governments, businesses, and consumers on lockdown are finding new ways to communicate - using mobile apps is one of the pathways.

1 | INTRODUCTION

The weekly time spent using apps has been growing 20% year after year¹ and since the COVID-19 pandemic has made many people confined to their homes, it seems that this trend will not slow down. Although many sectors are being affected by this outbreak, according to a recent market study², mobile app spending worldwide will continue to grow and will even double by 2024.

Countries – governments and businesses - are beginning to see mobile software applications as an opportunity to reach the population, whether through apps to ensure home quarantining, to receive healthcare remotely, to receive patients' insights or even for self-assessment.

Despite doubts as to whether our personal data is protected, it seems more and more common for countries to adopt these software applications.

2 | FRAMEWORKS

"An object-oriented abstract design, also called a framework, consists of an abstract class for each major component" (Johnson & Foote)³

We will list below some frameworks with the functionality of privacy-preserving contact tracing that are being used, or that are planned to be used, during the COVID-19 pandemic.

Some apps mentioned in the third part of this document use protocols created in these frameworks.

Google / Apple privacy-preserving tracing project – With this collaboration, the companies hope to harness the power of technology and help countries to slow the spread of COVID-19. They have released draft technical documentation for different frameworks and specifications:

1 Venkatraman , Adithya (2020-04-01) **"Weekly Time Spent in Apps Grows 20% Year Over Year as People Hunker Down at Home"**, App Annie <https://bit.ly/2xBFcK6> Retrieved 2020-04-07.

2 Nelson, Randy (2020-04-01) **"5-Year Market Forecast: App Spending Will Double to \$171 Billion by 2024 Despite COVID-19"**, SensorTower <https://bit.ly/3bfZLKx> Retrieved 2020-04-07.

3 Ralph E. Johnson and Brian Foote, **"Designing reusable classes"** Journal of Object-Oriented Programming, June/July 1988 (PDF) (Edited 2001) <https://bit.ly/2XEr5OR> Retrieved 2020-04-16.

Contact Tracing - [Bluetooth Specification](#)

Contact Tracing - [Cryptography Specification](#)

Contact Tracing - [Framework API](#)

Blue Trace Protocol – BlueTrace is a privacy-preserving protocol for community-driven contact tracing using Bluetooth devices. The protocol allows for interoperability. “BlueTrace is designed for decentralised proximity logging and supplements centralised contact tracing by public authorities”.⁴

Mobile apps that use this framework can blend decentralised and centralised models of contact tracing.

For more information, read their white paper [here](#).

Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT) project – PEPP-PT is a core technology providing applicable proximity tracing mechanisms.

In other words, each country can develop its own app and have its own secure infrastructure.

The organisation counts with a team of more than 130 members across eight European countries. According to their manifest, the PEPP-PT mechanisms offer different features such as international interoperability, enforcement of data protection, backend architecture and technology, etc. For more information, access the organisation manifesto [here](#).

Decentralised Privacy-Preserving Proximity Tracing (DP-3T) - DP-3T participates under the loose umbrella of the PEPP-PT project. Their design ensures data minimisation, prevents abuse of data and tracking of non-infected users. DP-3T processes the contact tracing data locally on the user’s device. Like BlueTrace, their proposal monitors the exchange of Bluetooth signals with other users of the app.

More information [here](#).

TCN Coalition/ TCN Protocol –This global and open coalition hopes to help flatten the curve. The core of the protocol stands for: Temporary Contact Number.

“This completely anonymous number is generated to privately record interactions between compatible mobile devices without allowing them to be tracked.”⁵

For more information on the TCN Protocol access [here](#).

4 Government Technology Agency Singapore “**BlueTrace: A privacy-preserving protocol for community-driven contact tracing across borders**” , Blue Trace (White Paper PDF) <https://bit.ly/2XGk0xa> - Retrieved 2020-04-16

5 “**A Global Coalition for Privacy-First Digital Contact Tracing Protocols to Fight COVID-19**”, TCN Coalition <https://bit.ly/2KeKLRf> - Retrieved 2020-04-16.

3 | CATEGORIES OF COVID-19 APPS

In a sample of 73 countries worldwide and after a comprehensive analysis of 108 COVID-19 apps that are implemented or under consideration in different countries, we categorised them into five clusters for a common understanding:

- Informational apps;
- Self-assessment/Medical reporting apps;
- Contact tracing apps;
- Multi-purpose apps;
- Other apps related to COVID-19.

3.1 | INFORMATIONAL APPS

At a time where there is a lot of misinformation/disinformation about COVID-19, these apps provide users with information regarding the disease outbreak (e.g. latest news, fact sheets, guidelines etc.) These apps do not have much customisation as they are more to inform than to interact.

Below are some practical examples (in alphabetical order).

- Bolivia – *Bolivia Segura*

The app shares the latest updates with citizens, like official communications and information on prevention, care, symptoms, emergency numbers, etc.

- Brazil – *Coronavírus - SUS*

The Brazilian Ministry of Health launched this app to raise awareness among the population about the outbreak. Information on how to act, where the nearby health units are or what to do in case of contracting COVID-19 are some examples of the information displayed.

- Cambodia – Khmer Education COVID-19 app (*contest launch*)⁶

The Ministry of Education, Youth and Sport launched a competition to encourage students and the general public to create an app that can be used to send the latest information about the virus to citizens.

- Cuba - *InfoCU*

This app updates citizens with relevant information from the Ministry of Health of Cuba on COVID-19. The app updates its contents from the Wi-Fi or mobile data network.

- Guatemala – *COVID-19 en Guatemala*

The tool was designed by the Institute for Research and Projection of Science and Technology (Incyt) and the Rafael Landívar University to follow the evolution of the virus (number of infected people/deaths/recovered people) in the country. They also provide *some predictions*.

- India (Kerala) – *GoK Direct*

This state app offers locals information regarding the outbreak in the area. General awareness, awareness for travellers, quarantine protocols or even advice for visitors are some examples of the information provided.

- India (Mizoram) – *Mcovid-19*

The Mizoram government has also launched an app that contains different information and updates on COVID-19 from reliable sources.

- Indonesia – *Pikobar Jawa Barat*

The app is from the Information and Coordination Centre for Disease and Disaster in West Java and allows users to have quicker and easier access to the latest information and data/statistics in West Java. Citizens can request logistical help, access emergency numbers and clarifications on misinformation.

- Mauritius – *beSafeMoris*

This app was developed by Mauritius Telecom and allows users to get real-time information from the Ministry of Health and Wellness of Mauritius. Among other features, citizens can find videos with help tips and a list of health centres.

⁶ Dara, Voun (2020-03-25) “**Covid-19 app contest launched**”, The Phnom Penh Post <https://bit.ly/2XIzwIT> - Retrieved 2020-04-07

- Namibia – *Covid-19 Namibia*

The Namibia University of Science and Technology (NUST) developed a website and an app to get citizens informed about the outbreak. Other projects include misinformation and sentiment analysis on social media, an app for self-reporting and a map to indicate locations of testing and help centres.

- Portugal – *Estamos ON*

The Government launched an app to provide the most relevant information about COVID-19 to citizens.

The app allows the user to receive notifications about the daily updated numbers of the country's epidemiological bulletin as well as news regarding the Government's response to the current pandemic.

- Trinidad and Tobago – (*soon*)

An app developer created an app to inform the population. He reached out to the Ministry of Health and according to *news sources*⁷, the Ministry agreed to use the tool and formalise a developer's account where he would continue to work and add features.

