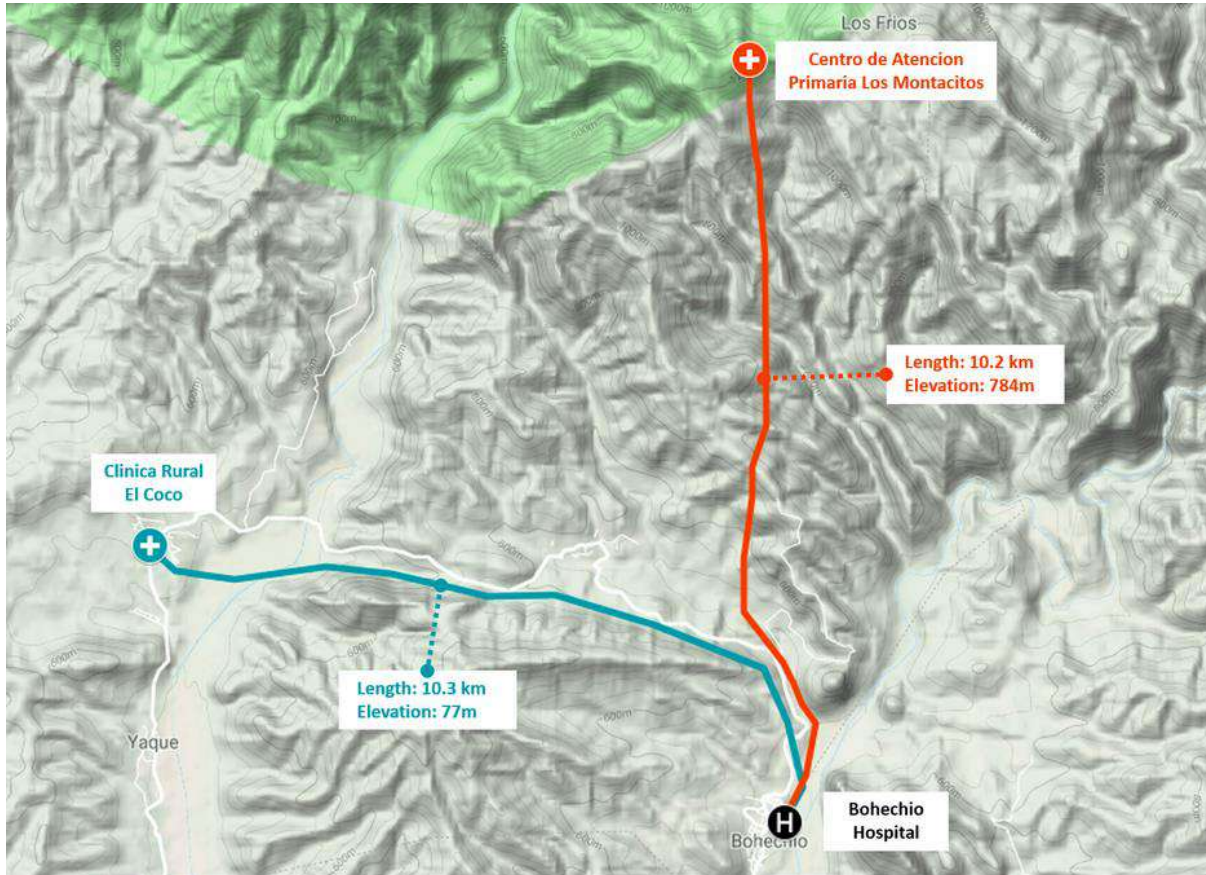


Delivering essential medicines to rural health facilities in the DR



Droneport based at Bohechio Hospital with medicines delivered to Montacitos and El Coco health facilities



Local doctor removes medicines after drone lands



Drone takes off carrying essential medicines

OVERVIEW

Flying Labs	Dominican Republic Flying Labs
Geographic area	San Juan Province, Dominican Republic, Caribbean
Date	June - July 2019
Sector program	HealthRobotics
Main SDGs	GOAL 3: Good Health and Well-being

