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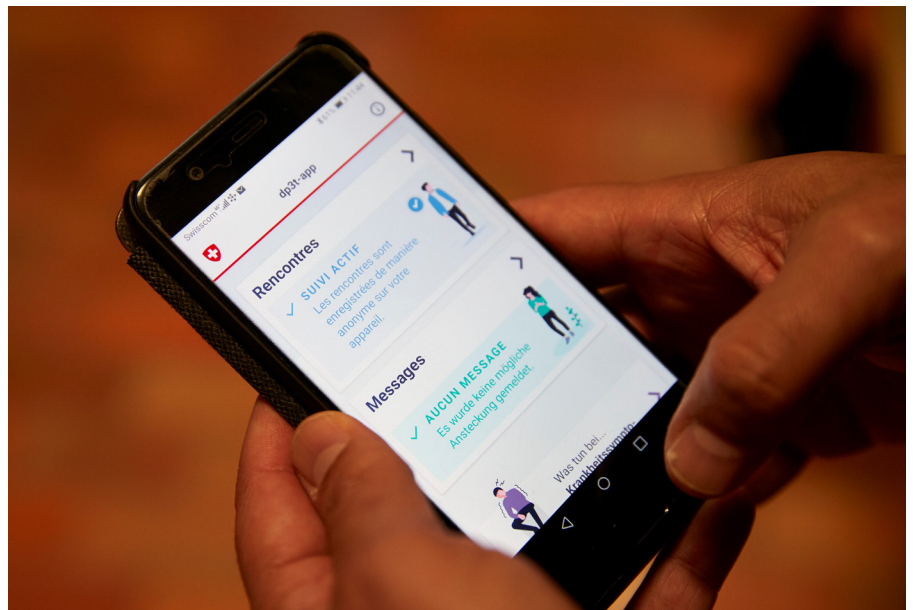
Digital Technologies in Corona Crisis Management

In the context of the global efforts to deal with the coronavirus pandemic, digital technologies are taking on a role that is both visible and controversial. At the same time, the reciprocal relationship between technology and society is often ignored. In interaction with other crisis management measures, countries worldwide apply digital technologies in very different ways.

By Sophie-Charlotte Fischer,
Kevin Kohler and Andreas Wenger

The first pandemic in the age of smartphones, big data, and artificial intelligence has led to a sudden proliferation of digital tools designed to fight infectious diseases. Digital technologies can be used to monitor and control physical distance and quarantine measures, they can facilitate contact tracing, and the detection of infection clusters. They can also help track the health status of individuals. However, digital technologies alone are not a magic bullet in the fight against the novel coronavirus SARS-CoV-2. Whether the technical possibilities are used in crisis response, and how and by whom they are used, depends on many factors.

In Europe, many have modeled their responses on those of Asian countries, some of which had used digital tools quickly and efficiently. At the same time, however, there was also skepticism about a perceived lack of concern about data protection and basic individual rights in Asia. While certain fundamental differences between Europe and Asia in the experience of dealing with pandemics and technology governance cannot be denied, the use of digital technologies in crisis response differs from country to country in both Asia and Eu-



The SwissCovid app, which uses the Google and Apple interface and stores the data decentrally on the devices, has been in the pilot phase since the end of May. Denis Balibouse / Reuters

rope. These differences reflect the complex interactions between politics, technology, and society.

Moreover, in both Asia and Europe, digital tools are most effective not when applied in isolation, but in combination with many

other analog measures as part of an overall strategy to tackle the pandemic. Therefore, there are currently intense debates at national levels about the effective and legitimate use of digital technology in different countries and societies. This gives rise to complex questions and trade-offs in terms

of desired or undesired social, economic, and political repercussions – including data protection, inequality, and state surveillance. Furthermore, in a globalized world characterized by cross-border mobility, there is an urgent need for internationally recognized technology standards.

