

Report Part Title: Appendix A:

Report Title: Pandemic Mitigation in the Digital Age

Report Subtitle: Digital Epidemiological Measures to Combat the Coronavirus Pandemic

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Appendix A: Country Case Studies

The purpose of this brief is to provide a conceptual framework and best practices for the application of technology to manage the corona crisis. Efforts to manage the crisis may be broadly categorized into three different buckets:

1. Contact tracing and monitoring of infections
2. Quarantine enforcement measures
3. Public communication

Cases have been drawn from 5 countries⁵¹ running through the following structure:

1. Short summary of country approach
2. Background study on pre-existing surveillance infrastructure
3. Best practices

In addition, an overview of key properties for each country is evaluated on the basis of their approach and data source:

Country	Approach	Data Source
Taiwan	Linking databases and geofencing	Mixed, mostly Provider Based
South Korea	Testing first, geofencing and linking databases	Mixed
Singapore	Public data release, case tracking	Ostensibly mostly User Based
China	Linking databases, enforced compliance, restriction of resources	Mostly Provider based
Israel	Geofencing and linking databases	Purely provider based

Country study 1: Taiwan

The Taiwanese approach is characterized by high transparency on all measures, **including on provider-based tracking, linking of databases, and segmenting of risk categories to streamline processing.** Taiwan has an extensive system of CCTV and is home to numerous CCTV companies⁵². Numerous smart city initiatives exist in Taiwan and extensive use is made of data-driven policy making. Examples include the national health insurance database which includes smart cards that track patient identity and medical history⁵³. The widescale use of provider-based cell-phone tracking for enforcing quarantine procedures likely builds on national security capacities.

⁵¹ China, Taiwan, South Korea, Israel, and Singapore

⁵² Chung, Lawrence: "Is Taiwan Becoming a Surveillance State? Privacy Advocates Sound Alarm", *South China Morning Post*: <https://www.scmp.com/news/china/politics/article/2163365/taiwan-becoming-surveillance-state-privacy-advocates-sound-alarm>

⁵³ Li, Yu-Chan: "Taiwan HIT Case Study", *Health Information Technology and Policy Lab*: <https://www.nbr.org/wp-content/uploads/pdfs/programs/TaiwanHIT.pdf>

Case 1a: Contact tracing and monitoring of infections⁵⁴

Taiwan has extensive structures put into place in the wake of the 2003 SARS epidemic, including a dedicated outbreak response unit for tracking any anomalous medical situation including anti-biotic resistant tuberculosis⁵⁵. Given the prior experience in the SARS epidemic, the first step Taiwan took was setting up structures for rapid inspections of incoming flights from Wuhan (as early as December 31) and efforts to coordinate the Ministries of Health and Welfare, Transportation, Economics, Labor, Education, and Environmental Protection. The Taiwanese approach has also been **characterized by the merging of datasets**, such as intersecting its National Health Insurance database with its immigrations and customs dataset. The purpose of this was to triage incoming flights for health screening based on recent travel history. This included proactive distribution of health declaration border passes via SMS. Another option was QR codes to report travel and health history for the last 14 days⁵⁶. Subsequent expansions of the dataset lead to 30 days travel history and an expanded set of countries.

Case 1b: Quarantine enforcement measures^{57 58}

14-day quarantine measures are mandatory in Taiwan for all incoming arrivals from high risk regions. In addition, foreign nationals have been banned from entry except under special circumstances. All entrants into Taiwan are required to undertake a 14-day home quarantine or subject to a fine of up to US\$ 33.000⁵⁹. All incoming high-risk individuals are given a health declaration and required to electronically sign a quarantine notification form⁶⁰. Face masks are mandatory, as are daily records of body temperatures. **High risk cases are geo-fenced via cellphone tracking and are given a text warning if they are found outside the perimeter⁶¹. The so called “electronic fence” is not voluntary and is not done by app but by the telecom provider** (cell tower triangulation)⁶². If the person under quarantine is seen as moving, they are called. If the cell phone is turned off (for instance due to depleted battery) then the police visit the residence.⁶³ People with unreliable phone connections or otherwise considered high-risk quarantine were provided government-issued cell phones for the purpose of electronic monitoring; failure to answer official calls leads to heavy fines. Officials call twice a day with activated video calls to ensure people don't avoid tracking by leaving their phones at homes⁶⁴.

