Drones for COVID-19 & Medical Deliveries

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WORLD ECONOMIC FORUM

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Following the Medicine from the Sky workshop on the sidelines of Wings India 2020 in March, the World Economic Forum in partnership with the State Government of Telangana hosted a Virtual Meting to address the following issues: 1) How can drones be used to help address the CoVID-19 pandemic? 2) What potential application areas should be prioritized and what is the efficacy of the technology? 3) How can we build capacity to use drones to alter the status quo in disaster response? 4) What criteria should be used to define for success in medical deliveries to gauge the effectiveness of drones in healthcare deliveries?

Drone Use Cases in the CoVID-19 Pandemic

Purushottam Kaushik, Head of the Centre for the Fourth Industrial Revolution, World Economic Forum opened the proceedings by speaking about the initiatives of the World Economic Forum around technology in healthcare and the need to engage interdisciplinary engineering in times of pandemic situations such as CoVID-19.

Rama Devi Lanka, Director of Emerging Technologies, Ministry of IT & C, State Government of Telangana provided detailed insights around the use of drones in responding to the CoVID-19 pandemic. The local dynamics around drone missions suggested that district collectors and municipalities made special requests to use drones on the ground. Given that the service was an emergency requirement, the State Government moved swiftly to ensure that drone teams were made available where needed to respond to situations. Outlining specific use cases where drones supported the local police in making announcements to disperse crowds and spraying disinfectant, Ms. Rama highlighted the need to have special provision for drone flight approvals in emergency situations.
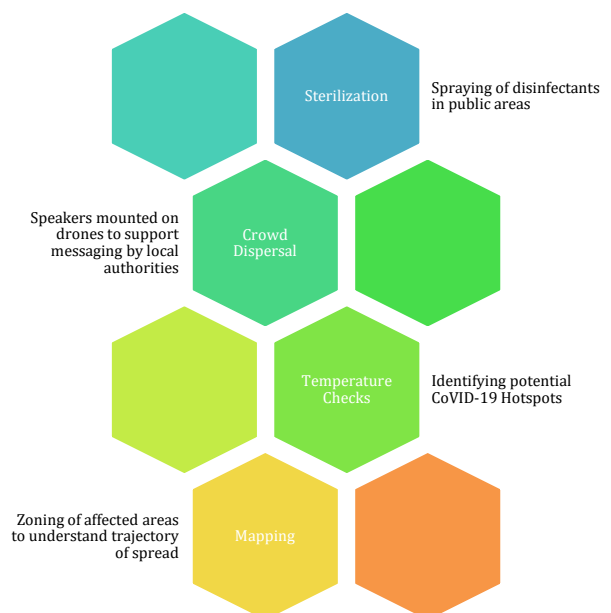
Asaad Joubran, Business Development, Zipline shared detailed insights and learnings from Zipline's global operations. In Ghana Zipline drones have transported CoVID-19 samples to increase testing rates and help government identify and track infected pockets. This would also demonstrate the confidence shown in drones for critical missions. The greater mission of replacing road freight for vaccine deliveries with drones was further bolstered as drones enabled less manual intervention thereby enabling social distancing during the CoVID-19 situation. An important example from Rwanda was cited where drones also delivered lifesaving medicines for cancers and other diseases to prevent a break from medical treatment due to pandemic situations.

Pradeep Palelli, Co-founder and CEO of Thanos, a Hyderabad based UAS company focusing on spraying among other efforts shared an important viewpoint on the efficacy of drones in spraying disinfectant when compared with backpack or tanker-based spraying. Focusing on specifics, while disinfectant spraying was conducted in open areas, roads and rooftops, the need to conduct such missions in areas where exposure to people is high was stressed upon rather than sparsely populated areas. In terms of efficacy, a lot remains to be observed before fully migrating to a drone centric solution. A difference between agricultural spraying in comparison with health-related missions is the level of efficiency. Healthcare missions entail zero tolerance to gaps in service.

Prem Vislawath, Founder and Chief Innovator, Marut Drones sharing insights from the frontline shared experiences on supporting the local police in making announcements in densely populated and hard-to-reach areas in the region. Having commissioned nineteen drones since March 2020, a lot is yet to be assessed in terms of the real impact of drones on ground vis a vis traditional measures.

Application areas under consideration include:

Sterilization — Spraying of disinfectants in public areas

Crowd Dispersal — Speakers mounted on drones to support messaging by local authorities

Temperature Checks — Identifying potential CoVID-19 Hotspots

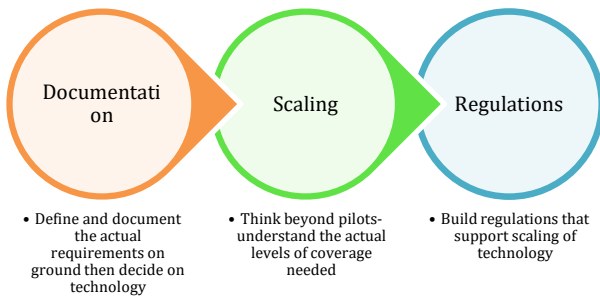Mapping — Zoning of affected areas to understand trajectory of spread

Building Institutional Capacity around Drones for CoVID-19 and Disaster Situations

Suresh Munuswamy, Head of Health Informatics and Technology Innovations at the Public Health Foundation of India delivered a comprehensive presentation on the incumbent healthcare supply chain mechanism and how drones would play a role in fundamentally overhauling the system. Key points from the keynote:

- Gauging the validity of drones in the response to CoVID-19 is important while we make efforts to scale for example, drone mounted thermal sensors may give us heat signatures but not pinpoint individuals with a high body temperature
- Collection of blood on a mass scale for serology testing must be considered

- CoVID-19 screening parameters may be included into the recently issued expression of interest by the State Government of Telangana
- Given that testing centers are located in urban areas, it is key to position collection points on the basis on drone range to swiftly obtain medical samples
- While there is a well-established network of facilities an efficient logistic system in connecting these centers is key.
- Hence, selecting a district, setting up a drone port and linking it to a diagnostic facility can enable patients to be tested large volumes.
- Plasma extraction centers can further improvise the efficiency of the testing process
- A Dynamic Response Model can ensure that resources are quickly routed to areas that are impacted by the pandemic. For this to be fully functional, policy guidelines must be in place. Technological iterations / modifications can be part of the post implementation phase. Immediate next steps:

Documentation
- Define and document the actual requirements on ground then decide on technology

Scaling
- Think beyond pilots- understand the actual levels of coverage needed

Regulations
- Build regulations that support scaling of technology

"The efficacy of drones in disaster response needs to be validated"

- **Dr. Suresh Munuswamy**

Ruchi Saxena, Director, India Flying Labs, shared her experience in building local capacity for disaster response. The Gujarat based drone squad operates in 12 states while the Drone Federation of India operates in 10 cities. A common goal embarked upon from a common platform can catalyze a drone-based response system to the Covid-19 pandemic and for other disasters. Citing an example from Noida, high definition drone maps of certain areas could help plan out positions for medical check posts and routes to guide couriers. Approximately 200 drone teams across India are on similar missions. While immense benefits are seen in the technology, it is also important to engage local communities and protect the identities of those captured on drone footage.

"We need to look beyond China and ramp up our manufacturing infrastructure so raw materials and spares can be procured locally"

- **Dr. Ruchi Saxena**

Harkabir Jandu, Immunization Expert, Clinton Health Access Initiative, advocates adherence the WHO recommended Covid-19 testing standards. Enhancing of testing capacities and augmenting the healthcare supply chain are key as drone-based resources are scarce. Toolkits that reflect the effectiveness of drones in such situations could help form the basis for data driven decisions.

Defining Success Criteria for 'Medicine from the Sky'

With the recent release of the Expression of Interest on 'Medicine from the Sky' by the State Government of Telangana, defining success criteria around drone-based mission will help further the adoption of the technology across the state.

Dr. Manish Verma, Transplant Surgeon at Apollo Hospitals, recommends the following assessments prior to a medical drone mission:
1. Reliability of drones and interruption free flights (due to external and technological factors)
2. Temperature maintenance in the payload carriage
3. Shock free landing of the drone to ensure minimal movement of the package

Dilip Kumar Damodaran, Joint General Manager, Airports Authority of India, stressed the importance of experiments being conducted in a controlled manner in compliance with the issued Civil Aviation

Requirements where practically possible while seeking necessary approvals for clauses that cannot be complied with. Key points included:

- Seek approval to discharge from the drone in case of medical deliveries as part of the UAOP
- Use an NPNT compliant drone with an approval under section 12.9 to transport hazardous material
- Similar to the proposed BVLOS experiments of the DGCA, conduct trials in pre-approved areas / routes by the AAI are required
- Prepare a safety case and sharing with the DGCA would further build confidence all round
- Engage a UTM service provider and share a dashboard with the local ATC to ensure that there is no encroachment of the local airspace
- In case of drone video footage, obtain approvals from the Ministry of Defence
- Fixed wing drones will be brought into the scheme of regulations in a phased manner

"Drones must be part of the solution and not part of the problem"

- **Amit Ganjoo**

Amit Ganjoo, Founder and CEO, ANRA Technologies, explains how drones should be part of the solution and not the problem- Safety, Security, Reliability and Scalability are key to defining success. An ideal sortie would ensure:
1. Safety of the airspace and the population on ground
2. Strategic deconfliction from other drones and manned aircrafts

A UTM system would track all flights and determine levels of priority for e.g. medical emergency missions would get priority over general missions. Further a UTM system may act as a one touch platform for preflight approvals. Remote IDs can help alleviate security concerns.

Anshul Sharma, Co-Founder, Redwing Labs advocated for a phased approach to understanding success from obtaining regulatory clearances to stakeholder communication, a gradual ramp up of operations would result in an optimal feedback. When assessing a drone designated to cover a hypothetical route between Primary Health Centre and Subcenter, Mean Time between Failure would help understand the reliability of the drone in question.

Nihar Vartak, Co-Founder and Director of Asteria Aerospace affirms the merit of transparency regarding exchange of data with the regulator as this would be an important piece in building confidence measures. Further, consistency and repeatability are factors that must be noted in the assessment of a drone.

Determinants of success:

Medical

Reliability of the drone
Payload temperature
Shock free landings

Airspace

Safety of airspace / ground
Security
Scalability - management of traffic

Technology

Mean Time Between Failure
Repeatability
Consistency

Conclusion

The discussion comprehensively covered various application areas of drones in pandemic situation, steps to build capacity and break silos for a combined effort in handling situations and defining parameters around safety, security, scalability and reliability that would result in actual impact on ground. With deeper insights and an iterative understanding of the technology, measured steps can be taken to catalyse policy making and strengthening of our healthcare supply chains.