Due to constraints, the app is not yet available, but it is expected to be operational soon.

- Vietnam – *NCOVI*

The Ministry of Health, together with the Ministry of Information and Communications launched this app to inform people about the virus in the country – official updates and statistics are provided.

Users can also receive recommendations and instructions to prevent the spread of the disease or the risk of infection.

7 Parsanlal, Nneka (2020-03-21) **“COVID-19 app developer: If you can do something to help, you should”** <https://bit.ly/2KfnmPE> - Retrieved 2020-04-07

3.2 | SELF-ASSESSMENT/MEDICAL REPORTING APPS

Since testing is often limited to only severe cases, not everyone with symptoms of COVID-19 may be able to be can get tested even though they might have symptoms of COVID-19. For this reason, self-assessment and medical reporting apps have been an option developed in several countries.

The purpose of this type of app is help reduce the burden on healthcare facilities and ensure that those most in need are getting the right treatment.

Below are some practical examples (in alphabetical order).

- Argentina - *COVID-19 Ministerio de Salud*

Argentina's Secretariat of Public Innovation set up a self-testing web app for citizens.

- Armenia – *Armenian Government*

This app was launched by the Armenian Government. This official app offers users the latest official news about Covid-19 in Armenia.

Users can also self-assess their symptoms to understand whether they need medical help.

- Australia – *Australian Government*

The app was launched by the Australia Government and allows citizens to stay up to date with the latest information regarding COVID-19. All information shared is sourced by Australia’s leading health organisations.

Citizens can also self-assess their symptoms to understand whether they need medical help.

However, the app is not an alternative to professional healthcare.

- Belgium – *moveUP App*

This app can facilitate the initial assessment and follow-up of suspected or diagnosed COVID-19 patients.

The app is free of charge and available for people who think they have symptoms of COVID-19 and need to contact their General Practitioner (GP) or for doctors who want to register so that patients can connect with them.

<p>I am a patient</p> <p>Contact your doctor</p> <p>In case you are a patient with COVID symptoms, contact your GP and ask for their COVID-moveUP code. With this code your doctor can immediately follow you up via the App.</p> <p>In case you cannot reach your GP for their COVID-moveUP code, a dedicated team of doctors can link you to your GP. In this case you can start the registration with code: 'COVID19'</p> <p>You can download the 'moveUP' App on the App Store or Google Play or by clicking here. Use the code you have received in the 'Register' App.</p> <p>The use of the moveUP App is free of charge.</p>	<p>I care for patients</p> <p>Register yourself</p> <p>By contacting covid19@moveup.care or using the contact forms on this website, our team will create your account.</p> <p>You will receive a doctor/hospital-specific code which your patients can use to connect with you.</p> <p>After registration you can login to the medical dashboard here.</p> <p>The use of the medical dashboard is free of charge.</p>
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In case a patient cannot reach their GP, a dedicated team of doctors can link them to their GP.

- Brunei – *HealthInfo*

The Ministry of Health of Brunei Darussalam developed a self-assessment tool for their citizens. To log in, citizens are asked to provide their mobile phone numbers.

- Bulgaria – *Virusafe*

This app was supported by the Bulgarian Ministry. The app gives users the possibility to self-assess their symptoms and health status daily. Users can also voluntarily provide their location. The app is compliant with the recent recommendations on COVID-19 apps for contact tracing made by the European Commission.

- Burkina Faso – DiagnoseMe (*soon*)⁸

An app developed by a young entrepreneur intends to help with self-diagnosis and disease prevention. The aim of the tool is to help fight against the saturation of healthcare institutions.

- Canada – *Canada Self-Assessment Tool and App/Outil et application d'autoévaluation du Canada*

The app will let users receive the latest updates and trusted resources, as well as helping them self-assess their symptoms.

- Canada: British Columbia - *COVID-19 BC Support App and Self-Assessment Tool*

This online tool will determine whether users may need further assessment or testing for COVID-19.

- Colombia - *CoronApp*

This app allows users to report their health status and monitor their symptoms.

The app also provides users with information on government measures, prevention recommendations, location of health services, as well as channels to guide citizens.

- France – *Maladie Coronavirus*

The app is provided to help streamline the emergency management of people during COVID-19.

⁸ Douce, Sophie (2020-03-19) “Au Burkina Faso, une appli pour déceler les symptômes du coronavirus”, Le Monde Afrique <https://bit.ly/2XLnHSa> - Retrieved 2020-04-07

On the website, you can read that the test does not replace medical advice : *"L'utilisation de l'application et de son contenu ne remplace en aucun cas le conseil nécessaire donné par votre médecin ou votre pharmacien ou tout autre professionnel de santé compétent dans chaque cas particulier."*

- France – [French Government online test](#)

The French Government set up a self-assessment online test for citizens with symptoms of COVID-19. However, the test does not provide medical advice.

- France – [Covidom](#)

Covidom is an app that allows home monitoring of patients infected with COVID-19. The app is only useful for patients that are being followed by medical professionals. The aim is to relieve pressure on French medical centres.

- Ghana – [Redbird](#)

Redbird is a medical diagnostics distributor start-up that provides access to healthcare in the country. They launched a daily check-in app to help patients to self-assess their symptoms.

The main goal is to provide a digital alternative to help with the triage and follow-up process to reduce the overload of calls to helplines.

- Guyana – [COVID-19 Response App Home Page](#)

The Ministry of Public Health's Information System offers a self-screening tool so that people can know their symptoms and avoid spreading the virus.

COVID-19 Response App Home Page

COVID-19 SELF SCREENING
This tool can help you understand what to do next about COVID-19.
Let's all look out for each other by knowing our status and trying not to infect others.

Stop and call 911 if you are experiencing:

- Severe, constant chest pain or pressure
- Extreme difficulty breathing
- Severe, constant lightheadedness
- Serious disorientation or unresponsiveness

After Answering Questions, Please PRESS Assess Case

Is this the First Time using the SELF-CHECK?

Yes No

Assess Case

India is a country with a lot of mobile phone users hence the extensive number of apps in the country.

- India – *Innovacer*

The Puducherry Ministry of Health introduced the app, which is India’s first automated self-evaluation assessment to identify at-risk patients.

- India – *CoronaCheck*

The Aga Khan University Hospital launched an app that allows citizens to conduct self-assessments at home. The self-assessment tool is an interactive chatbot – using Artificial Intelligence (AI).

- India – *Arogya Setu App*

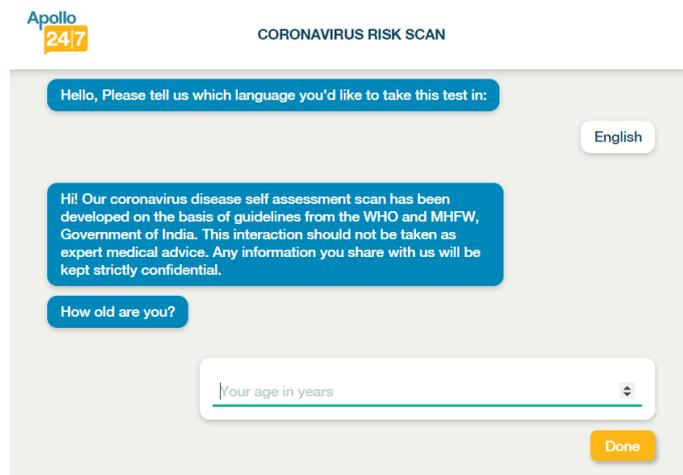
This app was launched by the Ministry of Electronics and IT to connect people with essential health services. Citizens can also run a quick test to check COVID-19 symptoms.

