

# FLARGO

## DEVELOPING A COST-EFFECTIVE AUTONOMOUS ALTERNATIVE TO HELICOPTERS

- VERTICAL TAKE-OFF AND LANDING
- ALL-WEATHER
- FOR CARGO TRANSPORTATION AND AERIAL WORK
- PAYLOAD 680 KG / 1,500 LB.



JUNE 2022

ver. 3.6

# MAJOR PROBLEMS ADDRESSED BY OUR SOLUTION

## PROBLEM:

## PAIN POINTS:

## SOLUTION:

HIGH OPERATIONAL COSTS



Operational costs are high, especially when delivering offshore / to the site, as well as on the middle- or last mile segments, where they can exceed 50% of the total expenses.

Significant reduction in operational costs due to lower fuel consumption, fewer maintenance hours required and lower operator wages.

LACK OF INFRASTRUCTURE



Even in Europe about 25% of residents live in rural areas, which complicates the service. The figures are significantly higher in Asian and African regions. About 69% of population in Sub-Saharan Africa do not have access to electricity.

VTOL technology doesn't require roads and complex infrastructure.

GROWING NUMBER OF NATURAL DISASTERS



Number of reported disasters increased from 711 in 1970-1979 to 3,105 in 2010-2019 (World Meteorological Organization).

The Drone can be quickly dispatched to deliver essentials. Destroyed or flooded territories won't be an obstacle.

HIGH HUMANITARIAN NEEDS



According to UNICEF, 235 million people worldwide are in need of humanitarian assistance.

Establishing life corridors in especially dangerous areas.

BIG LOSS DUE TO BAD WEATHER CONDITIONS



The Bureau of Transportation Statistics' report shows that weather is the reason for 33% of delays. The air cargo industry is losing more than \$1 billion annually due to delays.

Designed to work in poor weather conditions (icing, fog, etc.).

RISKS TO THE CREW



Helicopter fatal accident rate per 100,000 flight hours in 2018 was 0.72, meaning that the probability of surviving the hypothetical pilot 20-year career is ca. 86% (or 14% fatality rate).

There are no people on board, hence no risks to the crew.

# VALUE PROPOSITION

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If at least one condition from the business case below is available, the Flargo Drone will be an excellent choice. The more conditions are met, the more likely our solution will be the best or maybe even the only option –

COST-EFFECTIVE<sup>1</sup> TRANSPORTATION OF CARGO  
WEIGHING UP TO 680 KILOGRAMS  
FOR DISTANCES UP TO 880 KILOMETERS<sup>2</sup>  
IN AN UNFRIENDLY ENVIRONMENT<sup>3</sup>  
IN THE ABSENCE OF RUNWAYS OR ROADS<sup>4</sup>  
AND WITH TIGHT DEADLINES<sup>5</sup>.

where alternative solutions fall short:

- <sup>1</sup> helicopters and vehicles with vectored thrust (because of higher price and operational costs);
- <sup>2</sup> most eVTOL and other drones (due to payload or range limitations);
- <sup>3</sup> eVTOLs (inability to operate at negative temperatures) and helicopters (poor visibility or risk to the life of the crew);
- <sup>4</sup> airplanes (runways), ground transport (roads) and eVTOLs (in regions with limited access to electricity – e.g., on the African continent);
- <sup>5</sup> water transportation and eVTOLs (speed); ground transportation (speed; traffic).

# HOURLY COST

When looking at the market of domestic airfreight services, we can see small companies using helicopters or light aircrafts to transport cargo weighing 100 – 1,000 kg. Direct operating costs start from approx. 390 EUR per hour for helicopters. Light aviation is cheaper but requires runways. In addition, there are logistics costs, which include both temporary and airfield-related financial expenditures.

.Compared to helicopters, Flargo's hourly cost is expected to be lower due to at least 3 factors:

- Less complex design (easier maintenance, fewer hours required)
- Less fuel consumption
- Lower avg. wage of a drone operator in comparison to a pilot.

