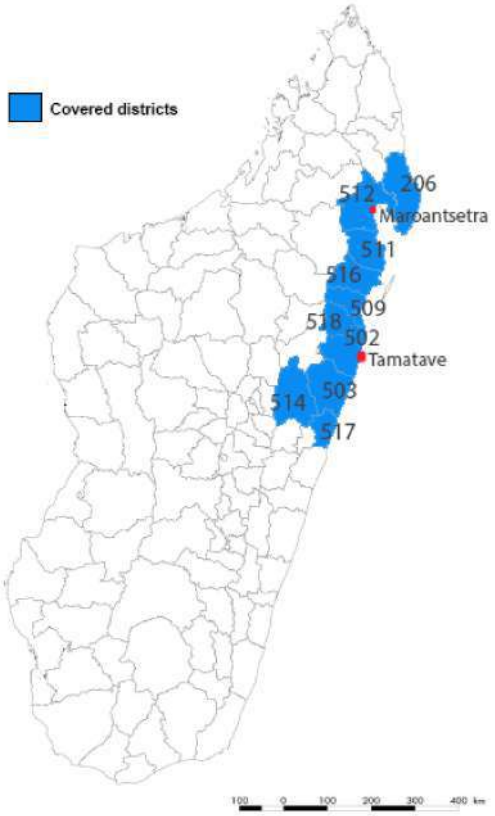
Serving more than 330 rural public health facilities in the North and East of Madagascar



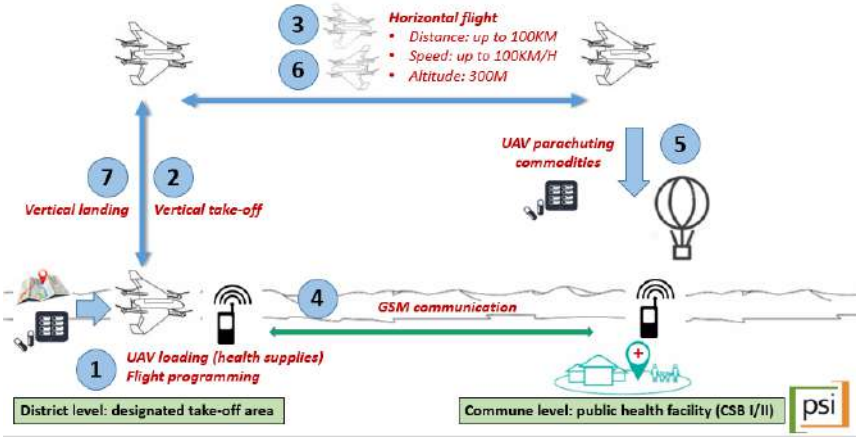
Region	District	District Code	Population	Number of CSB I/ II	Proportion of CSB I/II being stocked-out in mRDT, ACT or SP.	Population affected by stockouts
Sava	Antalaha	206	288,373	36	99%	285,489
Analanjirofo	Fenoarivo Atsinanana	509	257,795	33	88%	226,860
Analanjirofo	Mananara Avaratra	511	389,353	30	80%	311,482
Analanjirofo	Maroantsetra	512	171,837	22	93%	159,808
Alaotra-Mangoro	Moramanga	514	270,926	29	91%	246,543
Analanjirofo	Soanierana Ivongo	516	352,711	61	83%	292,750
Atsinanana	Toamasina II	502	160,814	23	98%	157,598
Atsinanana	Vatomandry	517	272,501	45	78%	212,551
Analanjirofo	Vavatenina	518	208,996	27	74%	154,657
Atsinanana	Vohibinany	508	245,709	23	91%	223,595
		Totals	2,619,015	329		2,271,333

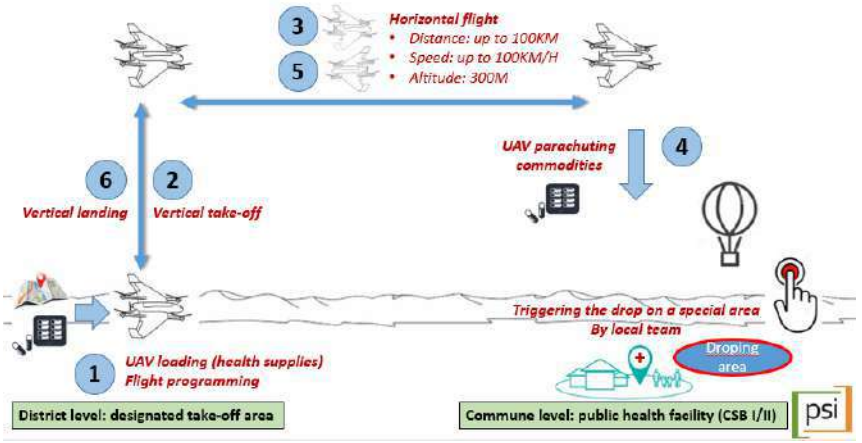
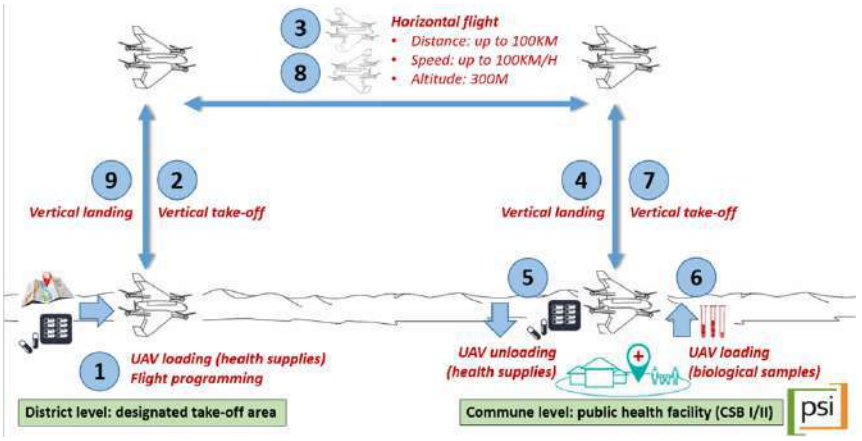
Districts and population covered by the project