⁵⁴ Duff-Brown, Beth: *How Taiwan Used Big Data, Transparency and a Central Command to Protect Its People From Coronavirus*, Stanford Health Policy: <https://healthpolicy.fsi.stanford.edu/news/how-taiwan-used-big-data-transparency-central-command-protect-its-people-coronavirus>

⁵⁵ Taiwan Centers for Disease Control: “Taiwan Epidemiology Bulletin”: <https://www.cdc.gov.tw/En/EpidemicTheme/List/dwCswLnYw874U8oPrVAPA>

⁵⁶ Moné, Brianna: “Taiwan Has Only 50 Coronavirus Cases. Its Response to the Crisis Shows That Swift Action and Widespread Healthcare can Prevent an Outbreak”, *Business Insider*: <https://www.businessinsider.nl/coronavirus-taiwan-case-study-rapid-response-containment-2020-3?international=true&r=US>

⁵⁷ Taiwan Centers for Disease Control: “Taiwan Epidemiology Bulletin”: <https://www.cdc.gov.tw/En/Category/Page/ONjOb0swWoBKWjZP6ahA3Q>

⁵⁸ Taiwan Today: “FAQ: Taiwan's 14-Day Quarantine Requirements”, *Taiwan Today*: <https://taiwantoday.tw/news.php?unit=2&post=173589>

⁵⁹ Cole, Brendan: “Man Fined \$33,000 After Breaking Coronavirus Quarantine To Go Partying At Nightclub In Taiwan”, *Newsweek*: <https://www.newsweek.com/taiwan-coronavirus-fine-taipei-quarantine-lockdown-covid-19-1493726>

⁶⁰ Ministry of Health and Welfare: “Quarantine System for Entry”: <https://hdhq.mohw.gov.tw/>

⁶¹ Yun, Michelle: “How Taiwan is Containing Coronavirus – Despite Diplomatic Isolation by China”, *The Guardian*: <https://www.theguardian.com/world/2020/mar/13/how-taiwan-is-containing-coronavirus-despite-diplomatic-isolation-by-china>

⁶² Presumed use of U-DTOA technology. This provides a maximum accuracy of 30m in urban areas but is much less accurate in rural areas, unless specific modifications have been taking. However, the inaccuracy is fixed unless the cell phone power is very weak -- therefore while the “Location” might not be exact the “movement” is discernable.

⁶³ BBC: “Coronavirus: Under Surveillance and Confined at Home in Taiwan”, *BBC*: <https://www.bbc.com/news/technology-52017993>

⁶⁴ Lee, Yimou: “Taiwan Tracking Citizen's Phones to Make Sure They Stay Indoors During Coronavirus Lockdown”, *Independent*: <https://www.independent.co.uk/news/world/asia/coronavirus-taiwan-update-phone-tracking-lockdown-quarantine-a9413091.html>

For those not in quarantine, face masks are recommended. Production and distribution of surgical masks was quickly nationalized to avoid price gouging and hoarding. Finally, **rationing of masks are achieved through requiring an individual's National Health Insurance card**, and an online ordering mechanism. **Foreigners that lacked such a card had to display their immigration services-provided QR code** for purchasing of masks. Further segmentation took the form of differing procedures for the purchasing of masks based on health status. Furthermore, each region's supply of masks, negative pressure isolation rooms, and other health provisions were mapped.