However, to use the app, citizens need to register using their mobile phone number. To function, it also requires Bluetooth and location access.

- India – *CORONAVIRUS RISK SCAN*

A chain of hospitals, Apollo, created an online self-assessment test so people can do a preliminary test at home. The self-assessment tool is an interactive chatbot – using Artificial Intelligence (AI).

The test is based on the guidelines from the World Health Organisation (WHO), the Ministry of Home and Family Welfare (MHFW) and the Government of India.



- India (Maharashtra) – *COVID-19 (Coronavirus) - Self Assessment Tool*

© Apollo

Maharashtra government also launched an online self-assessment tool that allows users to gauge if they have been infected. The online self-assessment tool also allows authorities to have a real-time dashboard and keep track of people with strong symptoms of COVID-19.

The platform also has helpline numbers and other important information regarding the virus.

- India (Goa) – *Test Yourself Goa*

The Ministry of Health of Goa, in collaboration with the company Innovaccer, launched an app where citizens can self-assess coronavirus symptoms. The app does not provide medical advice.

- India (Punjab) – *COVA*

The Punjab authorities launched an app to keep citizens informed about the virus and to provide help during the lockdown. Citizens can access their symptoms and get medical advice from doctors.

*The Government passed an order asking Google and Apple*⁹ to ensure that all their customers in the Punjab region download the app.

The Government also has made it mandatory for all social networks and all telecom service providers to use push notifications and advertisements to encourage users to download the app.

- Iran – AC19

Developed by the government, this app intends to help people self-assess their symptoms.

The app has been *very controversial*¹⁰ and it has been removed from the Google Play Store.

- Ireland – *HSC*

The Health & Social Care Board (HSC) of Northern Ireland is the provider of this app. It is owned and run by Digital Health and Care NI (DHCNI) on behalf of HSC, the Public Health Agency, and the Department of Health. The app aims to help management of COVID-19 in Northern Ireland by providing the latest advice and information. With the app, you can check your symptoms and assess their severity.

- Japan - by *Agree*

A local medical company, named Agree, created an app to allow citizens to consult with doctors and check their symptoms. It is expected that with the app they will be able to control the burden on hospitals.

Almost 120 doctors have registered for the service and users can get advice in about 30 minutes.

9 Kumar, Vinod (2020-04-07) “**Ensure Cova app download on all phones : Punjab to service providers**”, The Times of India <https://bit.ly/34JRigh> - Retrieved 2020-04-09

10 Gilbert, Ben (2020-03-10) “**The Iranian government released an official coronavirus app for Iranians, but Google pulled it from its app store**”, Business Insider <https://bit.ly/2VjQGuV> - Retrieved 2020-04-09

According to the news¹¹, the app was already used in 2018 during an earthquake and heavy rains.

- Libya – *SpeetarHealth*

The app allows users to conduct self-assessment of symptoms and to get a risk assessment. Doctors can treat patients through phone-based consultations, follow-up calls and messages.

- Malaysia – *MySejahtera*

Developed by the Government of Malaysia this app allows self-assessment by users and their family members. Through the app, the Ministry of Health (MOH) can monitor users and take immediate actions.

- Mexico – *Gobierno de la Ciudad de México*

This tool was designed by the Digital Agency for Public Innovation and helps citizens to assess if they have contracted COVID-19.

As you can see in the image, the web form requires a lot of personal information (name, address, age etc.).

Registration form

The fields with an asterisk are mandatory

Name(s) * Enter your first name	Surname * Enter your surname	Second surname (if applicable) Enter your second surname (if applicat
Sex * Select	Age * Enter your age using numbers	
Email Enter your email address	Cellphone * Enter your cellphone	
Street name * Enter your street name	Street number * Enter your street number	Zip code * Enter your zip code
Municipality * Select	Neighborhood * Select	

© Gobierno de la Ciudad de México

- Nigeria – Self-test (*soon*)¹²

The Lagos State University developed an app for self-assessment.

The app was developed by the Computer Science Department of the University to create awareness. It will be available soon!

- Oman – *Tarassud*

The Ministry of Health launched this app to help citizens to stay updated regarding the virus.

Besides providing reliable information, citizens can also self-assess their symptoms and ask questions. The app is equipped with a chatbot.

11 Jiji (2020-02-23) "Free Japanese-language medical app offers advice about coronavirus", The Japan Times <https://bit.ly/3er2TWd> - Retrieved 2020-04-10

12 Onaleye, Tomiwa (2020-04-02) "Lagos State University Develops COVID-19 Self-test App for Nigerians", Tech Next <https://bit.ly/2xCAhZo> - Retrieved 2020-04-07

- Pakistan – *Corona-Check*

The Aga Khan University and the Aga Khan University Hospital have launched this to enable citizens to easily evaluate symptoms with an in-home screening tool and understand the next steps they must take.

- Peru – *Plataforma digital única del Estado Peruano*

The Peruvian government set up a website for people to check their symptoms and search for help.

- Philippines – *FightCOVID.app*

1/3
Was I exposed to COVID-19? Let's track your exposure to the virus.

- I travelled to or resided in a country with local transmission of COVID-19.
See list of affected countries.
- I travelled to or resided in an area under enhanced community quarantine.
- Someone I know has laboratory-confirmed COVID-19 and I have interacted with them by:
- Staying in a closed environment (such as a classroom, household, workspace or gathering).
 - Travelling with or in close proximity (about a metre).
 - Giving direct care to them without proper personal protective equipment (PPE) such as masks or gloves.
- None of the above.
I don't know if I was exposed to COVID-19, or
- My last travel to a country with local transmission was more than 14 days ago
 - My last travel to an area under enhanced community quarantine was more than 14 days ago

Next

© FIGHTCOVID

This app is a tool meant to reduce overcrowding in hospitals and other health centres. The survey is meant to assess whether the patients need to seek medical care or not.

Apps in development in the Philippines:

SINAT - A thermal scanning system created by a group of volunteer developers.

- Saint Kitts and Nevis - *Nevis Health*

Implemented by Nevis Island Administration (NIA) in partnership with UNHIN (The Universal Health Information Network) and New Fields Technologies, this app allows citizens to assess their health and track their symptoms.

- Saudi Arabia - *Mawid*

The Saudi Health Ministry has introduced a self-assessment feature on its Mawid app offering a consultation window for the public.

The app also includes a list of guidelines, answers to questions, and instructions on how to respond to the outbreak.

- South Africa - *CoronaFighter*

Through a pre-test, citizens can track and monitor their symptoms online.

Citizens also have access to aggregated data from official sources, as well as access to the latest guidelines and news.

- Spain – *Spanish Government app*

This official app from the Spanish Government evaluates citizens' health and provides instructions and recommendations. It is active in the following autonomous regions: Cantabria, the Canary Islands, Castilla-La Mancha, Extremadura, and the principality of Asturias.

- Spain (Madrid) – *CoronaMadrid*

This official app from the Community of Madrid evaluates citizens' health and provides instructions and recommendations.