Our eVTOL, the Savior 330, flying over rice fields in Madagascar

Our eVTOL, the Savior 330, about to land close to iconic Malagasy baobab trees

OVERVIEW	
Flying Labs	Madagascar Flying Labs
Geographic area	North and East of Madagascar 10 districts in 4 regions: SAVA, Sofia, Analanjirofo, Atsinanana
Date range	June 1st, 2019 - March 31st, 2021
Sector program	HealthRobotics
Main SDGs	GOAL 3: Good Health and Well-being

SCOPE	
Project stakeholders	Population Services International (PSI) Global Fund Ministry of Public Health of Madagascar (MSANP) Civil Aviation Authority (ACM)
Beneficiaries	2,2 million beneficiaries through the 329 public health facilities restock
Challenge	Lack of access to antimalarial products in remote and highly endemic communities
Scope	Initially the project was designed in 3 successive phases: Initially, only the Centres de Santé de Base (CSB) that have GSM coverage will be supplied by the drones. The reason for this is that it will allow the drone operator (at the base) to talk with the CSB manager during the delivery operation (parachuting of the commodities).  In Phase 2, we will expand the delivery to CSB I/II that have no GSM coverage. Using a special remote control, the CSB manager will be able to trigger the parachuting of commodities from the drone hovering over the CSB.

	 In Phase 3, we will allow drones to land at some of the CSB I/II. For that, we will need to equip these CSB with a portable and protected “dronepad” to allow for precise and safe landing. Landing is necessary for the UAV to be able to transport mRDT results and/or blood samples back to the base.  Furthermore, during the COVID-19 pandemic, we were asked by the Ministry of Health (MoH) and Population Services International (PSI) to also deliver vaccines to these health facilities. In order to do so, we specifically designed a refrigerated rack to maintain the vaccines at temperatures between 2°C - 8°C.
Outcome	We had to work closely with PSI from the start in order to design the right type of drones (Electric Vertical Take-Off and Landing : eVTOL) for their needs. We took into consideration the distances to be flown, the altitude and weather conditions and the volume & weight of drugs to be delivered. We decided to go for a eVTOL drone because of the lack of space to take off and land in these mountainous areas (North East of Madagascar).

	For security reasons (presence of armed bandits), we decided to opt for a parachuting system to deliver the medicines without landing at destination. Our drones are part of a PULL supply chain system. The demand comes from the supply points we serve via PSI.
Impact	Thanks to this project, we are expecting to: ● Reduce malaria morbidity and mortality by ensuring adequate stock levels in RDT and ACT at CSB I/II, even in the most difficult-to-reach areas, all year round; ● Reduce proportions of low-birth weight infants and maternal morbidity by ensuring Sulfadoxyne Pyrémythamine (SP) stock levels and Intermittent Preventive Treatment (IPT) adherence; ● Support epidemiological monitoring in remote areas by transporting biological samples and RDT results back to a laboratory for diagnosis confirmation; ● Provide communities stranded by natural disasters with emergency malaria stocks (RDT and ACT).
Next steps	This project was funded through a special innovation fund set up by the Global Fund: the Innovation Challenge Fund (ICF). We are hoping that drones will become part of the next (New Funding Mechanism (NFM) malaria grant for Madagascar and scaled-up to other regions of the country.

COMMUNITY ENGAGEMENT	
Activities to engage with the community	We sensitized the local population using radio spots in local dialects as well as posters explaining the purpose of our UAV.
Community groups engaged with	● Government officials (Ministry of Health (MoH) at the central and district levels) ● Medical public sector's representatives ● Community representatives ● Community in general
Community attendance	If an in-person meeting, how many people attended in total? 30
Community feedback	All very positive and eager to have the drones serve them.

CARGO	
Cargo transported	mRDT : malaria Rapid Diagnotic Test Sulfadoxyne Pyrémythamine (SP) mACT (Artemisinin Combination Therapy for malaria) Chilhood vaccines
Cold chain	Yes, only for the vaccines

HARDWARE AND SOFTWARE	
Cargo drone	Savior 330
Precision landing	We use a dronepad and image recognition to land precisely at destination.
Flight plan software	Mission Planner

FLIGHT OPERATIONS	
Delivery distance(s)	100 km (200 km flight in total)
Number of flights	75
Number of deliveries	75
Flight altitude	100 m – 1000 m
Total cargo delivered	300 kg
Total distance flown	50,000 km
Take-off/landing sites	2 take-off sites Up to 20 landing sites

COST BENEFIT ANALYSIS	
Speed savings	Up to 2 hours by drone compared with days or weeks
Cost savings	N/A