Case 1c: Public communication⁶⁵

One of the explicit purposes of the Taiwanese approach is to improve information management and create a one-stop information system for quarantine operations along with making the quarantine process and information management more efficient. To that end, a toll-free central hotline was created for citizens to report suspicious symptoms; as full capacity was reached each major city was asked to create its own hotline. The **governments openness in its communication strategy has been credited with maintaining high confidence** in the temporary suspension of privacy rights. Daily media briefings by officials and highly technocratic leadership (Chen Chien-jen, the Taiwanese VP, is a John Hopkins trained epidemiologist)⁶⁶ have helped in maintaining high public trust.

Country study 2: South Korea

The South Korean approach is characterized by **high reliance on GPS tracking and widespread testing capabilities, supplemented by provider-based efforts**. South Korea has also seen collaboration between its main telecom companies and law enforcement agencies,⁶⁷ and has a long history of domestic surveillance stemming from past military dictatorships. The government has made a distinction between private data and "de-identified data,"⁶⁸ where the latter is no longer considered personal data, and can be processed without the consent of data subjects for purposes other than the original intention, such as big data analysis, and can even be provided to third parties⁶⁹. The most recent pieces of data protection legislation passed are the PIPA and ICNA amendments that will take effect in July of 2020⁷⁰, the PIPA amendment specifically is aimed at bringing South Korea in line with EU GDPR requirements.

⁶⁵ Waltz, Emily: "Big Data Helps Taiwan Fight Coronavirus", *Spectrum*: <https://spectrum.ieee.org/the-human-os/biomedical/devices/big-data-helps-taiwan-fight-coronavirus>

⁶⁶ Shapiro, Don: "Taiwan Shows Its Mettle in Coronavirus Crisis, While the WHO is MIA", *Brookings*: <https://www.brookings.edu/blog/order-from-chaos/2020/03/19/taiwan-shows-its-mettle-in-coronavirus-crisis-while-the-who-is-mia/>

⁶⁷ Koo, Se-Woong: "South Korea's Invasion of Privacy", *New York Times*: <https://www.nytimes.com/2015/04/03/opinion/south-koreas-invasion-of-privacy.html>

⁶⁸ Lee, Miru: "Data Protection in the Age of Big Data in the Republic of Korea", *Global Information Society Watch*: <https://giswatch.org/node/6187>

⁶⁹ KISA: "Guidelines for Non-Identification of Personal Information"; https://www.kisa.or.kr/public/laws/laws2_View.jsp?cPage=1&mode=view&p_No=282&b_No=282&d_No=3&ST=T&SV=

⁷⁰ OneTrust Data Guidance: "South Korea- PIPA Amendments: What You Need to Know": <https://www.dataguidance.com/south-korea-pipa-amendments-what-you-need-to-know/>

Case 2a: Contact tracing and monitoring of infections⁷¹

South Korea has made extensive use of GPS tracking and location-based apps. One such volunteer apps is “Corona 100m”, which makes use of **provider-based (telecom) data and alerts users if they come within 100 meters of a location visited by an infected person**. Various public website also exist that allow users to keep track of infection hotspots⁷². Furthermore, the South Korean government has created a GPS-enabled app that would set off an alarm if patients in quarantine went outside⁷³. The availability of data has also created online efforts to identify coronavirus carriers publicly. The South Korean outbreak was highly clustered around the Shincheonji Megachurch in Daegu⁷⁴, meaning that



Figure 1 Corona 100m app (Source: *The Guardian*)
contact tracing efforts was focused on that cluster.

Case 2b: Quarantine enforcement measures

Anyone that has encountered a carrier is subject to mandatory quarantine through geo-fencing that is officially monitored via both in-person calls and visits **supplemented by voluntary use of a government provide quarantine app**.⁷⁵ Twice daily calls by official and mobile testing teams are implemented as well. The procedure is a patient interview, verification by CCTV footage, credit card records and mobile GPS data⁷⁶. The government then proceeds to release that data via text messages and state-managed websites to allow for hotspot mapping. With the number of people in quarantine reaching 30,000⁷⁷, an app was developed to help manage the program. The use of the app is not mandatory and is supplementary to the call monitoring system. In addition to the GPS apps noted above, there have also been efforts made to open