China: Digitalized Control

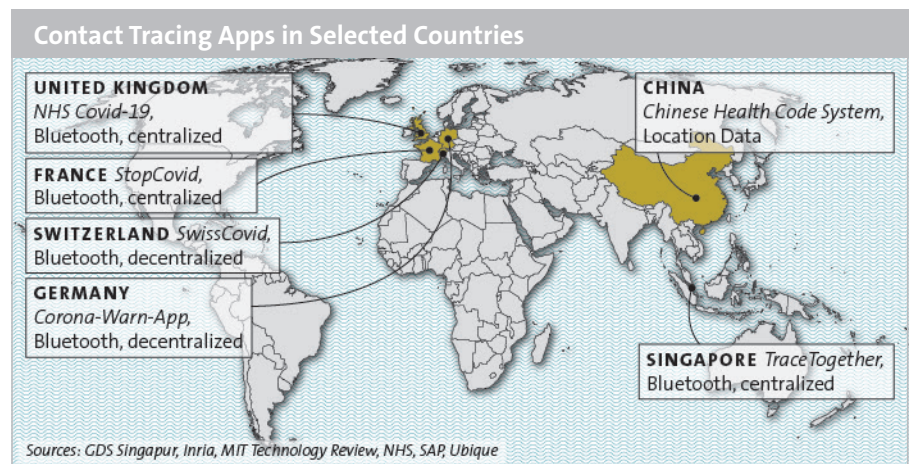
China, the country where the coronavirus originated, exemplifies how the existing political and technological foundation of the state influences its crisis response. Even before the corona crisis, the increasing fusion of state control and digital technology was a characteristic of the relationship between state and society in China. Against this background, it is hardly surprising that in order to contain the pandemic, China made extensive use of digital technologies to control its citizens involving the non-transparent collection and processing of data.

In order to identify individuals' faces in public spaces while measuring their body temperature, China is deploying widespread facial recognition software in combination with infrared technology. Other technologies include applications integrated into the smartphone apps Alipay and WeChat that encode the health status of citizens based on personal data. The result is a green, yellow, or red QR code that will determine an individual's freedom of

In China, the existing political and technological foundation of the state influences its crisis response.

movement. However, it remains unclear how the respective color codes are generated, which actors have access to the collected data, and how the data is further processed.

These applications are just a few examples of the increasing expansion of surveillance policies that are now also impacting crisis management. It remains to be seen which of the measures taken in the context of crisis management will be lifted, and when. Critics warn that although data may have been initially collected for a legitimate purpose, they can also be used for other political or economic objectives. In any case, new opportunities are opening up for the state and for political parties to extend their control over the population. Moreover, the development of national technology solutions encourages differentiation



from the rest of the world. For Chinese tech companies such as Tencent, Alibaba, Baidu, and Megvii, new economic opportunities are opening up both inside and outside of China.

Singapore: Socio-technical Limitations

Due to its rapid response and the combination of airport health checks, strictly enforced distancing rules, and broad-based testing, Singapore was long considered a model for the successful control of the coronavirus. The city-state managed to keep its chains of infection under control until the end of March. Then, a rapid increase in the number of cases occurred, mainly among foreign migrant workers who live in confined spaces and are severely disadvantaged, both socially and politically. As a result, the government was forced to impose a lockdown on public life and the economy, although the number of infections among the local population remained small.

Part of Singapore's initial success was due to a strict policy of contact tracing, combining analog and digital measures. In European countries, the "TraceTogether" app in particular received a lot of attention. It uses Bluetooth technology to detect the proximity between smartphones. This approach was explicitly cited as a model for European apps, which added privacy protection measures. However, the example of Singapore also shows that the role of digital technologies in combating the pandemic should not be overemphasized. Despite a fundamentally high level of social acceptance of new technologies, the voluntary app is still only being used by around 20

per cent of the population. It is thus primarily a supplement to a policy of strict manual contact tracing, which in turn is supported by the state's strict monitoring of quarantine for those infected.

