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COVID-19 TRANSPORT BRIEF

Drones in the Era of Coronavirus

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Drones are proving to be versatile and effective tools in the Coronavirus epidemic. Yet with drone regulation still in its infancy, their potential is not fully exploited. Drone deployment in the Covid-19 crisis thus offers a learning opportunity for how airspace regulations could be updated to facilitate their use – also beyond emergency response.

Takeaways from this Brief

- In the pandemic, drones are being used for contact-free delivery, surveillance, enforcement, and hygiene applications.
- Administrative exemptions from airspace regulations and fast-track partial deregulation were needed to deploy drones against Covid-19.
- Positive experiences with drones during the pandemic may shift attitudes towards drones and increase acceptance of non-emergency uses.
- Concerns remain about the safety of drones, as well as impacts for security, privacy and the environment. Equitable use and impacts on jobs are additional issues.
- Establishing a regulatory framework for drones that takes into account concerns beyond safety could improve emergency responses in the future. It could also be helpful for drone deployment for general transport uses.

The need to reduce human contact as a health precaution in the time of Covid-19 has provided a boost to the use of drones. Since the onset of the Coronavirus crisis, drones have been deployed to deliver medical supplies, collect or dispatch lab samples, deliver daily necessities to confined citizens, monitor social distancing, make public announcements, or disinfect public spaces.

The indisputable utility of drones in the current health crisis may well accelerate their deployment and may lead to increased social acceptance for the use of these tools. As some forms of physical distancing and even of confinement will probably stay in place for some time, devices that can carry out specific tasks without human contact may even see continued demand. Positive experiences with drone deliveries and other services they can provide could lead to a permanent shift in attitudes towards drones that may go beyond the immediate use of drones during the crisis.

The regulatory framework for the operation of drones is evolving in most countries. At the time of the Covid-19 outbreak, regulations were still mostly restrictive. Drone use was limited, *inter alia*, out of concern for potential safety, security, privacy and environmental issues. Critics also raised issues related to equity (will drone services be only for the well off?) or employment (will jobs be lost due to

automation?), to name some of the most important. Their deployment during Covid-19 crisis has thus been based on pragmatic interpretation of the rules, administrative exemptions for specific use cases and, in some cases, also fast-track (partial) deregulation.

The practical experience shows that governments should adapt airspace regulation to accommodate and make even better use of drone applications in future emergencies. Lessons learned during the crisis and from examining the use-cases that prove to be of societal benefit during the Coronavirus crisis may even encourage updates to drone regulation that go beyond the use of drones in times of crisis. This Brief provides an – necessarily preliminary – overview of practical use cases of drones that have emerged in the era of Covid-19 so far. The focus is on drone applications for the movement of goods, for the monitoring of peoples' movements and their regulatory context.

Contact-free delivery

Drone operators around the globe have begun to cater to new demand induced by Covid-19. They deliver supplies, medical and other, with a minimum of human interaction, thus helping to limit the risk of human-to-human transmission of the Coronavirus.

Hit first by the virus, **China** was also among the first countries to use drones in response to Covid-19: In February 2020, a drone successfully transported test samples and medical supplies from a local hospital in Zhejiang province to a nearby disease control center. Its operator, Antwork, part of Japanese group Terra Drone, had been the first urban drone delivery company to obtain a license from the Civil Aviation Administration of China (CAAC), in October 2019.

Immediately after Wuhan was put under quarantine on 23 January 2020, Antwork offered to provide technical support to authorities with its drones and received permission contingent on its ability to meet certain health precautions. The operator claims to have more than halved transport time compared to ground transport and so helped to relieve stress on medical staff. Antwork has since begun assisting other medical institutions in China in a similar fashion (Cozzens, 2020).

In April 2020, **Ireland**'s aviation authority approved drone operator Manna Aero to deliver medication and critical supplies to roughly a dozen households under confinement in the rural town of Moneygall. The delivery works in a "closed loop" end-to-end system: local doctors prescribe medication after a video consultation; these are then dropped off at patients' homes by the drones, which can carry up to 4 kg. The operator says it can currently provide up to 100 flights a day, but looks to expand its service to other towns in Ireland and also the United Kingdom. Non-medical products such as groceries could also be delivered (Chandler, 2020; Reuters, 2020, Molloy/Copestake, 2020).

In **Switzerland,** US drone operator Matternet was cleared already in 2017 to carry out autonomous, beyond-the-line-of-sight flights to transport blood samples between hospitals in the city of Lugano for a maximum distance of 20 km and 2 kg load (Kolodny, 2017; Zorthian, 2017). However, the demonstrated capabilities of this well-established drone service were not utilised during the health crisis. As the Swiss health system switched to a Covid-19 response and standard processes were de-prioritised, the transport of blood and urine samples from the emergency room to a lab by drone was also halted (Protalinski, 2020).

In **Ghana**, US-based drone operator Zipline is supporting the Ghanaian authorities in their fight against Covid-19 since 1 April by providing a "contactless drone delivery" service that collects Coronavirus test samples from 1 000 rural health facilities and delivers them to laboratories in Accra and Kumasi. (Reuters, 2020).

This alternative to long and arduous transport across difficult terrain by vehicle has reduced the transit time of test samples from many hours to less than one hour in some cases. Zipline plans to conduct daily flights of test samples as long as needed (Reuters, 2020; Muller, 2020).