⁷¹ Wray, Sarah: “South Korea to Step-Up Online Coronavirus Tracking”, *Smart Cities World*:

<https://www.smartcitiesworld.net/news/news/south-korea-to-step-up-online-coronavirus-tracking-5109>

⁷² Dong-Hoon, Lee: “Corona Map”, *CoronaMap*: <https://coronamap.site/>

⁷³ Kim, Max: “South Korea is Watching Quarantined Citizens With a Smartphone App”, *MIT Technology Review*: <https://www.technologyreview.com/s/615329/coronavirus-south-korea-smartphone-app-quarantine/>

⁷⁴ Yoon, Dasl & Martin, Timothy: “Why a South Korean Church Was the Perfect Petri Dish for Coronavirus”, *The Wall Street Journal*: <https://www.wsj.com/articles/why-a-south-korean-church-was-the-perfect-petri-dish-for-coronavirus-11583082110>

⁷⁵ Kim, Max: “South Korea is Watching Quarantined Citizens With a Smartphone App”, *MIT Technology Review*: <https://www.technologyreview.com/s/615329/coronavirus-south-korea-smartphone-app-quarantine/>

⁷⁶ Law, Elizabeth & Choon, Chang May: “How China, South Korea and Taiwan are Using Tech to Curb Coronavirus Outbreak”, *The Straits Times*: <https://www.straitstimes.com/asia/east-asia/how-china-s-korea-and-taiwan-are-using-tech-to-curb-outbreak>

⁷⁷ Kim, Max: “South Korea is Watching Quarantined Citizens With a Smartphone App”, *MIT Technology Review*: <https://www.technologyreview.com/s/615329/coronavirus-south-korea-smartphone-app-quarantine/>

data on the availability of protective masks⁷⁸. The shortage of masks nationwide was resulting in long queues.

Case 2c: Public communication

Extensive use has been made of SMS notifications, as well as public information platforms, that includes public hotspot mapping. Pre-existing emergency infrastructure was also applied including the emergency ready app⁷⁹. The communication measures have also emphasized on getting as many people as possible to report for testing, many in rapid “drive through” test stations. As of March 24, 2020, South Korea has capacity for **up to 20.000 tests a day – by far the most comprehensive testing regime worldwide.**



Figure 2 Emergency Ready App (Source: [unintelligible])

Country study 3: Singapore

The Singapore public approach is characterized by **individual case tracing of contacts including the use of QR codes**⁸⁰ and making public exposure maps.

In addition, it has taken a maximalist approach to testing and has segmented its quarantines into different risk levels. **What is remarkable is the strong emphasis on “public empowerment” and user-provided data given that** Singapore has some of the most elaborate surveillance infrastructures in the world. Singapore has highly integrated datasets and makes extensive use of data analytics in its policy making apparatus. In addition, Singapore is the third most surveilled city outside of China in terms of CCTV cameras and has likely also made use of artificial intelligence facial recognition software⁸¹. Singapore has also stimulated the use of public data API’s to allow for app development and research.

Case 3a: Contact tracing and monitoring of infections⁸²

Singapore has publicly applied phone-based travel data tracking in conjunction with CCTV to back-track infection vectors. It follows a similar trajectory to South Korea, with patient interviews and a review of CCTV footage. In so-called “close contact” or otherwise “difficult” cases the patients may be asked to **voluntarily provide their mobile phones so as to be able to extract historic GPS movement data** and retrace subjects' movements. What is unknown is the role of the provider-based cellphone tracking, which is widely believed to be extensive and likely can deliver at least as accurate results as used in Taiwan (see above). Also unknown is the use of facial recognition technology in analyzing CCTV footage, but Singapore

⁷⁸ Wray, Sarah: “South Korea to Step-Up Online Coronavirus Tracking”, *Smart Cities World*: <https://www.smartcitiesworld.net/news/news/south-korea-to-step-up-online-coronavirus-tracking-5109>