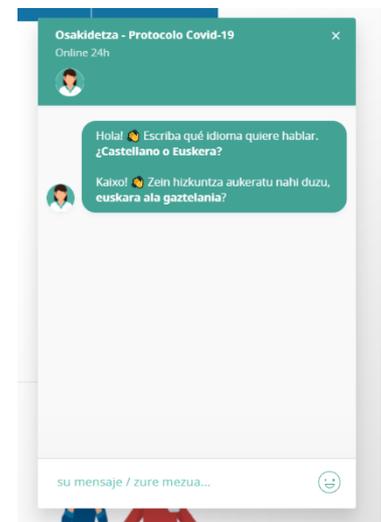
- Spain (Catalonia) – *StopCOVID19Cat*

The healthcare system will monitor the cases based on the data sent via the app and, if necessary, they will activate primary care services or the medical emergency services.

- Spain (Basque Country) – *COVID-19.EUS*

The Basque Government, together with the Basque company EricTel, developed this app to help prevent (self-assessment tool), detect and monitor COVID-19.

The app has an interactive chatbot, using Artificial Intelligence (AI).



- Switzerland (*waiting for regulatory approval*¹³)

The local company Detect-Now has created an app that tests for COVID-19 by recording the sound of users' cough. The app detects patterns in the cough sound that humans cannot detect.

13 Montero, Ana Maria (2020-04-07) "An app to detect COVID-19's telltale cough", CNN Switzerland <https://bit.ly/2xuIJdg> - Retrieved 2020-04-16

- Uganda – *Zoctu*

To avoid people flocking to the hospitals, the Uganda Nurses and Midwives Union has rolled out an app that links patients with nurses and other healthcare professionals.

The Union is requesting all nurses to join the platform. The app can be downloaded at www.zoctu.com.

- Uruguay – *App Coronavirus UY*

The Ministry of Public Health in Uruguay launched an app to facilitate consultations. Preventing infections, as well as recommending and directing people to the right services are some of the features that the app allows.

The app will send the data provided by the user to their health provider so that they can be assisted.

The app also assists people who are already diagnosed through a telemedicine tool where they can video chat with a doctor.

- USA – *COVID-19 screening tool*

Apple, in collaboration with the Centers for Disease Control and Prevention (CDC), the White House and the Federal Emergency Management Agency (FEMA), launched a *screening tool* to help people to assess their symptoms in order to reserve care for those who really need it.

3.3 | CONTACT TRACING APPS

With some people disregarding quarantine orders, some countries have started using tools to monitor home quarantine by tracking citizens. The aim is to prevent quarantine breaches and consequently mitigate the spread of COVID-19. Contact tracing apps are also being used to track infected people.

Below are some practical examples (in alphabetical order).

- Austria – *Stopp Corona*

The Austrian Red Cross, in partnership with Uniqa Stiftung, launched an app to track people who have been in contact with COVID-19 carriers. The app will then notify users if they have been in contact with people with the virus.

The app launched some debates with some people arguing that it should not become mandatory. A *recent survey*¹⁴ shows that 21% of Austrians are against making the app mandatory.

According to recent news, at the beginning of April, the app had already *more than 130,00 downloads*.¹⁵

- Brazil – *DESVIRALIZE*

This is an online platform offering local, real-time monitoring of the evolution of COVID-19 (maps and statistics).

However, the app also shows the symptoms of the people around users and of those who are part of their network. To have access to the information, it is necessary to provide a telephone number.

- China - "*Health Code*"

Integrated into Alipay and WeChat apps, the app allows citizens to check if they have been in close contact with anyone diagnosed with COVID-19.

People using the health code are assigned a QR code along with a colour ranking — yellow or red means that they must be quarantined. This app is raising some *concerns over privacy*¹⁶.

14 Grüll, Philipp (2020-04-10) "**VIENNA – Survey shows Austrians against making Corona-tracing-apps mandatory**", Euractiv <https://bit.ly/2XIt5Wd> - Retrieved 2020-04-13

15 (2020-04-02) "**Covid-19: Thousands download coronavirus tracking app in Austria**", TheStar <https://bit.ly/2RLpDq> - Retrieved 2020-04-07

16 Davidson, Helen (2020-04-01) "**China's coronavirus health code apps raise concerns over privacy**", The Guardian <https://bit.ly/2xEVn9n> - Retrieved 2020-04-15

- China: Hong Kong - *StayHomeSafe*

This app traces contacts of people subjected to compulsory quarantine. If citizens are obliged to do the quarantine, they must put on a wristband and install the app. If family members are also subject to quarantine, users need to scan the QR code on their wristbands.

- Croatia (*in development*)¹⁷

The Croatian Government is thinking of creating a dedicated app for citizens who are in isolation. However, the country said that they do not intend to track movements.

- Cyprus - *COVTRACER*

A first pilot version of the app targets those on the frontline (e.g. police officers, firefighters, doctors etc.) Based on the MIT project *safepaths*, this app tracks location trails of carriers of the disease and people that were in close contacts with diagnosed carriers.

- Czechia - *eRouška*

At the beginning of April, the Czech government released a video explaining their “smart quarantine system”: a system to track the movements of infected citizens.

The monitoring system requires consent and uses data from mobile phones or payment cards of citizens who have tested positive for COVID-19.

- France - Stop Covid (*under deliberation*)¹⁸

According to recent news, the French government says that they want to have an app to track people and, in this way, slow the spread of COVID-19.

That app would leverage the Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT) protocol.

- Ghana - *GH COVID-19 Tracker*

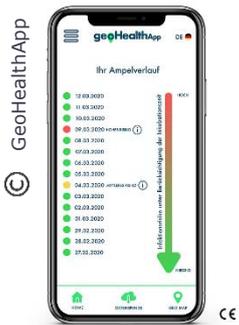
This app tracks people with COVID-19 and those who have been in close contact with infected citizens.

The app offers six languages including English and some local dialects.

17 Orovic, Joe (2020-03-30) “Croatia's Tracking of COVID-19 Patients Takes Shape”, Total Croatia News <https://bit.ly/33ZrwEj> - Retrieved 2020-04-07

18 Dillet, Romain (2020-04-08) “France is officially working on ‘Stop Covid’ contact-tracing app”, Tech Crunch <https://tcn.ch/3enKpFQ> - Retrieved 2020-04-13

- Germany – *GeoHealthApp*



Sponsored by Arit Services and the Zurich Foundation, this app determines if a person has been in contact with an infected person, based on the user’s whereabouts within the last 14 days.

An interactive map shows the areas with high infection rates so that users can avoid them.

- Iceland (*in development*)

According to *recent news*¹⁹, an app will be launched soon to locate people (using GPS) who may have been in contact with confirmed COVID-19 patients. The app is voluntary, but to be effective at *least 60% of Icelanders need to download it*.²⁰

- India – *Corona Kavach*

This app was intended to track the data of the users every hour and alert them when they have crossed paths with a person infected by the COVID-19 virus. The app was using geographical location to map if the user was in a high-risk zone.

According to the *latest news*²¹, this app has been discontinued by the government.