South Korea and Taiwan: Experience

South Korea and Taiwan were very quick to react to the first public report of the emergence of a novel viral lung disease in China. Unlike Singapore, neither of these countries have been forced to declare a state of emergency or comprehensively shut down social and economic life so far. This is all the more surprising as South Korea and Taiwan were both exposed to a relatively high risk of imported cases due to the high volume of travel to and from China. It is therefore very likely that the two countries' success so far in containing the coronavirus can be attributed to their previous experience in dealing with coronavirus epidemics.

The memory of China's lack of transparency during the SARS outbreak in 2003 was particularly crucial in shaping the rapid response of South Korea and Taiwan. Not least due to this experience, both countries decided to impose quarantine measures for travelers from high-risk areas in China without waiting for the World Health Organization's (WHO) official confirmation of human-to-human transmission. Similarly, they were quick to ramp up national production lines for the manufacture of masks. In South Korea in particular, capacities for rapid testing were also expanded at an early stage. All these measures were facilitated by the expansion and further development of national crisis management systems initiated in the wake of previous epidemics.

South Korea in particular had not always been successful in handling previous epidemics. During the MERS-CoV epidemic in 2015, for example, the country had the second highest number of reported infections worldwide after Saudi Arabia. The government at the time was strongly criticized, among other things, for withholding relevant information about the whereabouts of infected individuals. Subsequently, South Korea formulated the strategy of complete openness and transparency in dealing with epidemics that is in effect today. This includes publishing very precise information on the movement profiles of infected individuals and making accessible the location of all individuals in quarantine.

The Infectious Disease Control and Prevention Act, revised in 2015, allows the South Korean Ministry of Health to request and use personal information (location data, credit card transactions, and video recordings) for contact tracing. The data exchange is managed via an automated platform that connects 28 organizations and greatly accelerates manual and digital tracing. Quarantine violations are subject to heavy fines in South Korea and are monitored with GPS-encoded tracking bracelets. Even though the disclosure of sensitive personal data has sometimes been criticized, public confidence that this data will be used only temporarily, and based on the pandemic legislation, seems to remain fundamentally intact.

Europe: Diverging Preferences

Even though national crisis management efforts in Europe have varied, two fundamental differences can nevertheless be identified in comparison with the various socio-political contexts in Asia: On the one hand, most crisis management systems in Europe had less experience in dealing with coronavirus epidemics, since European countries had been largely spared during the SARS (2003) and MERS (2015) outbreaks. The pandemic plans of most European countries were therefore based on mitigation strategies modeled on influenza scenarios that are familiar to Europeans and have resulted in significantly lower mortality rates. European societies also tend to greatly value data protection in the context of technology governance and healthcare policy.

Given the rapid escalation of infection rates, digital technologies only played a minor role in the first phase of the response to the crisis in Europe. Their use was only promoted in a second phase, with the aim

of analyzing the population's mobility behavior during the so-called lockdown and of finding a path towards establishing a new normality. The debate on the development and deployment of a pan-European contact-tracing app proved particularly controversial. The cross-border work of scientists and industry experts on a software toolkit for such an app led to a dispute between those who preferred a decentralized solution, with user data being primarily stored on smartphones, and those who argued in favor of a centralized solution, with data also being stored on a central server. Subsequently, these two approaches were reflected in the divergent preferences of European governments.

In addition to the issue of data protection, the economic and political influence of private companies also played a significant role in determining the situation in Europe. Germany, for example, had initially opted for a centralized solution before opting for a decentralized version. On the one hand, this decision was due to widespread societal concerns about centralized data storage and processing. On the other hand, the market dominance of Google and Apple may have also influenced this choice, since compatibility with the two most common operating systems for smartphones – Android and iOS – is a prerequisite for effective digital contact tracing via Bluetooth. In a rare show of unity, both Google and Apple advocated a decentralized approach early on and have been developing a programming interface based on this premise ever since. This is also why the UK is now considering a decentralized rather than a centralized approach. France, by contrast, is sticking to a centralized solution for the time being and is pressuring both companies to provide more leeway when it comes to implementation.

