

# UAVs over Africa

Michael Schmidt

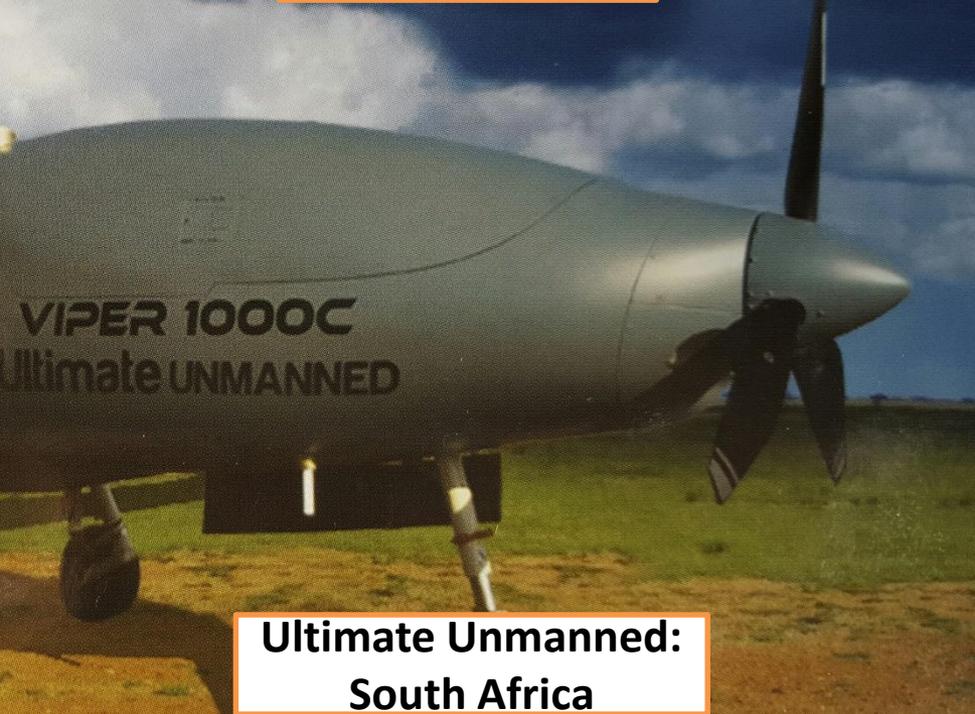




**CASTC: China**



**Proforce: Nigeria**



**Ultimate Unmanned:  
South Africa**



**Schiebel: Austria**

# Civilian Drones



**Leica Aibot X6  
(Germany)**

# DJI Phantom 2 Vision+





<b>NAME</b>	DJI Phantom 2 Vision+
<b>TYPE</b>	Leisure, adventure sports, newsgathering
<b>OPERATOR(S) IN AFRICA</b>	African skyCAM (Kenya), other news operations examining their use
<b>STATUS</b>	Development in Kenya stalled by temporary drone flight restrictions
<b>POWERPLANT</b>	4 x lithium-ion batteries, driven by four vertical-lift rotors
<b>RANGE &amp; DURATION</b>	1km line-of-sight; 25 minutes
<b>CEILING</b>	3,280ft
<b>SPEED</b>	Maximum 54km/h
<b>PAYLOAD</b>	244g: ZenmuseH3-3D gimbal and GoPro Hero3 Black 1,080 pixel video camera
<b>SYSTEM COST</b>	US\$1,143