- India (Maharashtra) – *MahaKavach*

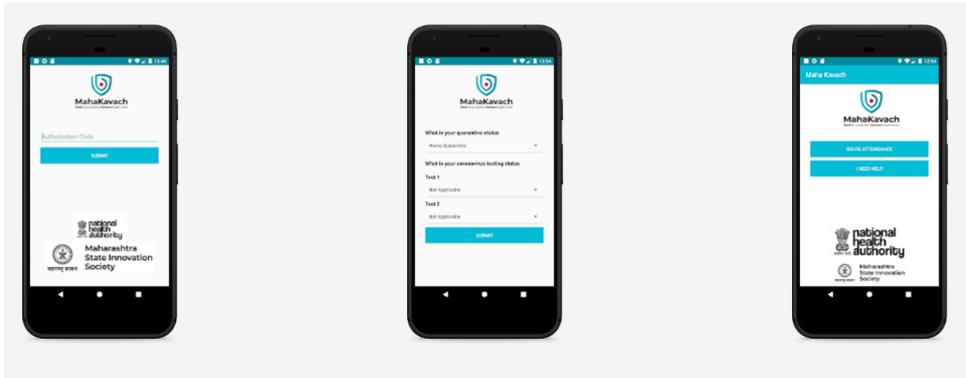
Developed by the Maharashtra State Innovation Society, the app aims to curb the spread of COVID-19 through contact tracing and quarantine tracking. Maharashtra is the region most affected by the virus in the country.

19 Logadóttir, Fanndís Birna (2020-03-31) “**Smitrakningarapp fer í loftið fyrsta apríl**”, Fréttablaðið logo <https://bit.ly/3exDDxh> - Retrieved 2020-04-07

20 Askham, Poppy (2020-04-01) “**COVID-19 Tracking App Launches Today**”, The Reykjavik Grapevine <https://bit.ly/2VhVxwk> - Retrieved 2020-04-07

21 Singh, Saurabh (2020-04-08) “**Govt discontinues Corona Kavach, Aarogya Setu is now India’s go-to COVID-19 tracking app**”, Financial Express <https://bit.ly/3bkeTqn> - Retrieved 2020-04-13

So far, the app has 10k downloads.



© Sensor Tower

- Indonesia - Peduli Lindungi

According to the local news, the government is urging citizens to download this app that traces, tracks, and fences people suspected of a COVID-19 infection.

- Ireland (in development) – Department of Health and HSE

According to *Irish Examiner*,²² the Department of Health and HSE are working on an app for real-time symptom tracking and digital contact tracing.

A recent survey²³ published by the Irish Computer Society states that 87% of Irish people are willing to share their data for this purpose.

- Israel - Hamagen

Using the user's whereabouts, the app compares them with movements of people diagnosed with COVID-19 to check if paths were crossed within the previous 14 days.

- Kazakhstan – Smart Astana

The app aims to bridge the citizens of Nur Sultan and the government. The app enables geolocation settings, Wifi and Bluetooth so that it is possible to track and monitor people who were ordered to carry out mandatory quarantine.

The app also allows users to access public services (e.g., check administrative fines, call a doctor, or even get an authentication of sick leave).

²² McEnroe, Juno (2020-03-31) "App to track and trace Covid-19 infections being developed", *Irish Examiner* <https://bit.ly/2XK4z7i> - Retrieved 2020-04-13

²³ Samuel, Stolton (2020-04-02) "DUBLIN – Irish personal data survey", *Euractiv* <https://bit.ly/3cvrs2p> - Retrieved 2020-04-13

- Kenya – Pamoja (*waiting for governmental approval*)²⁴

A prototype app has been developed to give Kenyan citizens reliable, tangible information regarding COVID-19. With the app, users can report or call a free-toll number or even check facilities nearby. The app will also track infected citizens through GPS.

This app is waiting for governmental approval.

- Mongolia

*The news reported*²⁵ that law enforcement bodies will track citizens using mobile apps.

- Morocco (*in development*)

*According to recent news*²⁶, Morocco has commenced the development of an app to track potential carriers of COVID-19. The app development is being done by the Digital Development Agency (ADD).

The app should be deployed by the end of April 2020.

- New Zealand (*considering*)

*According to the latest news*²⁷, the New Zealand Government is considering adopting the TraceTogether app that is currently deployed in Singapore.

- North Macedonia – *StopKorona!*

Set up by the Ministry of Information Society and Administration, this app uses Bluetooth technology to track people that have been in close contact with an infected person in the past 14 days.

If an app user gets infected with the virus, the Ministry of Health will request the app user to share with the Ministry his/her app data to inform the persons that have been in proximity.

24 Ktn NEWS (2020-03-26) “**Kenyan Mobile App to track COVID-19 infections**”, Ktn NEWS <https://bit.ly/2Vzjf5y> - Retrieved 2020-04-07

25 Ankhtuya (2020-03-23) “**Surveillance app being used in Mongolia to fight COVID-19**”, News.MN <https://bit.ly/34Hwsy2> - Retrieved 2020-04-13

26 Guessous, Hamza (2020-04-14) “**Morocco commences development of COVID-19 tracking app**”, Morocco World News <https://bit.ly/3covg5p> - Retrieved 2020-04-16

27 Keall, Chris (2020-04-12) “**Covid 19 coronavirus: As NZ considers TraceTogether, a Kiwi in Singapore gives his verdict on the tracking app**”, New Zealand Herald <https://bit.ly/2XJBrNt> - Retrieved 2020-04-13

- Norway – *Smittestopp*

The Norwegian Institute of Public Health, together with the Norwegian company Simula, developed an app to track users' geolocation. The app uses GPS and Bluetooth.

If a person is infected, their location data can be used to detect with which people they have had close contact. The app is not mandatory.

- Philippines – *RC143*

The Philippine Red Cross (PRC) has launched an app using geo-location to provide better tracing (number of users within proximity, location etc.). The aim is to help users to stay away from high risk areas.

The idea is to integrate the end-to-end app system in the Red Cross command centres so that professionals on the frontlines and the general public can also access the app.

- Poland – *Home Quarantining*

This app was developed by the Polish government to check on people that were required to undergo quarantine for 14 days after returning from abroad. The website states that if citizens do not download the app, they can receive unexpected visits from the police.

After download, the app requires reference pictures, phone numbers and regular check-ins. The aim is for police to monitor home quarantine.

- Poland – *ProteGo* (soon)

*The Digital Ministry*²⁸ is working on an app to trace people who have been in contact with people infected with COVID-19. The app would use Bluetooth technology and the encrypted data will be stored for two weeks.

- Qatar – *Ehteraz*

In a recent press conference, Qatar announced the launched of this app that uses GPS and Bluetooth to enhance preventive measures.

The app offers the latest developments and statistics on COVID-19, tracks movements of those subject to quarantine and provides a hotline for coronavirus information.

- Russia – Moscow (in development)

28 Sharma, Shubham (2020-04-06) "**Poland working on ProteGo app that could help slow down coronavirus spread**", Silicon Canals <https://bit.ly/3bnOsjo> - Retrieved 2020-04-07

Moscow is launching an *app to track citizens*²⁹ who are infected by the virus to ensure quarantine measures.

The app will request access to the user's calls, location, camera, storage, network information, among other data. For people with COVID-19 that don't own a smartphone, they "could borrow one with the software pre-installed, for a fortnight" explained *Eduard Lysenko*, the local government's IT chief.

- Singapore – *TraceTogether*

The Ministry of Health of Singapore, in collaboration with SG United and GOVTECH Singapore, launched this app to track people infected with COVID-19 through Bluetooth. In the explanation video, they say: "Get peace of mind for you and your family through community-driven contact tracing."

- South Korea – *Corona 100m*

South Korea's app uses GPS to track locations and monitor home quarantine citizens. If a person using the app comes within 100 meters of a person infected, they get a push notification warning.

*According to the developer*³⁰ Bae Won-Seok, the app has 20,000 downloads every hour.

- South Korea – *Corona Map*

Like Corona 100m, this apps also tracks locations where people infected by COVID-19 have been. The purpose is to encourage other users to avoid these areas.