⁷⁹ Jae-Un, Limb: “Emergency App Launched in English”, *Korea.net*: <http://www.korea.net/NewsFocus/Sci-Tech/view?articleId=117966>

⁸⁰ Singapore Government: “Coronavirus Disease 2019: Cases in Singapore”, *gov.sg*: <https://www.gov.sg/article/covid-19-cases-in-singapore>

⁸¹ Aravindan, Aradhana & Geddie, John: “Singapore to Test Facial Recognition on Lampposts, Stoking Privacy Fears”, *Reuters*: <https://www.reuters.com/article/us-singapore-surveillance/singapore-to-test-facial-recognition-on-lampposts-stoking-privacy-fears-idUJ5KBN1HK0RV>

⁸² Bengali, Shashank & Pierson, David: “How Singapore Has Kept the Coronavirus Under Control”, *Los Angeles Times*: <https://www.latimes.com/world-nation/story/2020-03-11/a-singaporeans-view-of-the-coronavirus-its-surprising-to-see-the-u-s-so-messed-up>

CCTV does have that capability⁸³. Singapore has traced down every single infection and mapped the vector into social network visualizations⁸⁴.



Figure 3 COVID19 Tracker (Source: Strait Times)



Figure 4 QR code for entry (Source: Personal Communication)

Singapore has put great public emphasis on the voluntary provider-based information. It has enforced checkpoints for any major office building that requires measurements by thermal scanner or digital thermometer, as well as logging of phone numbers and any recent travel in virus-affected areas. In addition, Singapore has made extensive use of QR codes at all public buildings and most transport nodes (including taxis) to facilitate contact tracing if needed. Using or entering these facilities require the scanning of the relevant QR code, and all public buildings have large-capacity body temperature measuring facilities (which is only marginally useful for this particular outbreak).

Singapore has also promoted “community” measures like the “TraceTogether” app. **TraceTogether is a government sponsored app** that uses Bluetooth to detect user proximity using the government developed BlueTrace protocol. Once a subject is confirmed to be infected anyone who has been within 2 meters for at least 30 minutes can be identified and notified⁸⁵. The app does not track location or contacts and will only store the information for 21 days unless the subject is identified as a close contact.⁸⁶ The Singapore government has decided to provide the source code of the app for free for foreign adoption.⁸⁷

Case 3b: Quarantine enforcement measures⁸⁸

Two basic quarantine orders are issued. “Stay at home” orders are executed for any person who has travelled abroad or who was in a general coronavirus-positive area. They are required to stay at home for

⁸³ Interview

⁸⁴ Covid 19 SG: “Singapore Cases”, AgainstCovid19: <https://co.vid19.sg/cases>

⁸⁵ Baharudin, Hariz: “Coronavirus: S’pore Government to Make Its Contact-Tracing App Freely Available to Developers Worldwide”, The Strait Times: <https://www.straitstimes.com/singapore/coronavirus-spore-government-to-make-its-contact-tracing-app-freely-available-to>

⁸⁶ Singapore Government: “Help Speed Up Contact Tracing With TraceTogether”, Gov.sg: <https://www.gov.sg/article/help-speed-up-contact-tracing-with-tracetogether>

⁸⁷ Baharudin, Hariz: “Coronavirus: S’pore Government to Make Its Contact-Tracing App Freely Available to Developers Worldwide”, The Strait Times: <https://www.straitstimes.com/singapore/coronavirus-spore-government-to-make-its-contact-tracing-app-freely-available-to>

⁸⁸ Min, Ang Hwee: “NTU to Log Student Attendance via QR Codes to Facilitate Contact Tracing for Coronavirus Outbreak if Needed”, Channel News Asia: <https://www.channelnewsasia.com/news/singapore/wuhan-virus-ntu-contact-tracing-attendance-qr-codes-12422134>

14 days. “Quarantine” orders are issued both to those who have tested positive for the virus or exhibited symptoms, as well as those who have been in close contact with an identified carrier⁸⁹. Quarantine may occur at home, but there are also dedicated government facilities available⁹⁰. Both types of orders are mandatory and are enforced. Measures include twice-daily phone calls and cellphone images of their surroundings. If patients are found to be non-compliant, RFID tags or detainment and isolation are also implemented. Patients in home quarantine are sent a SMS at randomized times to report their current location through a link that is provided to monitor compliance.⁹¹ While no public information is available on the use of cell phone (triangulation) data to monitor quarantine enforcement, it is likely that this is also used, similar to the employment in Taiwan.