# Airware Aerial Ranger





<b>NAME</b>	<b>Airware Aerial Ranger</b>
<b>TYPE</b>	Conservation: anti-poaching reconnaissance / animal tracking
<b>OPERATOR(S) IN AFRICA</b>	OI Pejeta Conservancy (Kenya)
<b>STATUS</b>	Custom-built prototype field tested in 2013; development in Kenya stalled by temporary drone flight restrictions
<b>POWERPLANT</b>	Catapult-launched; battery-powered and propeller-driven
<b>RANGE &amp; DURATION</b>	125km; 2 hours
<b>CEILING</b>	Cruise 500ft
<b>SPEED</b>	Maximum 100km/h
<b>PAYLOAD</b>	Live-streaming gimbal-mounted Sony HD camera with 20x zoom, and thermal imaging for night flights, able to cover 40km <sup>2</sup> per flight; remote radio frequency microchip reader for animal identification
<b>SYSTEM COST</b>	US\$50,000-70,000

# Military & Security Drones



**Desert Wolf Skunk  
(South Africa)**

# Denel Dynamics Seeker 400





<b>NAME</b>	<b>Denel Dynamics Seeker 400</b>
<b>TYPE</b>	Military: hunter-killer / surveillance
<b>OPERATOR(S) IN AFRICA</b>	Denel Dynamics (South Africa)
<b>STATUS</b>	In final stage of development for South African Defence Force; possible African clients; previous version, Seeker II, used in Kruger National Park in counter-poaching operations
<b>POWERPLANT</b>	Propeller-driven; four-stroke aircraft engine, producing 63,4kW
<b>RANGE &amp; DURATION</b>	250km; extended with use of forward ground station 750km; 16 hours
<b>CEILING</b>	18,000ft
<b>SPEED</b>	Maximum 222km/h
<b>PAYLOAD</b>	100kg: 2 x Impi laser-guided 10km-range air-to-ground missiles; either an electronic surveillance payload for signals interception, or a Zeiss LEO III optical package including infrared imager, day and night spotter cameras, synthetic aperture radar and laser rangefinder
<b>SYSTEM COST</b>	US\$17,3-million for a package of 3 x drones, 3 x payloads, 1 x ground station