The rapid implementation of this specific use of drones as the Covid-19 crisis unfolded was facilitated by an existing collaboration between Zipline and the Ghanaian government. Zipline is operating the world's largest drone delivery network in Ghana, with up to 600 flights per day that deliver vaccines to 2 000 hospitals across the country. Zipline, which has had a presence in Rwanda since 2016, had been working in Ghana since April 2019 and airspace regulations had already been adjusted to permit drones to carry out such flights (McBride 2020; ITF, 2019).

In the **United States**, Zipline has been granted permission by the Federal Aviation Administration (FAA) to deliver medical supplies and personal protective equipment in a contactless manner to a medical centre in Charlotte, North Carolina, in response to Covid-19. This is the longest-range drone delivery service approved in the US so far. (Bright, 2020; Porter 2020)

Major US companies like Amazon and Alphabet (parent of Google) have been exploring the use of drones for some time. Wing, the drone subsidiary of Alphabet, has been running deliveries in the rural town of Christiansburg, Virginia, since October 2019. With the onset of the Covid-19 crisis, enrollment in, and orders through, Wing have risen sharply. Wing drones deliver pharmacy orders, daily necessities like toilet paper, and take-out meals to local residents, usually within ten minutes. The service alleviates pressure on traditional last-mile delivery providers and has helped local firms stay in business despite confinement (Dwyer, 2020).

Surveillance and enforcement

Surveillance is another increasingly common use case for drones in the Covid-19 crisis. Again, **China** took the lead and deployed surveillance drones early during the pandemic, with other countries across the world following suit (Liu, 2020).

In **France**, the police have used drones to monitor compliance with lockdown measures, especially in public spaces such as parks and beaches (Mogg, 2020). In **India**, police in Hyderabad have deployed two drones to identify "sensitive" areas where people are not following lockdown requirements. This information is then used for the targeted deployment of police officers (Choudhary, 2020).

In March, **Italy's** civil aviation authority ENAC exempted local police forces from regulatory restrictions on drone operations after receiving requests from "many local police units" to monitor the movements of citizens during the pandemic (Holroyd, 2020). Authorities have also used loudspeaker-equipped drones as flying public address systems to remind citizens to respect physical distancing requirements in public spaces – for instance in Italy and in several US states. There, authorities have also used drones for communicating to specific communities difficult to reach by more common means, such as homeless people (Santocchia, 2020: Guerrero, 2020).

A more advanced, and still experimental, use case has been to install thermal cameras on drones to identify potentially infected citizens by their body temperature. This practice has been reported from **China, India, Italy, Oman** and **Colombia**, among others. Its efficacy is contested, however (Greenwood, 2020; Acosta, 2020).

The ability of drones to provide a bird's eye view and fly over areas inaccessible e.g. by police vehicles fills an important need from a crowd management perspective. However, privacy concerns have put an

end to drone surveillance in some cases. In mid-May 2020, **France**'s constitutional court banned the use of camera-equipped police drones to help contain Covid-19, ruling that this constituted "a serious and manifestly unlawful infringement of privacy rights" (Fouquet/Sebag, 2020; Jacqin/Normand, 2020).

Hygiene applications

Improved hygiene is one of the imperatives imposed on affected societies by the Covid-19 health crisis. Drones have emerged as an effective tool that can sanitise large spaces and help lower the risk of infection for humans. In **China**, more than 900 km^2 in 20 Chinese provinces have been disinfected using a total of 2600 drones, according to reports (BBC, 2020; Counterpoint, 2020). In **Korea**, drones used in the city of Daegu sprayed an area of 10 000 m^2 in around ten minutes. In India, disinfection with drones was carried out in Delhi and Indore City, Madhya Pradesh (Counterpoint, 2020). In the **US**, drones have been tested for large-scale disinfection of seats in sports arenas and concert halls (ABC, 2020).

Regulatory issues

Existing airspace regulations often appear to limit the use of drones in the fight against Covid-19. The case of **Italy** shows that this does not necessarily only apply to private drone operators. Here, also enforcement agencies were required to obtain waivers first, to make use of drones during the pandemic.

In the **US**, regulation requires operators to prove that the use of drones is necessary to respond to an emergency. Given the resulting delays in deploying drones, the benefits of drones during an emergency cannot be fully exploited. Some US aviation experts worry that waiving regulations in a rush to deploy drones in emergencies may cause unforeseen problems, however. Privacy issues are one concern; a fragmentation of the governance for low-altitude airspace is another (Pressgrove, 2020). Safety must also be carefully considered where drones transport sensitive or hazardous items (Kolodny, 2017).

The drone industry is clearly reckoning that the pandemic provides opportunities to test and assess different use cases for their products. The experiences gained during the crisis may even lead to a faster development of the sector. A Chinese drone manufacturer has claimed that the Coronavirus has been "an excellent catalyst" that "will fast-track our growth" (Liu, 2020).

The Small UAV Coalition, a US drone industry association, wrote to the US Secretary of Transportation and the FAA Administrator on 19 May 2020 to reiterate a request made originally in March to "waive the prohibition on commercial [drone] package delivery operations" (Small UAV Coalition, 2020). Likewise, a group named "DroneResponders" (itself part of an initiative called "Drones for Good" set up by a private investor), is promoting drones as an emergency response tool, and specifically use cases and demand scenarios related to Covid-19 (DroneResponders, 2020).

Overall, it appears that even if countries prefer a cautious approach to drones, establishing a regulatory framework for drones now that takes into account concerns beyond safety may help improve emergency responses in the future.

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