- Thailand – *MorChana*

A collaboration between multiple private and state organisations resulted in this app. It serves as a tool to track users in close contact with infected people and prevent transmission especially among healthcare professionals. The app uses GPS and Bluetooth technology.

- Thailand – *Covid Tracker*

This app was developed by a Thai team called 5Lab to track the spread of COVID-19 in the country.

The app tracks cases on a nationwide map and gives alerts (see picture).



© Covid Tracker

- Turkey – (in development) *CoroWarner*

29 Kelion, Leo (2020-04-01) "**Coronavirus: Moscow rolls out patient-tracking app**", BBC News <https://bbc.in/2KeP92Q> - Retrieved 2020-04-07

30 Watson , Ivan & Jeong, Sophie (2020-02-28) "**Coronavirus mobile apps are surging in popularity in South Korea**", CNN Business <https://cnn.it/3bi7gAP> - Retrieved 2020-04-07

A group of technology enthusiasts is developing an app that allows community-driven contact tracing. Citizens will receive alerts if they have had contact with infected people.

- UK – (in development) *NHSX*

This app was developed by the health service’s digital transformation arm to trace close contact of people infected with COVID-19 and to advise them to self-isolate. The app is still in the development stage, but according to *recent news*³¹, the NHS is in talks to roll out the application.

- United Arab Emirates – *Stay Home*

The Ministry of Health – Abu Dhabi, DOH, has launched an app “Stay Home” to ensure that people respect the mandatory quarantine. By tracking people’s location, the aim is to maximise the benefit of self-quarantine procedures and to avoid quarantine breaches.

3.1 MULTIPURPOSE APPS

This category of apps combines at least two of the previous clusters – informational apps, self-assessment/medical reporting apps and contract tracing.

31 Devlin, Hannah (2020-03-31) “**NHS developing app to trace close contacts of coronavirus carriers**”, The Guardian <https://bit.ly/2wMaQnI> - Retrieved 2020-04-07

Below are some practical examples (in alphabetical order).

- Bangladesh – (*soon*)

The app will allow people to check symptoms of COVID-19 by uploading a chest X-ray. The test results are provided thanks to AI technology.

According to *recent media sources*³², the country is developing an app to track COVID-19 hotspots.

The app will be operated by mobile telecom operator Teletalk.

The purpose of the app is to help people and authorities ensure home quarantine is respected.

- Haiti – Haiti Strategic Health Information Systems (HIS)

Although the country does not have many people infected with COVID-19, the government wants to be prepared in the best way possible and they believe that improving surveillance and ensuring systems to monitor disease events and share information is key.

With the support of the Haiti Strategic Health Information Systems (HIS) programme (funded by the U.S. Agency for International Development), they developed an app to trace contacts and monitor confirmed cases.

An interesting feature is that the app will *"allow for cross-border interoperability with other countries."*³³

They also have a dedicated website where people can *assess their symptoms*.

- Ivory Coast - *Anticoro*

Ten local start-ups supported by governmental authorities created an app that allows potential patients to check their symptoms. The information is then sent directly to the National Institute of Public Hygiene (INHP), the Pasteur Institute and the police so that they can act quickly.

Another feature makes it possible to geolocate citizens in order to avoid contacts while awaiting confirmation of analyses.

- Netherlands – under research

32 Sumon, Shehab (2020-04-06) **"Bangladesh launches app for coronavirus tests"**, Arab News <https://bit.ly/3ajfGqh> - Retrieved 2020-04-07

33 DAI (2020-03-20) **"USAID Program Develops Tool to Support COVID-19 Tracking in Haiti"**, DAI <https://bit.ly/2yqtYby> - Retrieved 2020-04-07

According to *recent news*³⁴, the Ministry of Public Health is looking into two different apps. One is to assess symptoms of citizens and the other is to track who is carrying the virus.

- Nepal - *Kathmandu Metropolitan City (KMC)*

Developed jointly by NREN, Insol, iClick, PHECT-Nepal, NADEM, IDS, and ICT4D, an app has been launched that allows self-assessment for Kathmandu Metropolitan City (KMC). However, the app can also be used for people outside of KMC.

The system provides a dashboard for health workers to monitor patients under self-quarantine.

The app also has a surveillance feature: the GIS-based mapping tracks people in quarantine and does location-based strategic planning.

- USA – *How we feel*

This app is supported by Pinterest and is a self-reporting and tracking app. Citizens can check their symptoms and check how many people have symptoms around them. The app also updates citizens with the latest information regarding the outbreak in the country.

3.4 | OTHER RELATED COVID-19 APPS

This category includes apps that cannot be assigned to any of the previous categories. However, they are also helping in the fight against COVID-19. This may be through resource management (e.g. masks), the fight against disinformation, or through e-purchase to prevent places from becoming overcrowded.

- Oman – *Mawaleh Market*

The Oman Ministry of Commerce and Industry announced the launch of an “e-purchase app” to allow people to buy products online, reduce crowds inside of the market and ensure social distancing.

- Pakistan – *Care for Media* (soon)

The leading agency, MarCom, helped the Ministry of Information and Broadcasting of the Government of Pakistan to develop and launch an app for the advertising & media industry. The app was created to help the Pakistani media and journalists to stay updated about the spread of the virus in the country. The app can also be used by other citizens that want to stay informed.

- Philippines – (in development) *Eddie*

34 Pieters, Janene (2020-04-08) “GOV'T plan to use app to track COVID-19 raises privacy concerns”, NL Times <https://bit.ly/2VhEmLG> - Retrieved 2020-04-13

The app intends to provide daily transportation and emergency transfer (for free) by utilising only authorised government vehicles.

- Poland – *#FakeHunter*

In order to tackle disinformation during the COVID-19 outbreak, the Polish Press Agency (PAP) and GovTech Polska, the Polish government's technology agency, are launching an app to fight misinformation and disinformation surrounding COVID-19.

The programme partners include Demagog, DO OK, Objectivity and Amazon Web Services.

- Saudi Arabia - *Tawakkalna*

This app provided by the Saudi Data and Artificial Intelligence Authority enables citizens to view their curfew status and if needed request emergency curfew break permission. The app also provides citizens with news alerts and medical advice during quarantine.

- Taiwan - *NHI App*

The National Health Insurance of Taiwan already has an app, but during this pandemic, people can also pre-order face masks using their app.

Still in Taiwan, as mask demands surged, an app developer created an interactive map to track local mask supplies since the country has a mask-rationing system.

News source *here*.³⁵

- Uganda – (contest open) *COVID-19 Quarantine Time Mobile App*

Pixan Inc, a Ugandan technology company, and Bold Cashers Limited have launched a contest for finding digital solutions that will ease the live of citizens during and after the pandemic. One of the categories is healthcare.

Participants can submit their mobile app project idea for consideration by sending the concept to *covid19qc@pixaninc.com*. The deadline for receiving applications is 25th April 2020.

4 | FAKE APPS, MALWARES AND DISINFORMATION

³⁵ Lee, Zinnia (2020-03-12) "Taiwan's app to track local mask supplies amid coronavirus pandemic", South China Morning Post <https://bit.ly/3ag6Utg> - Retrieved 2020-04-13

As already mentioned by countless sources and as highlighted by the World Health Organisation (WHO), the spread of false news during the COVID-19 pandemic generated an "infodemic" ³⁶.

Since the rumours were spreading faster than the virus, public health authorities have invested in partnering with online platforms to ensure that credible information reaches citizens.

Privacy issues (see point 5) have been under debate, but our security, especially online, has also been under threat during this pandemic.