# CASTC Caihong CH-3

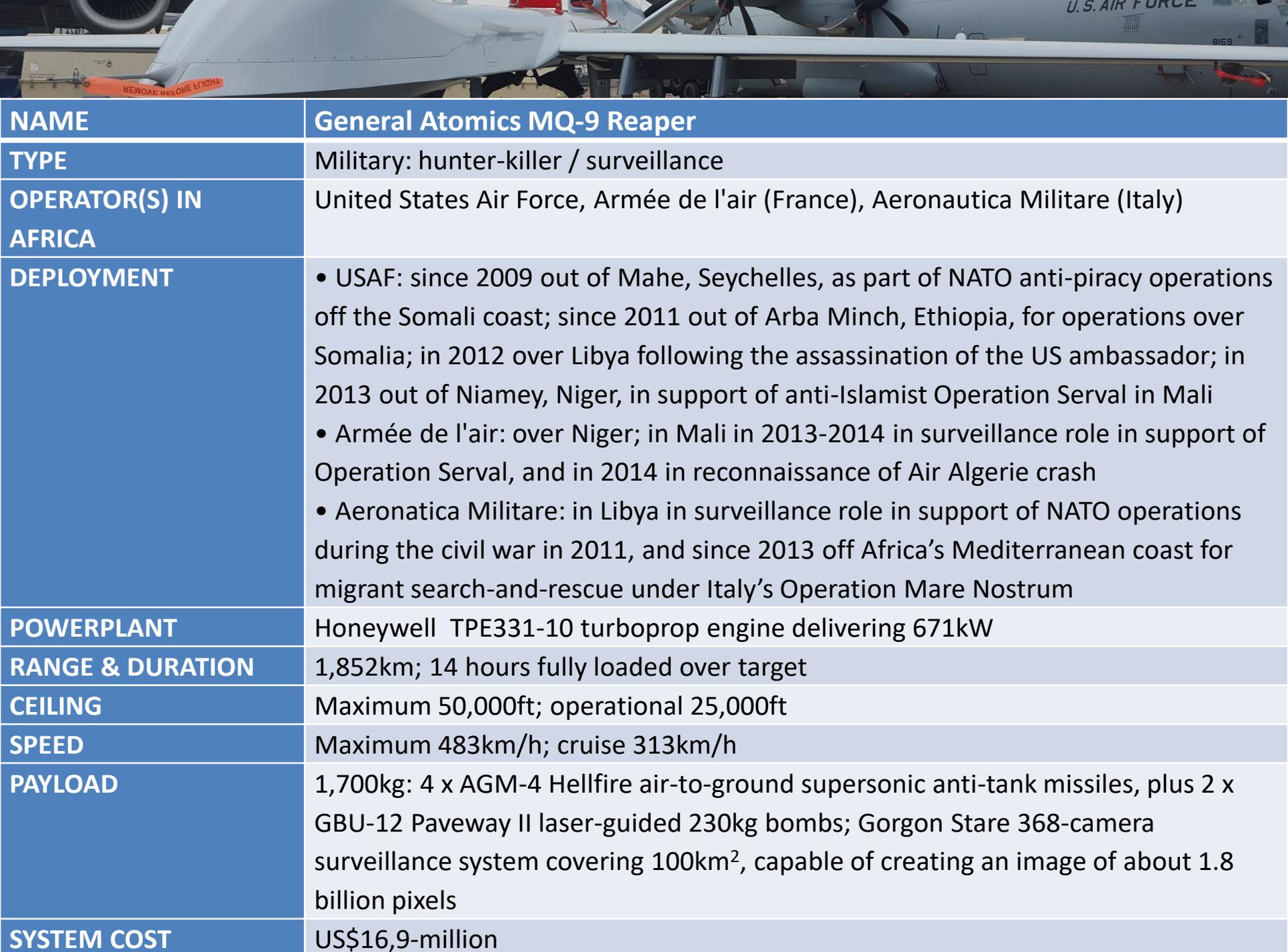




<b>NAME</b>	<b>China Aerospace Science &amp; Technology Corporation Caihong (Rainbow) CH-3</b>
<b>TYPE</b>	Military: hunter-killer / surveillance
<b>OPERATOR(S) IN AFRICA</b>	Nigerian Army (as the US prohibits drone sales to Nigeria), suspected use of CH-4 version by People's National Army (Algeria)
<b>DEPLOYMENT</b>	<ul style="list-style-type: none"><li>• Nigerian Army: North-eastern Nigeria in 2015, speculated to be used as reconnaissance and fire support against Boko Haram terrorists</li><li>• People's National Army: unknown, although the CH-4 has both reconnaissance and hunter-killer versions</li></ul>
<b>POWERPLANT</b>	Rocket & catapult assisted launch; propeller-driven aircraft engine
<b>RANGE &amp; DURATION</b>	2,400km; 12-15 hours
<b>CEILING</b>	Maximum 19,685ft; operational 16,400ft
<b>SPEED</b>	256km/h
<b>PAYLOAD</b>	90kg: 2 x 45kg AR-1 air-to-ground anti-tank missiles; surveillance package undisclosed but reportedly includes a digital camera, TV camera or forward looking infrared (FLIR) sensors, as well as electronic warfare and communications relay suites
<b>SYSTEM COST</b>	Just under US\$1-million

# General Atomics MQ-9 Reaper





# Legislative & Ethical Challenges



**NO  
DRONE  
ZONE**



**CAUTION**



**DRONE ZONE**



**Federal Aviation  
Administration**

# Comparing UAV regulations

				
<b>Max. Altitude</b>	400ft			
<b>Max. Range</b>	VLOS			
<b>Max. Weight</b>	25kg			
<b>Cargo Allowed?</b>	YES but no HazMat			
<b>Special Permission Required for Commercial Operations</b>	FAA license Pilot training Night ops Above 400ft alt			

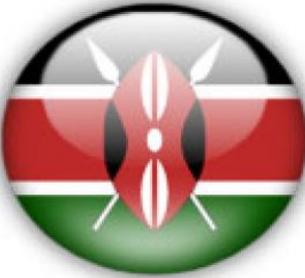
# Amazon's octocopter & DHL's Paketkopter



