

Rapid Innovations in Response to COVID-19: Examples from the Republic of Korea

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COVID-19 became a huge global challenge within a few weeks. It is important to share some of the early experiences and lessons learnt – even though they might need to be revisited soon again. The Republic of Korea (hereafter ROK) is well known for its advanced technology and innovations. Since the breakout of COVID-19 in the country on 22 January 2020, the Government and the private sector have been introducing various innovative measures in response. This piece illustrates some innovative practices introduced by the Korean Government and the private sector with regards to public information disclosure, virus testing, and monitoring of quarantined persons by the authorities.

I. Innovative Practices

1. Public Disclosure of Information on COVID-19

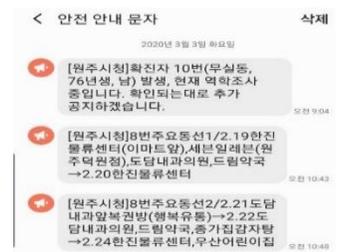
ROK is known worldwide for its advanced ICT as well as for the transparency of public information. In dealing with the COVID-19 crisis, the Government has taken various measures of open data to disclose real-time information to alert citizens on the possible risks in view of the highly infectious nature of COVID-19. In addition to the daily briefings from the Korea Centers for Disease Control and Prevention (KCDC) through the traditional media, the area-specific information is disseminated by local government entities, through frequent phone-based emergency alert messages, websites, as well as mobile apps.

CBS -based emergency alerts

With the use of mobile technology, Korean citizens are getting the latest COVID-19 outbreak updates from both central government authorities and local governments, specific to their location.

Municipal governments in ROK provide real-time information on confirmed cases in respective cities and travel routes of confirmed patients through mobile phone-based “Emergency Alerts” using a Cell Broadcasting Service (CBS) available to all mobile stations within a defined geographic area regardless of subscription.

CBS utilizes a cell phone’s paging channel to send out customized emergency alerts according to users’ location. The Ministry of the Interior and Safety (MOIS) in collaboration with the Korea Meteorological Administration (KMA), related government agencies and local governments, mobile carrier



[Figure 1] Emergency alerts from Wonju municipal government with detailed information on the itineraries of each confirmed patient including where and when the patients visited the location.

companies (SKT, KT, LGU+) and cell phone manufacturing companies run an emergency alert system to effectively respond to natural and man-made disasters.

These alert messages disclose detailed information on the itineraries of each confirmed patient (i.e. where, and when they visited the location, after developing the symptoms), as well as status updates on the epidemiological survey of the most recently confirmed cases.

CBS which is administered by MOIS is delegated to 17 municipal governments in ROK to ensure a prompt response in a crisis, and targeted approaches and field-based solutions.

Open database website by Seoul Metropolitan Government

Seoul Metropolitan Government (SMG) is well known for its public information disclosure policy. The website (<http://www.seoul.go.kr/coronaV/coronaStatus.do>) quickly developed by SMG allows citizens to access the latest list of confirmed patients' information, including their age, gender, date of infection confirmation, location of residence, along with detailed information on their itinerary (or "infection points")—i.e. where and when they visited after developing symptoms. They disclose the name of restaurants and shops (with the exact hour of their visits) and even the seat numbers at the cinema.

Such information is intended to enable residents to take precautionary measures and to monitor and report on their conditions if they develop symptoms after having visited the "infection points" at the same hours as the patients. The information is updated several times a day. SMG also has made a mobile application that provides the same information for convenience.

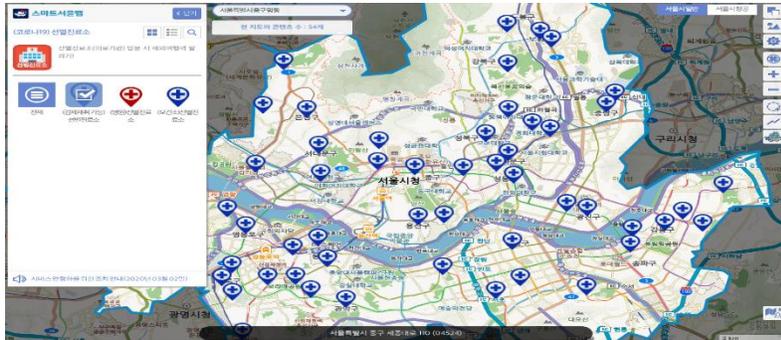
In order to mitigate the side effects on businesses (due to people avoiding the places even after disinfection), measures have also been adopted. For instance, the Seoul government also provides information about the nearest testing clinics and 'clean zones' (places that have been disinfected after visits by confirmed patients), to assuage people's fears and encourage the businesses. Users can run a search for 'clean zones' on the map.