SCOPE	
Project stakeholders	Pfizer, Bohechio Hospital, health facilities in Montacitos & El Coco
Who Benefits	<p>Local drone pilots get professional hands-on training and experience to lead cargo drone projects, thus strengthening long term cargo drone capacity in the Dominican Republic.</p> <p>Local hospitals and clinics are introduced to alternative solutions to medical deliveries.</p> <p>Local communities are introduced to the benefits of drone deliveries to receive medical supplies in a more timely manner.</p>
Challenge	<p>Local communities in the remote mountains of the Dominican Republic do not have regular access to healthcare services. This is not due to the lack of paved roads connecting their villages and local clinics to regional hospitals. Instead, it is the cost of local transportation that serves as the most significant impediment. This is particularly problematic when local clinics run out of medicines, or when they cannot test patient samples locally. When this happens, patients have to travel to the hospital in person. If the patient can afford the cost of local transportation, then getting to the hospital often requires a full day of travel due to the limited number of local transportation options. Taking a full day away from paid work and/or from supporting family is often not an option.</p>
Scope	<p>Deliver essential medicines in a timely and reliable manner using affordable and locally operated cargo drones. Repurpose existing industrial mapping drones into cargo drones, and fully train local drone pilots with DR Flying Labs to operate the 100+ deliveries entirely independently.</p>
Outcome	<ol style="list-style-type: none"> 1) This pilot project demonstrated that affordable cargo drones can be locally operated to reliably deliver essential medicines over an extended period of time. Local experts now have the knowledge and skills to transform the pilot into a long-term delivery service. 2) The detailed documentation of this pilot project in the form of a 70+ page report that represents the most detailed and transparent publicly available report on cargo drones to date. The full report is openly available here. 3) The same project can be implemented by Flying Labs in other countries that seek to demo cargo drone operations for essential medical deliveries and are looking for an affordable, proven alternative with a successful and fully transparent track record.

Next steps	DR Flying Labs is ready to offer cargo drone services to local clients.
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COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT

Consent for cargo flight	Dominican Republic Flying Labs engaged with local government, hospitals, clinics and communities to gain consent
Activities to engage with the community	Official meetings with relevant representatives, demonstrations to these representatives and to local communities
Community groups engaged with	Government officials, Health professionals, Community in General, Community children
Community attendance	Multiple in-person meetings were organized ranging from 3-10 participants
Community feedback	Communities were very receptive; that said, really important to manage expectations since we never know if a donor will renew a grant

CARGO

Cargo Transported	Medicines: Cefalexina, Ciprofloxxina, CalcioCarbonato, VitaminaD3, Dolorgesic, Nistatina, Metronidazol, Fluimucil, EspadrapoBase, Azitromicina, Salbutamol, Diclofenac, Aguadestiada, Ketoconazol, Naproxen, Sulfadiazina, Getamicina
Cold Chain	Not required

HARDWARE AND SOFTWARE

Cargo Drone	DJI Matrice 600 repurposed into a cargo drone by WeRobotics
Precision Landing	GPS and optical image recognition using ArUco markers
Flight plan software	Mission planning software developed by WeRobotics (see screenshot below)



Mission planning software for cargo delivery developed by WeRobotics

FLIGHT OPERATIONS	
Delivery Distance(s)	Horizontal: 10-11 kilometers; Vertical: 0.8 kilometers
Number of Flights	101 (outbound and return)
Number of Deliveries	40
Flight Altitude	70-100 meters AGL
Total Cargo Delivered	25.25 kilograms of essential medicines
Total Distance Flown	993.3 kilometers
Takeoff/Landing sites	Flat rooftops of health facilities

COST BENEFIT ANALYSIS	
Speed Savings	Drone deliveries were 42%-70% faster than ground deliveries
Cost Savings	7% cost saving per kilometer for 5 deliveries per day: <ul style="list-style-type: none"> ● Aerial: \$0.40 per kilometer ● Land: \$0.43 per kilometer 23% cost saving per kilometer if deliveries increased to 8 per day: <ul style="list-style-type: none"> ● Aerial: \$0.33 per kilometer ● Land: \$0.43 per kilometer