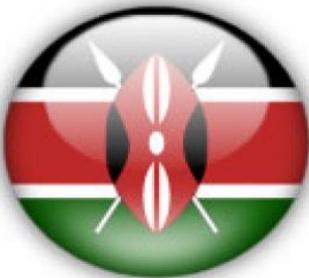
# Comparing UAV regulations

				
Max. Altitude	400ft	400ft		
Max. Range	VLOS	500m VLOS		
Max. Weight	25kg	Classed up to 7kg, up to 20kg, up to 150kg, and 150kg+		
Cargo Allowed?	YES but no HazMat	YES		
Special Permission Required for Commercial Operations	FAA license Pilot training Night ops Above 400ft alt	CAA license Pilot training 20kg + Above 400ft alt Beyond RVLOS		

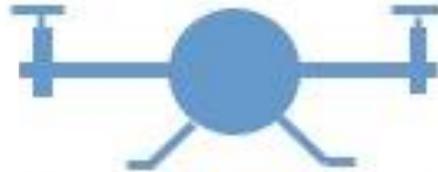
# Comparing UAV regulations

				
<b>Max. Altitude</b>	400ft	400ft	Draft: 400ft	
<b>Max. Range</b>	VLOS	500m VLOS	Draft: RVLOS	
<b>Max. Weight</b>	25kg	Classed up to 7kg, up to 20kg, up to 150kg, and 150kg+	Draft: Classed up to 5kg, up to 25kg, and 25kg+	
<b>Cargo Allowed?</b>	YES but no HazMat	YES	Draft: YES	
<b>Special Permission Required for Commercial Operations</b>	FAA license Pilot training Night ops Above 400ft alt	CAA license Pilot training 20kg + Above 400ft alt Beyond RVLOS	M.Def license Pilot training Night ops 25kg + Above 400ft alt	

# Comparing UAV regulations

				
<b>Max. Altitude</b>	400ft	400ft	Draft: 400ft	400ft
<b>Max. Range</b>	VLOS	500m VLOS	Draft: RVLOS	500m RVLOS
<b>Max. Weight</b>	25kg	Classed up to 7kg, up to 20kg, up to 150kg, and 150kg+	Draft: Classed up to 5kg, up to 25kg, and 25kg+	Classed by weight, impact velocity, etc
<b>Cargo Allowed?</b>	YES but no HazMat	YES	Draft: YES	NO
<b>Special Permission Required for Commercial Operations</b>	FAA license Pilot training Night ops Above 400ft alt	CAA license Pilot training 20kg + Above 400ft alt Beyond RVLOS	M.Def license Pilot training Night ops 25kg + Above 400ft alt	SACAA license Pilot training Night ops Beyond RVLOS