Case 3c: Public communication⁹²

Singapore has taken steps to publicly disclose all infection vectors as well as identify infection hotspots. These include daily announcements of individual infections by “cases” as well as their likely point of infection and subsequent movements on a public website. GovTech⁹³ has also provided two or three daily updates on WhatsApp to counter misinformation flows⁹⁴; this included the application of AI tools to rapidly translate material from English into the other official languages.

Country study 4: China

The PRC is widely considered to have one of the world’s most elaborate internal surveillance capacities using vast systems of artificial intelligence, CCTV and facial recognition technology, telecommunication monitoring (both Internet access as well as cell-phone location tracking) and comprehensive bio-metric data to keep track of its citizens. Many of these measures were already bundled together under the “Golden Shield” program.

Case 4a: Contact tracing and monitoring of infections⁹⁵

The most well-documented case of app usage in China is the Alipay “Health Code” that uses color-coded QR systems for contact tracing and is effectively mandatory for any kind of movement. A Green QR code means proceed as normal, in the yellow and red cases means that there has been a definite or supposed contact with a identified coronavirus carrier. A green QR code is required to make use of public transportation, entering supermarkets or otherwise making use of public services, and it is necessary to “sign-in” with QR readers in specific locations. Data is intersected with other data streams including travel history as is the case in the “Qihoo 360/NoSugar Tech” proximity app⁹⁶. AI applications including chatbots and automated

⁸⁹ Yong, Clement: “How Quarantine Orders, Stay-Home Notices Differ”, *The Strait Times*: <https://www.straittimes.com/singapore/how-quarantine-orders-stay-home-notice-differ>.

⁹⁰ *Ibid.*

⁹¹ Basu, Medha: “Exclusive: How Singapore Sends Daily Whatsapp Updates on Coronavirus”, *GovInsider*: <https://govinsider.asia/innovation/singapore-coronavirus-whatsapp-covid19-open-government-products-govtech/>

⁹² Ministry of Manpower: <https://www.mom.gov.sg/covid-19/advisory-on-social-distancing-measures>

⁹³ Government Technology Agency: “Our Role”, *GovTech*: <https://www.tech.gov.sg/who-we-are/our-role/>

⁹⁴ Basu, Medha: “Exclusive: How Singapore Sends Daily Whatsapp Updates on Coronavirus”, *GovInsider*: <https://govinsider.asia/innovation/singapore-coronavirus-whatsapp-covid19-open-government-products-govtech/>

⁹⁵ Mozur, Paul; Zhong, Raymond & Krolik, Aaron: “In Coronavirus Fight, China Gives Citizens a Color Code, With Red Flags”, *New York Times*: <https://www.nytimes.com/2020/03/01/business/china-coronavirus-surveillance.html>

⁹⁶ *South China Morning Post*: “Apps Check For Coronavirus”, *Abacus News*: <https://www.abacusnews.com/tech/if-youre-worried-you-traveled-someone-coronavirus-get-these-apps/article/3048251>

calls are made to survey travel history and response for the purpose of publicly identifying infection hotspots.⁹⁷ The app sends as well as receives data from government servers, leading to situations where suddenly a “health color” changes when a risk is identified by the system. It is widely presumed that user-delivered data is correlated with cellphone location monitoring data,⁹⁸ which however would be much less accurate and not useful in multistoried buildings with lots of traffic. A further app called “Fuxuema” (“back to school”) created by Alipay competitor Tencent encourages the entry of student biometric data (like body temperature) to make yet another color-coded segmentation of risk. Other non-mandatory apps exist, such as another app provided by Tencent which tracks general “outbreak” areas (see Figure 6)⁹⁹ and therefore encourages users to avoid and plan around a specific area.