[Figure 2] The Update Board on the above-mentioned website. The board shows the statistics of confirmed cases, suspected cases, testing, tested negative, self-quarantine, under surveillance, and surveillance lifted.



[Figure 3] Map of past itinerary of confirmed patients in Seoul. Green points show visited places and blue lines show travel routes by public transportation.



[Figure 4] Map of testing clinics in Seoul. The Smart Seoul Map allows users to search for nearest testing clinics. Blue points are testing clinics designated by the government.

클린존 CLEAN ZONE [방역관리시설] 이 시설은 서울특별시에서 방역을 완료하였습니다.

Public Facilities Disinfection Status

다중이용시설 방역현황

District	Facility Type	Facility Name	Facility Address	Disinfection Date	Frequency
자치구	시설구분	시설명	시설주소	최근 방역일	방역주기
강남구	대중교통	봉은사역	서울시 강남구 봉은사로 지하 601	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	삼성중앙역	서울시 강남구 봉은사로 지하 501	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	선정릉역	서울시 강남구 선릉로 지하 580	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	연주역	서울시 강남구 봉은사로 지하 201	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	논현역	서울특별시 강남구 학동로 지하 102 ? (논현동)	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	학동역	서울특별시 강남구 학동로 지하 180 ? (논현동)	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	강남구청역	서울특별시 강남구 학동로 지하 346 (삼성동)	2020. 3. 3.	매일 1회 이상 자체방역
강남구	대중교통	청담역	서울특별시 강남구 학동로 지하 508 (청담동)	2020. 3. 3.	매일 1회 이상 자체방역

[Figure 5] List of 'clean zones' (areas disinfected after confirmed patients' visit) in Seoul. Users can search by district and facility type. Facility type includes schools, hospitals, local markets, church, community centre, daycare centre, social welfare centre, and more. The website shows how frequently each facility is disinfected.

Patient Number	Personal Information	Infection Point	Date Tested Positive	Area of Residence	Quarantined Facility
97	Korean, Female, 1969	Contracted through Patient No.90	Mar 2	Gangnam District	Seoul Medical Center
	Feb 25	09:00 Office (Nonhyun Hakdong Station Exit 3) → 12:00 Lunch (Nonhyun Eonjoo Station Exit 3) → 15:00 Home			
	Feb 26	08:30 Hospital (Nonhyun Hakdong Station Exit 2) → 09:20 Pharmacy (Nonhyun Eonjoo Station Exit 2) → 09:30 Home			
	Feb 27	09:00 Office (Nonhyun) → 12:00 Lunch (Banpo Nonhyun Station Exit 2) → 13:00 Café (Jamwon Nonhyun Station Exit 6) → 19:30 Dinner (Shinsa Station Exit 4) → 22:00 Home			
	Feb 28	09:00 Office → 12:00 Lunch (Nonhyun Hakdong Station Exit 3) → 12:30 Café (Hakdong Station Exit 3) → 16:00 Visit to Friend's (Joongrang District Myunmok Town) → 21:00 Visit to Friend's (Anyang City)			
	Feb 29	15:00 Lunch (Goonpo City Sanbon Town) → 24:00 Visit to Friend's (Anyang City)			
	Mar 1	11:00 Home → 13:00 Gangnam Health Centre (Designated clinic) → 14:00 Home → 16:00 Groceries (Hakdong Station Exit 5)			
	Mar 2	09:00 Tested Positive			

*Mask worn on all days

[Figure 6] English translation of Patient No. 97's past itinerary in Seoul (as an example). Patients are numbered by order in which they are tested positive.