# The Drone Journalism “hierarchy of ethics”



# Future Drones



**AugustaWestland SW4  
Solo OPH (UK-Italy)**

# Red Line & Blue Line medical UAVs



Wingspan: 3m

Range: 50km

Payload: 10kg



x20

500ml

**Total: 10 Litres**



Wingspan: 6m

Range: 100km

Payload: 100kg



x200



x50



x1.54



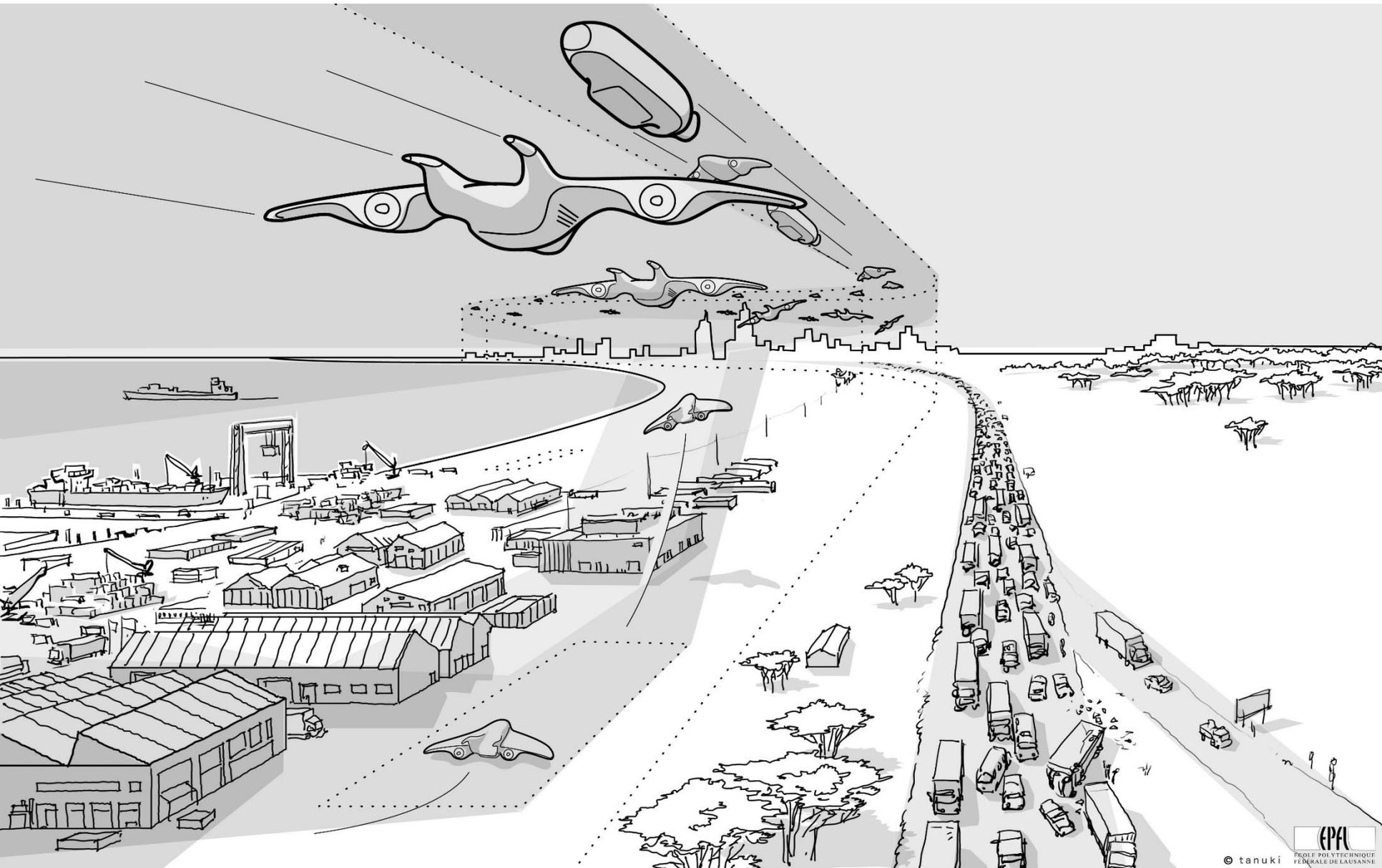
<b>NAME</b>	Red Line
<b>TYPE</b>	Medical: emergency delivery / disaster reconnaissance
<b>OPERATOR(S) IN AFRICA</b>	Red Line Consortium (Kenya, Rwanda, UK, Switzerland etc)
<b>STATUS</b>	Launched in 2015; development for several undisclosed African countries (likely Ethiopia & Rwanda); expected to be airborne by 2020
<b>POWERPLANT</b>	To be determined: most likely battery-powered and propeller-driven
<b>RANGE &amp; DURATION</b>	160km; duration to be determined, but likely to be around 2 hours
<b>CEILING</b>	Maximum 500ft
<b>SPEED</b>	To be determined, but probably not faster than 100km/h
<b>PAYLOAD</b>	10kg: blood plasma, medicine, surgical supplies, reconnaissance crawler robots
<b>SYSTEM COST</b>	To be determined