Figure 5 Alipay Health Code app (Source: South China Morning Post)



Figure 6 Tencent Mapping app (Source: Tencent)

Case 4b: Quarantine enforcement measures

Chinese quarantine protocols have been primarily centered on social containment through physical means rather than through technological means, a system massively facilitated by the use of local CCP officials and volunteers on a neighborhood level that are responsible for enforcing strict movement limitations in and out of residential buildings. The technological application has primarily been through the use of the “Health Code” app, which shows a red rating for all those under strictest quarantine measures. Software not used for enforcing quarantine per se, but which effectively still do so include “DingTalk”, sometimes called the Chinese version of the popular communication program “Slack”, which however also can include a location tracking component. It has become the principle quarantined schoolchildren home-school device and is especially unpopular as a result.¹⁰⁰ There are no public reports whether the Golden Shield system is being deployed to track quarantined user movement – for instance using cell phone location monitoring or facial recognition technologies. While this can be expected, the totality of the highly localized and physical travel restrictions in all urban areas make these technology measures less necessary.

⁹⁷ Mehta, Ivan: “China’s Coronavirus Detection App is Reportedly Sharing Citizen Data With Police”, TNW: <https://thenextweb.com/china/2020/03/03/chinas-covid-19-app-reportedly-color-codes-people-and-shares-data-with-cops/>
⁹⁸ Kuo, Lily: “The New Normal: China’s Excessive Coronavirus Public Monitoring Could be Here to Stay”, The Guardian: <https://www.theguardian.com/world/2020/mar/09/the-new-normal-chinas-excessive-coronavirus-public-monitoring-could-be-here-to-stay>
⁹⁹ Yang, Samuel & Zhao, Iris: “Bid to Contain Coronavirus COVID-19 Sees Chinese Tech Giants Deploy Tracking Maps”, ABC News: <https://www.abc.net.au/news/2020-02-22/coronavirus-covid-19-china-quarantine-measures-questioned/11987900>
¹⁰⁰ Li, Jane: “What is DingTalk, Alibaba’s Slack Equivalent That Quarantined Kids in China Hate?”, Quartz: <https://qz.com/1814937/what-is-dingtalk-the-alibaba-app-that-quarantined-kids-in-china-hate/>

Furthermore, an app has been rolled out that allows you to check not only your own exposure risk, but also the risk of three other persons.¹⁰¹ The assessment is based on shared classrooms, housing, travel, and the health status of first-degree social contacts upon which an evaluation of risk is made. The app is ostensibly connected into the data streams of the National Health Commission, the Ministry of Transport, China Railway, and the Civil Aviation Administration of China. The app appeared to be successful in calming down public anxiety and has been copied in South Korean cities.¹⁰² On the mitigation side, various apps allow users to identify whether they have traveled on a flight or train with another person who was infected with the virus. Similar apps exist for mapping of corona indications, including by Tencent (see Figure 6).

Case 4c: Public communication

The government has used the Golden Shield and Great Firewall technologies to both limit outside information as well as help track “misinformation” of whatever description. The “counter misinformation” track has been particularly challenged due to the overall high amount of communication by Chinese during the crisis, but had already failed at the outset – when the “whistleblowing” Wuhan doctor Li Wenliang posted a social media alert to his colleagues on the virus on December 30th. The report went viral despite attempts to shut it down. There has also been a marked uptick in the activity of the so-called “50 cent army”, the CCP’s 2 million strong “commentator force” whose job previously was largely to distract from political issues. Since March 15, it has directly contributed to spreading rumors that “the US Army was responsible for the Wuhan outbreak”.¹⁰³

Country study 5: Israel

The Israeli government – in the middle of a prolonged leadership dispute – announced on March 18 an emergency law to allow for the use of the country’s comprehensive domestic surveillance apparatus to combat the spread of the coronavirus.¹⁰⁴ While relatively new, these measures likely draw from the high level of integration between telecom providers as well as various datasets held by parts of the government. While the means are very controversial in Israel itself, a number of other CTQ apps are being developed as well.