With people spending more time surfing the internet and relying on it to stay informed, the risk of harm has risen (e.g. for vulnerable audiences such as children) and the panorama has become attractive to hackers.

One of the prominent problems has been the increase of fake apps that are consequently spreading malwares.

For example, the app "COVID19 Tracker" camouflaging itself as a COVID-19 outbreak map is ransomware. The app blocks the victim's phone and demands them to pay \$100 in bitcoin within 48 hours in order to lift the encryption.³⁷

Another example includes a web hijacker who has been opening victims' browsers and inviting them to download an information app that falsely claims to be an app of the World Health Organisation (WHO).³⁸

Health organisations have also been subject to cyberthreats, such as the *US Department of Health and Social Science*.³⁹

Now more than ever it is important to join efforts against cybercrime and to enforce our preparedness for cybersecurity threats.

5 | EUROPEAN COMMISSION POSITION

36 Zoe, Thomas (2020-02-13) "**WHO says fake coronavirus claims causing 'infodemic'**", BBC News <https://bbc.in/2KdWfUy> Retrieved 2020-04-17.

37 Villas-Boas, Antonio (2020-03-16) "**A fake coronavirus tracking app is actually ransomware that threatens to leak social media accounts and delete a phone's storage unless a victim pays \$100 in bitcoin**", Business Insider <https://bit.ly/3bhWkD3> Retrieved 2020-04-17.

38 Gedeon, Kimberly (2020-03-26) "**Fake COVID-19 apps are spreading malware: How to protect your PC**", LaptopMag <https://bit.ly/2RIW5JA> Retrieved 2020-04-17.

39 Clarke, Laurie (2020-03-17) "**Cyber-attack on US health agency aimed to disrupt COVID-19 response**", NC Tech <https://bit.ly/2yjYfIS> Retrieved 2020-04-17.

On 16 April 2020, the European Commission released a “Guidance on Apps supporting the fight against COVID-19 pandemic in relation to data protection”.

The Commission starts by stressing the importance of apps and how essential they can be in supporting public health authorities on the fight against the COVID-19 pandemic. Providing guidance to citizens and support to contact tracing efforts are some of the features that the European Commission values.

This set of recommendations especially underlines the importance of privacy-friendly technologies that use anonymised data, and which can have a more precise assessment of the contact, such as through Bluetooth proximity technology.

An important point is strict limits to data storage.

Regarding information functionality, categorised in this document under the cluster informational apps, the data should not be saved. “If any data is collected while installing this functionality, it should be deleted immediately.”⁴⁰

Regarding symptom checker and telemedicine functionalities, categorised in this document under the cluster of self-assessment/medical reporting apps, “such data should be deleted by the health authorities after maximum one month (incubation period plus margin) or after the person was tested and the result is negative”⁴¹. If health authorities need to retain the data for longer, it should be in an anonymised form.

Contact tracing and warning functionalities, categorised in this document under the cluster of contact tracing apps, follow the same procedure as the previous group.

40 European Commission (2020-04-16) “**Guidance on Apps supporting the fight against COVID 19 pandemic in relation to data protection**” (PDF) <https://bit.ly/2VEE4gP> Retrieved 2020-04-17.

41 European Commission (2020-04-16) “**Guidance on Apps supporting the fight against COVID 19 pandemic in relation to data protection**” (PDF) <https://bit.ly/2VEE4gP> Retrieved 2020-04-17.

However, in this case: “the data should be stored on the user’s device and only data that has been communicated by the users and is necessary to fulfil the purpose should be uploaded to the server available to the health authorities where this option is chosen.”⁴²

Apps can be an important tool assisting the health sector in this outbreak. However, when developing apps, countries should consult/involve Data Protection Authorities.

⁴² European Commission (2020-04-16) “**Guidance on Apps supporting the fight against COVID 19 pandemic in relation to data protection**” (PDF) <https://bit.ly/2VEE4gP> Retrieved 2020-04-17.

CONCLUSIONS

Mobile applications are technological approaches increasingly used by countries to curb the spread of COVID-19.

We noticed an exponential increase in the number of mobile applications based on contact tracing. Mobile contact tracing apps are especially popular in East Asia. Countries like China and South Korea are strong supporters of the use of this technology during the COVID-19 pandemic.

Familiar to previous and large-scale pandemics such as the Middle East Respiratory Syndrome (MERS) or Severe Acute Respiratory Syndrome (SARS), these countries saw a way to control the virus through citizen control via these digital infrastructures.

Different societies have different approaches. However, and as proven in this document, Europe begins to embrace and sometimes mimic this approach with the creation of apps to trace and track people.

Despite considering that apps can support public health authorities, the European Commission (EC) has raised concerns regarding citizens' privacy.

It is important to understand that this technology is being implemented because we are experiencing a health crisis.

However, this crisis should also encourage us to consider the progress of technological innovation and policy enhancement. We must be careful that privacy does not suffer.



BIBLIOGRAPHY

Ralph E. Johnson and Brian Foote, **"Designing reusable classes"** Journal of Object-Oriented Programming, June/July 1988 (PDF) (Edited 2001) <https://bit.ly/2XEr5OR>

Retrieved 2020-04-16.

Venkatraman, Adithya (2020-04-01) **"Weekly Time Spent in Apps Grows 20% Year Over Year as People Hunker Down at Home"**, App Annie <https://bit.ly/2xBFcK6> Retrieved 2020-04-07.

Nelson, Randy (2020-04-01) **"5-Year Market Forecast: App Spending Will Double to \$171 Billion by 2024 Despite COVID-19"**, SensorTower <https://bit.ly/3bfZLKx> Retrieved 2020-04-07.

"Privacy-Preserving Contact Tracing", Apple <https://apple.co/3euPHQ0>

Retrieved 2020-04-16.

"Contact Tracing Bluetooth Specification" (PDF) (Preliminary ed.), Apple and Google <https://bit.ly/2VgGymE>

Retrieved 2020-04-16.

"Contact Tracing Cryptography Specification" (PDF) (Preliminary ed.), Apple and Google <https://bit.ly/2XG8tOG>

Retrieved 2020-04-16.

"Contact Tracing Framework Documentation (API) (PDF) (Preliminary ed.)", Apple and Google <https://bit.ly/3bhmgPb>

Retrieved 2020-04-16.

"Privacy-Preserving Cross-Border Contact Tracing", BlueTraceProtocol

<https://bit.ly/3et15vz>

Retrieved 2020-04-16.

Government Technology Agency Singapore **"BlueTrace: A privacy-preserving protocol for community-driven contact tracing across borders"**, Blue Trace (White Paper PDF) <https://bit.ly/2XGk0xa>

Retrieved 2020-04-16.

"Pan-European Privacy-Preserving Proximity Tracing"

<https://bit.ly/2VH2IgW>

Retrieved 2020-04-16.

"PEPP-PT - Pan European Privacy Protecting Proximity Tracing", PEPP-PT (Manifesto PDF) <https://bit.ly/3ewIAq4>

Retrieved 2020-04-16.

DP-3T. "documents/README.md at master · DP-3T/documents · GitHub". Github.com. <https://bit.ly/34KEYN2>

Retrieved 2020-04-16.

"A Global Coalition for Privacy-First Digital Contact Tracing Protocols to Fight COVID-19", TCN Coalition <https://bit.ly/2KeKLRf>

Retrieved 2020-04-16.