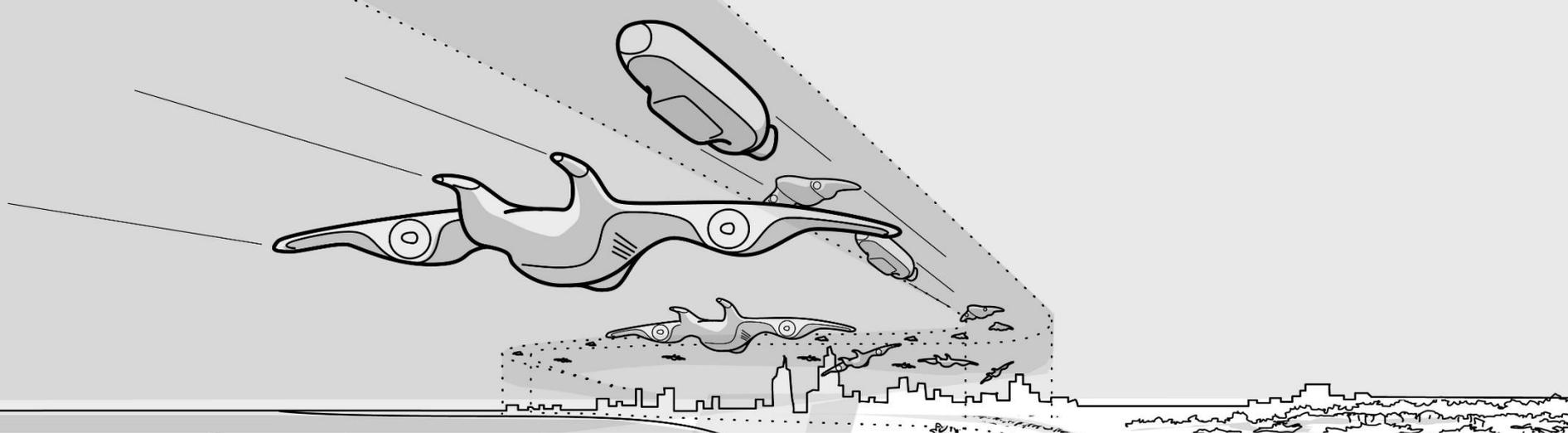
# Zipline - UPS Droneport, Rwanda



The Rwandan Civil Aviation Authority issues UAV permits for aerial photography, crop monitoring/inspection, search & rescue, delivery of emergency supplies, research & development, and education & recreation.