2. ROK's New Drive-Thru (DT) testing facility for COVID-19

The Government has also developed an innovative way to test the COVID-19: **approximately 85 drive-through testing stations (as of 19 March 2020)**. For instance, the City of Goyang in Gyeonggi Province set up a drive-thru testing facility on February 26, where symptom checks, sample collection and payment receipt are done in a one-stop fashion in under 10 minutes. At the drive-through coronavirus testing site, citizens simply let their windows down, and allow the nurses (protected by safety gears) to register the visitors, check their body temperatures, and use the swabs to get samples from their throats and noses. Results of the test come out within three days (including weekends) and are sent to testers by SMS.



Health officials test patients through a car window at the drive-through site.

Likewise, SMG has already set up the 'Drive Through' clinic in four locations. If additional tests such as lung X-rays are needed during the process, tests will be conducted in conjunction with nearby municipal hospitals and public health centers.

Sejong City, where the Government Complex is located, has also been operating the drive-through testing site since February 26. "If you take samples and wait for the results at home, you don't have to quarantine them at the hospital and not many people have to wait," said Moran Ki, Head of the Korean Society for Preventive Medicine's COVID-19 Response Committee.

3. Compulsory self-quarantine monitoring application

The MOIS developed an app in order to effectively monitor people who have been put on a compulsory self-quarantine by the government authorities--e.g. who are waiting for the test results and those who are waiting to be tested for identified risks. *(Note: The compulsory self-quarantine is imposed through an official government order by the health authorities.)* This was urgently introduced in response to the challenges the Government recently experienced with those who violated the quarantine orders and infected more people by moving around. On 6 March, the Government announced that it will start utilizing this app for 32,400 persons.

The app has two types: one for quarantined COVID-19 persons and the other for government officials in charge of monitoring them. Quarantined persons register their personal information and their quarantine locations (as designated by the authorities) so that notifications are made when they move out of a designated area. The result of self-diagnosis on health is automatically shared with government personnel in charge of monitoring twice a day. Furthermore, police services can be requested if the quarantined person leaves the designated location.

Those who refuse to abide by the compulsory quarantine could be fined up to 3 million Korean won (around USD 2,500) according to the Infection Disease Control and Prevention Act. The punishment will be strengthened from the 5th of next month, resulting in up to one year in prison or up to 10 million won in fines. The app also provides daily rules to live by for quarantined persons and contact information about government officials in charge.

In order to effectively enforce the quarantine, the police action is also linked with this app. When the health officials report that quarantined persons have left their designated locations and cannot be contacted, the police are to dispatch their personnel to track them down, and help transfer them back to their self-quarantine locations.

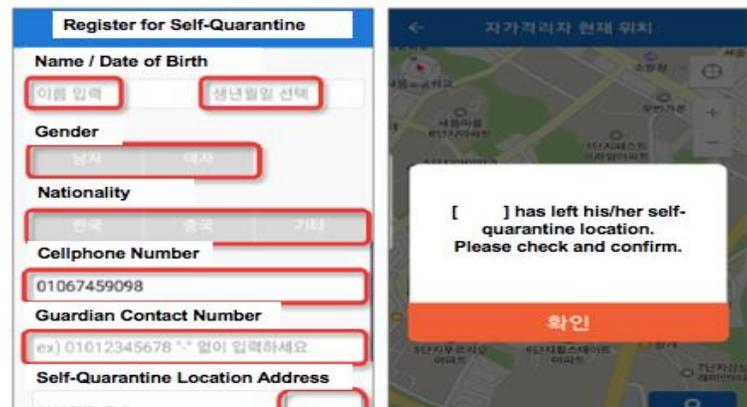


[Figure 7]

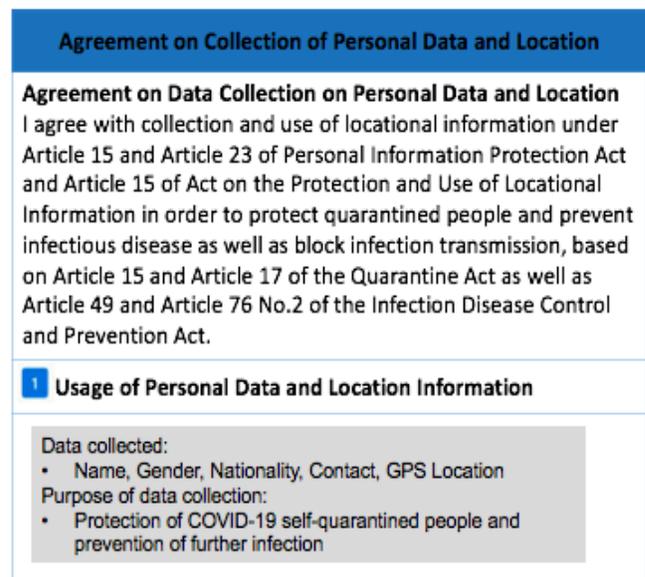
The application offers the following services:

- 1) Register personal information and address of self-quarantine location
- 2) Self-diagnosis of symptoms and report to official in charge
- 3) Alarm alert when leaving designated quarantine location
- 4) Guidelines for the compulsory self-quarantine and contact information of official in charge

[Figure 8] Users are required to register user information as above. When the user leaves the designated quarantine location, a notification is sent to both the user and the official in charge.



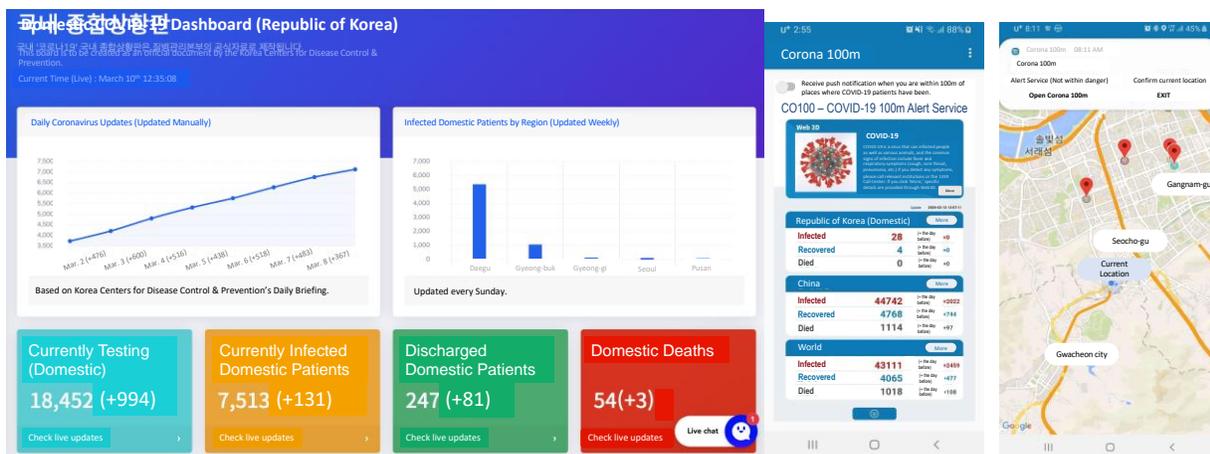
[Figure 9] The application requires a user agreement on the collection and use of individual GPS information. The application also provides services in three languages: Korean, Chinese, and English. To the right is the translation of the user agreement screen.



II. Private-sector responses to COVID-19

Based on the data provided by the Ministry of Health and Korea Centers for Disease Control and Prevention, private sector companies have developed **real-time dashboards** and mobile apps to further increase public awareness and effectively **disseminate disease information**. Such technologies (e.g. [Corona NOW](#), [Corona Map](#), [Corona 100m](#)) allow people to visualize data on confirmed **coronavirus patients, along with the patient's nationality, gender, age, which places the patient has visited**, and how close citizens are to these coronavirus patients.

[Figure 10: Images of real-time dashboards and mobile apps with information translated into English]



Mobile carrier companies are also exchanging mobile data with the government to monitor the movement paths of patients with COVID-19 as per the Infectious Disease Control and Prevention Act. An example of private sector efforts, particularly to use mobile big data to prevent global epidemic diseases, include KT's Global Epidemic Prevention Platform (adopted as Safiri Smart in Kenya) that sends warning messages to people who visit disaster-prone areas; enables the public to make real-time reports to health offices; and enables the government to collect and monitor data on health crises.

With the Ministry of Education's decision to postpone the new school term by three weeks, **online learning platforms** are being used to substitute regular courses and to send out announcements to parents and students. (e.g. [CLASSUM](#), [Classting](#), other global video conferencing platforms). At the same time, **online and mobile shopping** and delivery services are even more frequently used to **lower the exposure** to risks caused by people to people contact.

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