Case 5a: Contact tracing and monitoring of infections

On March 18, some Israeli recipients received a SMS message from the Health Ministry announcing they had been in close contact with a coronavirus case and were told to self-isolate immediately. It subsequently emerged that the internal security service Shin Bet was using the technologies associated with counterterrorism to track and identify possible carriers based on past cellphone geolocations. While little additional information has been revealed, subsequent reporting indicates that the telephone providers have been able to fully map individual cellphone user movements at a very high level of detail (possibly

¹⁰¹ *The Strait Times*: “Coronavirus: China Introduces Close Contact Detection App”: <https://www.straitstimes.com/asia/east-asia/coronavirus-china-introduces-close-contact-detection-app>

¹⁰² Watson, Ivan & Jeong, Sophie: “Coronavirus Mobile Apps are Surging in Popularity in South Korea”, CNN: <https://edition.cnn.com/2020/02/28/tech/korea-coronavirus-tracking-apps/index.html>

¹⁰³ Yu, Haiqing: “The coronavirus and Chinese social media: finger-pointing in the post-truth era”, *The Conversation*: <https://theconversation.com/the-coronavirus-and-chinese-social-media-finger-pointing-in-the-post-truth-era-130698>.

¹⁰⁴ Lomas, Natasha: “Israel Passes Emergency Law to Use Mobile Data for COVID-19 Contact Tracing”, *TechCrunch*: <https://techcrunch.com/2020/03/18/israel-passes-emergency-law-to-use-mobile-data-for-covid-19-contact-tracing/>

exceeding the 30m location radius given as a normal maximum with different GSM triangulation technologies) over previous weeks and have combined the data with Health Ministry data on known COVID-19 carriers.¹⁰⁵

On March 22, the Israeli Health Ministry launched the “HaMagen” app, Hebrew for “The Shield”. The voluntary app uses a phone’s location history over the past 14 days and cross-references it with data from the epidemiological investigations of existing cases to determine if close contact was made.¹⁰⁶ It is unknown from where the original data on the investigation is drawn from.

Case 5b: Quarantine enforcement measures

Media reporting indicates that the same Shin Bet surveillance infrastructure was being used to provide real-time information to law enforcement on the street tracking adherence to quarantine orders. It was reported that it can extend to individual vehicles being stopped on the suspicion that a passenger is a likely or potential carrier who should be in quarantine.¹⁰⁷ At the same time, the government has said that it would not use the geolocation system to enforce quarantine procedures.¹⁰⁸

¹⁰⁵ Estrin, Daniel: “Israel Begins Tracking and Texting Those Possibly Exposed to the Coronavirus”, NPR: <https://www.npr.org/2020/03/19/818327945/israel-begins-tracking-and-texting-those-possibly-exposed-to-the-coronavirus>

¹⁰⁶ Kahan, Raphael: “Israeli Health Ministry Launches Voluntary Covid-19 Tracking App”, CTech: <https://www.calalistic.com/ctech/articles/0,7340,L-3803052,00.html>

¹⁰⁷ Estrin, Daniel: “Israel Begins Tracking and Texting Those Possibly Exposed to the Coronavirus”, NPR: <https://www.npr.org/2020/03/19/818327945/israel-begins-tracking-and-texting-those-possibly-exposed-to-the-coronavirus>

¹⁰⁸ Gross, Judah Ari: “Netanyahu Sparks Privacy Scare With Move to Track Corona Patient’s Phones”, *The Times of Israel*: <https://www.timesofisrael.com/netanyahu-sparks-privacy-concerns-with-move-to-track-corona-patients-phones/>