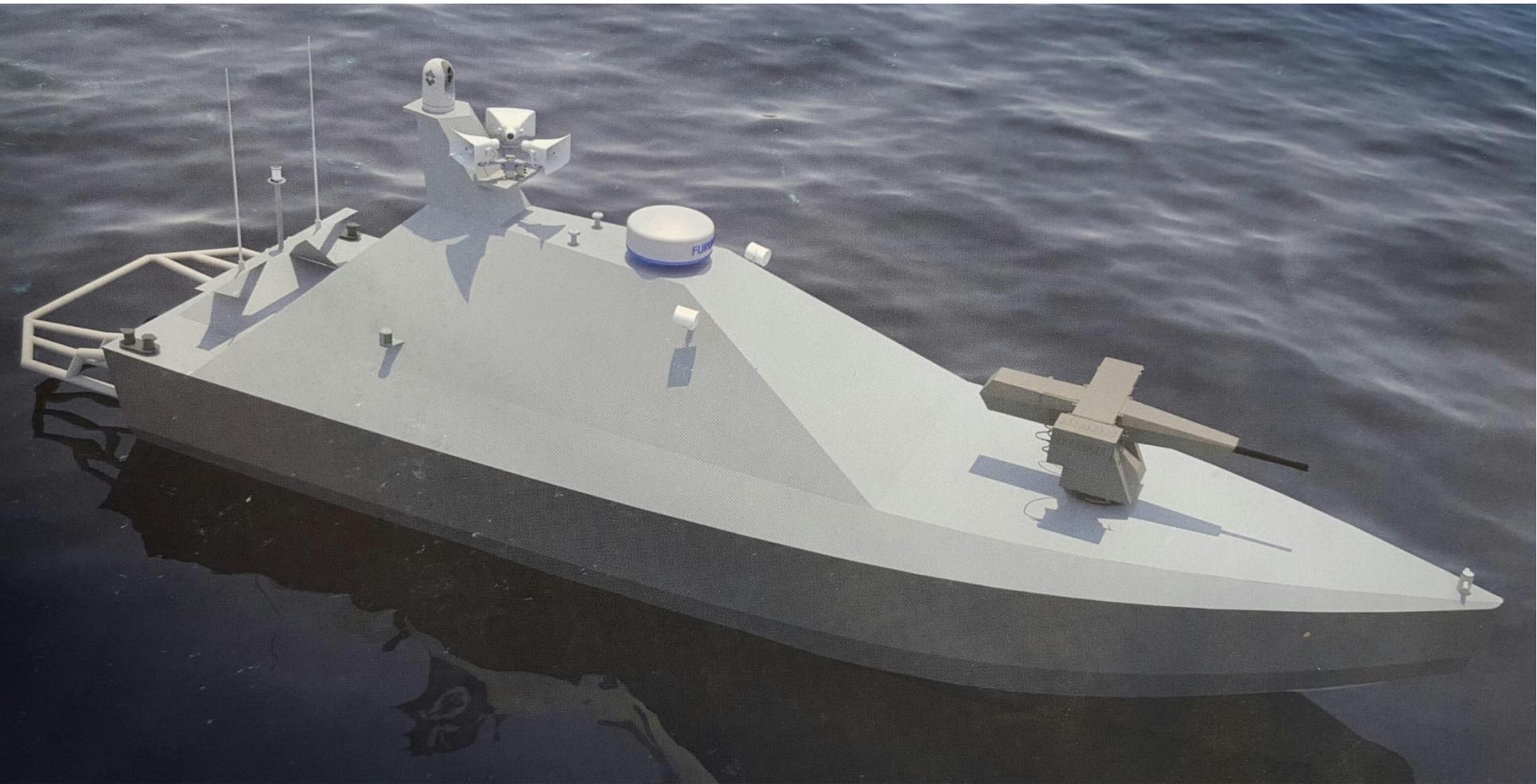
# Flying Donkey cargo UAV concept





<b>NAME</b>	<b>Flying Donkey</b>
<b>TYPE</b>	Cargo: high-value general goods
<b>OPERATOR(S) IN AFRICA</b>	Various competing developers including Hamali Angani (Kenya)
<b>STATUS</b>	Launched in 2013; development in Kenya stalled by temporary drone flight restrictions
<b>POWERPLANT</b>	To be determined: most likely internal combustion or battery-powered and propeller-driven
<b>RANGE &amp; DURATION</b>	Range to be determined, but probably around 200km; duration to be determined, but likely to be around 4 hours
<b>CEILING</b>	Maximum 500ft
<b>SPEED</b>	To be determined, but probably not faster than 100km/h
<b>PAYLOAD</b>	20-60kg: mail, medicine, mechanical spares, other high-value payloads
<b>SYSTEM COST</b>	To be determined

# Paramount Silver Surfer USV



؛ شكرًا!

مخفف!

¡Gracias!

Obrigado!

Merci!

谢谢！

धन्यवाद!

Спасибо!

Thank you!

Tack!

Asante!

Ngiyabonga!