In Europe, too, many additional private and public applications based on digital technologies are being developed in addition to the contact tracing apps. France is testing the use of facial recognition software in the Paris subway system in order to establish how many people are wearing masks. In Poland, facial recognition is integrated into the quarantine app. In Liechtenstein, a pilot project is underway using tracking wristbands made by the Zurich-based start-up Ava, which record health data including skin temperature as well as respiratory and heart rates. The use of a

similar health-tracking system is also being tested in Bulgaria and Belgium.

A Holistic Perspective

None of these individual technological solutions will be decisive on their own in the fight against the coronavirus. However, as long as no vaccine is available, the same is true for all non-digital measures. It is therefore all the more important that societal and political debates should consider the interplay of all analog and digital measures within the framework of an overall strategy. This involves a complex balance of social and political interests, and the identification of the most suitable combination of effective measures. The aim of an overall strategy must be to use targeted and effective measures to facilitate economic and social life while keeping the virus under control until a vaccine is available.

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Digital technologies are no substitute for non-technical measures and technological solutions must be tailored to the respective socio-political context. This also applies to the widely discussed and controversial digital contact tracing, which complements the well-established healthcare practice of manual contact tracing. Experts agree that the full impact of digital tracing apps only begins to unfold when they are used by approximately 60 per cent of the population. For the foreseeable future, such a usage rate will probably be hard to achieve on a voluntary basis without additional incentive mechanisms. Moreover, with most projects, many non-technical issues in connection with their integration into an overall strategy still remain unresolved; additionally, the underlying technologies will require further testing and practical experience in terms of acceptance, effectiveness, and regulation.

The effectiveness of hybrid contact tracing that combines manual and digital approaches depends on how well it is integrated with other measures, such as hygiene measures, physical distancing, broad testing, the possibility of self-quarantine for all, and many other sector-specific measures that contribute to overall success. In these areas too, politics and society will have to strike a difficult balance between the common good and individual funda-

mental rights, and between government action and individual responsibility. Ulti-

Digital contact tracing also represents a test for the European digital path.

mately, the basic question is who will make decisions for how long and on what legal basis. The great uncertainty surrounding the coronavirus requires that the effectiveness of the measures must be continuously monitored and the overall strategy gradually adapted to an evolving situation.

International Cooperation

The shock of the corona crisis will lead to a worldwide reassessment of epidemic control measures. Thus, the process of adapting pandemic plans and crisis management systems will keep states and international organizations busy for years to come. From a European perspective, it is crucial that technological development is accompanied by a broad societal debate even in times of crisis. It is important to strike a balance between rapid and legitimate decisions, between data protection and data exchange, and between national and international so-

lutions. For the time being, the focus of the debate has shifted to the national level – which is hardly surprising, given the different regional impact of the pandemic and the distinctiveness of the various socio-political contexts affected by it. Over the long term, however, it remains crucial in a globalized world that contingency plans for the next pandemic should also be coordinated at the international level.

With the gradual opening of the borders in Europe, the pressure to cooperate is mounting, especially in the area of digital contact tracing. In principle, this should be seen as an opportunity to find an international solution that is considered effective and legitimate beyond the limits of Europe. After all, the EU's power to shape technology governance is one of its strengths: The influence of the General Data Protection Regulation (GDPR) extends beyond the circle of EU member states. For Europe, a cross-border solution is vital for political, economic, and social reasons. Since the effectiveness of contact-tracing apps is based on network effects, they can help policymakers overcome the initially incoherent national responses to technology develop-

ment. At the same time, however, the debate on European tracing apps also underlines Europe's dependence on US tech companies. Against this background, digital contact tracing also represents a test for the European digital path. It remains to be seen whether Europeans will succeed in developing and deploying cross-border digital technologies for pandemic management in a timely and pragmatic manner that is also based on democratic processes and standards.

For more on Socio-technical Resilience and Disaster Preparedness, see [CSS core theme page](#).

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