TCNCoalition/TCN, TCN Coalition, 2020-04-15 <https://bit.ly/2ViqQYe>

Retrieved 2020-04-16.

Dara, Voun (2020-03-25) "**Covid-19 app contest launched**", The Phnom Penh Post <https://bit.ly/2XIzwIT>

Retrieved 2020-04-07.

Parsanlal, Nneka (2020-03-21) "**Covid-19 app contest launched**", **COVID-19 app developer: If you can do something to help, you should**, <https://bit.ly/2KfnmPE>

Retrieved 2020-04-07.

Douce, Sophie (2020-03-19) "**Au Burkina Faso, une appli pour déceler les symptômes du coronavirus**", Le Monde Afrique <https://bit.ly/2XLnHSa> - Retrieved 2020-04-07.

Gilbert, Ben (2020-03-10) "**The Iranian government released an official coronavirus app for Iranians, but Google pulled it from its app store**", Business Insider <https://bit.ly/2VjQGuV> -

Retrieved 2020-04-09.

Onaleye, Tomiwa (2020-04-02) "**Lagos State University Develops COVID-19 Self-test App for Nigerians**", Tech Next <https://bit.ly/2xCAhZo>

Retrieved 2020-04-07.

Jiji (2020-02-23) "**Free Japanese-language medical app offers advice about coronavirus**", The Japan Times <https://bit.ly/3er2TWd>

Retrieved 2020-04-10.

Montero, Ana Maria (2020-04-07) "**An app to detect COVID-19's telltale cough**", CNN Switzerland <https://bit.ly/2xuIJdg>

Retrieved 2020-04-16.

Grüll, Philipp (2020-04-10) "**VIENNA – Survey shows Austrians against making Corona-tracing-apps mandatory**", Euractiv <https://bit.ly/2XIt5Wd>

Retrieved 2020-04-13.

(2020-04-02) "**Covid-19: Thousands download coronavirus tracking app in Austria**", TheStar <https://bit.ly/2RLpDq> -

Retrieved 2020-04-07.

Davidson, Helen (2020-04-01) "**China's coronavirus health code apps raise concerns over privacy**", The Guardian <https://bit.ly/2xEVn9n>

Retrieved 2020-04-15.

Orovic, Joe (2020-03-30) "**Croatia's Tracking of COVID-19 Patients Takes Shape**", Total Croatia News <https://bit.ly/33ZrwEj>

Retrieved 2020-04-07.

Dillet, Romain (2020-04-08) "**France is officially working on 'Stop Covid' contact-tracing app**", Tech Crunch <https://tcrn.ch/3enKpFQ>

Retrieved 2020-04-13.

Logadóttir, Fanndís Birna (2020-03-31) **"Smitrakningarapp fer í loftið fyrsta apríl"**, Fréttablaðið logo <https://bit.ly/3exDDxh>

Retrieved 2020-04-07.

Askham, Poppy (2020-04-01) **"COVID-19 Tracking App Launches Today"**, The Reykjavik Grapevine <https://bit.ly/2VhVxwk>

Retrieved 2020-04-07.

McEnroe, Juno (2020-03-31) **"App to track and trace Covid-19 infections being developed"**, Irish Examiner <https://bit.ly/2XK4z7i>

Retrieved 2020-04-13.

Samuel, Stolton (2020-04-02) **"DUBLIN – Irish personal data survey"**, Euractiv <https://bit.ly/3cvrs2p>

Retrieved 2020-04-13.

Singh, Saurabh (2020-04-08) **"Govt discontinues Corona Kavach, Aarogya Setu is now India's go-to COVID-19 tracking app"**, Financial Express <https://bit.ly/3bkeTqn>

Retrieved 2020-04-13.

Ktn NEWS (2020-03-26) **"Kenyan Mobile App to track COVID-19 infections"**, Ktn NEWS <https://bit.ly/2Vzjf5y>

Retrieved 2020-04-07.

Ankhtuya (2020-03-23) **"Surveillance app being used in Mongolia to fight COVID-19"**, News.MN <https://bit.ly/34Hwsy2>

Retrieved 2020-04-13.

Guessous, Hamza (2020-04-14) **"Morocco commences development of COVID-19 tracking app"**, Morocco World News <https://bit.ly/3covg5p>

Retrieved 2020-04-16.

Keall, Chris (2020-04-12) **"Covid 19 coronavirus: As NZ considers TraceTogether, a Kiwi in Singapore gives his verdict on the tracking app"**, New Zealand Herald <https://bit.ly/2XJBrNt>

Retrieved 2020-04-13.

Bye Skille, Øyvind (2020-03-27) **"FHI-app skal lagre info om dine bevegelser i 30 dager"**, NRK <https://bit.ly/2Vf31QM>

Retrieved 2020-04-16.

Sharma, Shubham (2020-04-06) **"Poland working on ProteGo app that could help slow down coronavirus spread"**, Silicon Canals <https://bit.ly/3bnOsjo>

Retrieved 2020-04-07.

Kelion, Leo (2020-04-01) **"Coronavirus: Moscow rolls out patient-tracking app"**, BBC News <https://bbc.in/2KeP92Q>

Retrieved 2020-04-07.

Watson, Ivan & Jeong, Sophie (2020-02-28) **"Coronavirus mobile apps are surging in popularity in South Korea"**, CNN Business <https://cnn.it/3bi7gAP>

Retrieved 2020-04-07.

Pieters, Janene (2020-04-08) **"GOV'T plan to use app to track COVID-19 raises privacy concerns"**, NL Times <https://bit.ly/2VhEmLG>

Retrieved 2020-04-13.

Sumon, Shehab (2020-04-06) **"Bangladesh launches app for coronavirus tests"**, Arab News <https://bit.ly/3ajfGqh>

Retrieved 2020-04-07.

DAI (2020-03-20) **"USAID Program Develops Tool to Support COVID-19 Tracking in Haiti"**, DAI <https://bit.ly/2wMaQnI>

Retrieved 2020-04-07.

Lee, Zinnia (2020-03-12) **"Taiwan's app to track local mask supplies amid coronavirus pandemic"**, South China Morning Post <https://bit.ly/3ag6Utg>

Retrieved 2020-04-13.

Zoe, Thomas (2020-02-13) **"WHO says fake coronavirus claims causing 'infodemic'"**, BBC News <https://bbc.in/2KdWfuY> Retrieved 2020-04-17.

Retrieved 2020-04-17.

Villas-Boas, Antonio (2020-03-16) **"A fake coronavirus tracking app is actually ransomware that threatens to leak social media accounts and delete a phone's storage unless a victim pays \$100 in bitcoin"**, Business Insider <https://bit.ly/3bhWkD3>

Retrieved 2020-04-17.

Clarke, Laurie (2020-03-17) **"Cyber-attack on US health agency aimed to disrupt COVID-19 response"**, NC Tech <https://bit.ly/2yjYfIS>

Retrieved 2020-04-17.

Gedeon, Kimberly (2020-03-26) **"Fake COVID-19 apps are spreading malware: How to protect your PC"**, LaptopMag <https://bit.ly/2RIW5JA>

Retrieved 2020-04-17.

European Commission (2020-04-16) **"Guidance on Apps supporting the fight against COVID 19 pandemic in relation to data protection"** (PDF) <https://bit.ly/2VEE4gP>

Retrieved 2020-04-17.

(2020-04-28) **"Together we can fight coronavirus – download the Smittestopp app"**, Helsenorge.no

<https://bit.ly/2YNNV6W>

Retrieved 2020-05-07.