	Hourly Cost	Take-Off	Useful Load	Range
Flargo Drone	€ 233	VTOL	680 kg	880 km
Cessna 172R	€ 155 *	runway	398 kg	1,272 km
Robinson R-44 Raven II	€ 392 *	VTOL	451 kg	550 km
Airbus H-125 (AS 350)	€ 867 *	VTOL	976 kg	630 km

\* Source: <https://www.aircraftcostcalculator.com/>



# CUSTOMER PROFILE

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## HELICOPTER OPERATORS

to deliver in the mountains and remote areas, as well as to carry out many types of aerial works



## CONSTRUCTION & MINING COMPANIES

to deliver spare parts to the mine or site when idle time is so expensive



## OWNERS OF OFFSHORE FACILITIES

to inspect and maintain wind farms or drilling platforms, to deliver tools and consumables



## 2PL ( SECOND-PARTY LOGISTICS)

to supplement or replace the fleet of light aviation, drones or trucks on problematic/ineffective routes and areas



## HUMANITARIAN AGENCIES

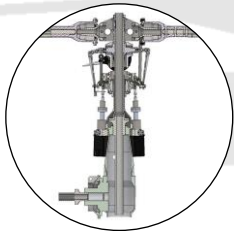
to help those in need, especially in areas of natural disasters and battle zones

# TECHNOLOGY

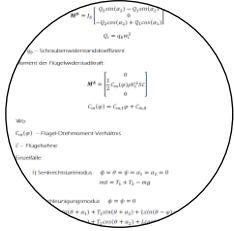
2 KEY INNOVATIVE COMPONENTS  
FOR UNIQUE FUNCTIONALITY -

WHAT WE DID:

I. WE IMPROVED THE SWASHPLATE AND DESIGNED IT AS A SINGLE KEY UNIT TOGETHER WITH TRANSMISSION



II. DEVELOPED A PROPRIETARY INTELLIGENT CONTROL SYSTEM BASED ON THE MATHEMATICAL MODEL



WHICH GAVE US:

- A. TWIN ROTOR CONFIGURATION WITH TWO EQUALLY EFFICIENT ROTORS
- B. BLADES DIAMETER REDUCED TO 11'
- C. BLADES ROTATION SPEED INCREASED TO 2,000 RPM
- D. THRUST-TO-POWER RATIO OF 12 LB. PER 1 HP

FEATURES GAINED:

- 1. SIGNIFICANTLY LOWER OPERATING COSTS
- 2. WORK IN POOR WEATHER CONDITIONS
- 3. AUTONOMOUS CONTROL
- 4. FUEL CONSUMPTION IS AT LEAST 20% LESS (AND LESS CO2 EMISSIONS)
- 5. REDUCED NOISE AND VIBRATIONS
- 6. AUTOROTATION MODE

POTENTIALLY:

- 7. MODULAR CONCEPT CAN BE IMPLEMENTED (UP TO 8 ROTORS)
- 8. THE INTELLIGENT CONTROL SYSTEM CAN ALSO WORK WITH A ROTARY PYLON (E.G. IN A TILTROTOR MODIFICATION)

# DRONE SPECIFICATION

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TAKE-OFF TYPE:	VERTICAL TAKE-OFF AND LANDING
CONTROL:	UNCREWED
PAYLOAD:	680 KG / 1,500 LB. *
RANGE:	880 KM / 540 MI
OPERATING RANGE:	440 KM / 270 MI
CRUISE SPEED:	220 KPH / 136 MPH
OPERATING TIME:	4 HOURS
ENGINE TYPE:	PISTON or TURBOSHAFT
DIMENSIONS:	8 M x 4 M x 2 M / 26' x 13' x 7'

## OPTIONS:

Depending on their preferences, customers can additionally decide on:

- ENGINE POWER (it will affect the payload)
- EQUIPMENT (e.g. cameras, night vision, etc.)

\*The Flargo platform is designed to be scalable:

the payload can be increased by combining several modules to get a 2-, 4-, 6- or even 8-rotor vehicle.



# SAFETY

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Two key safety features of Flargo Drone are:

## 1. UNCREWED TECHNOLOGY

It's very straightforward: No crew means zero risk to the crew.

## 2. AUTOROTATION

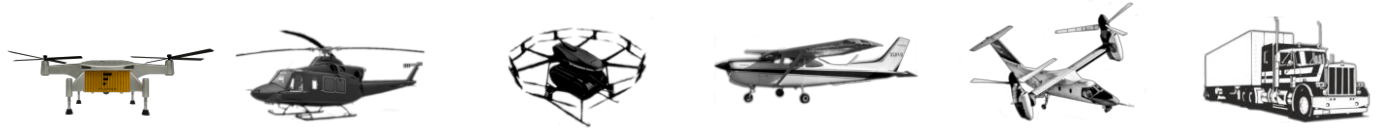
In case of a sudden loss of power / thrust, the blades will be driven solely by the upward flow of air through the rotors.

During the maneuver (which is performed autonomously based on real-time data) the blades generate sufficient lift and thrust through the combination of their angle of attack and velocity for a smooth descent and soft landing.



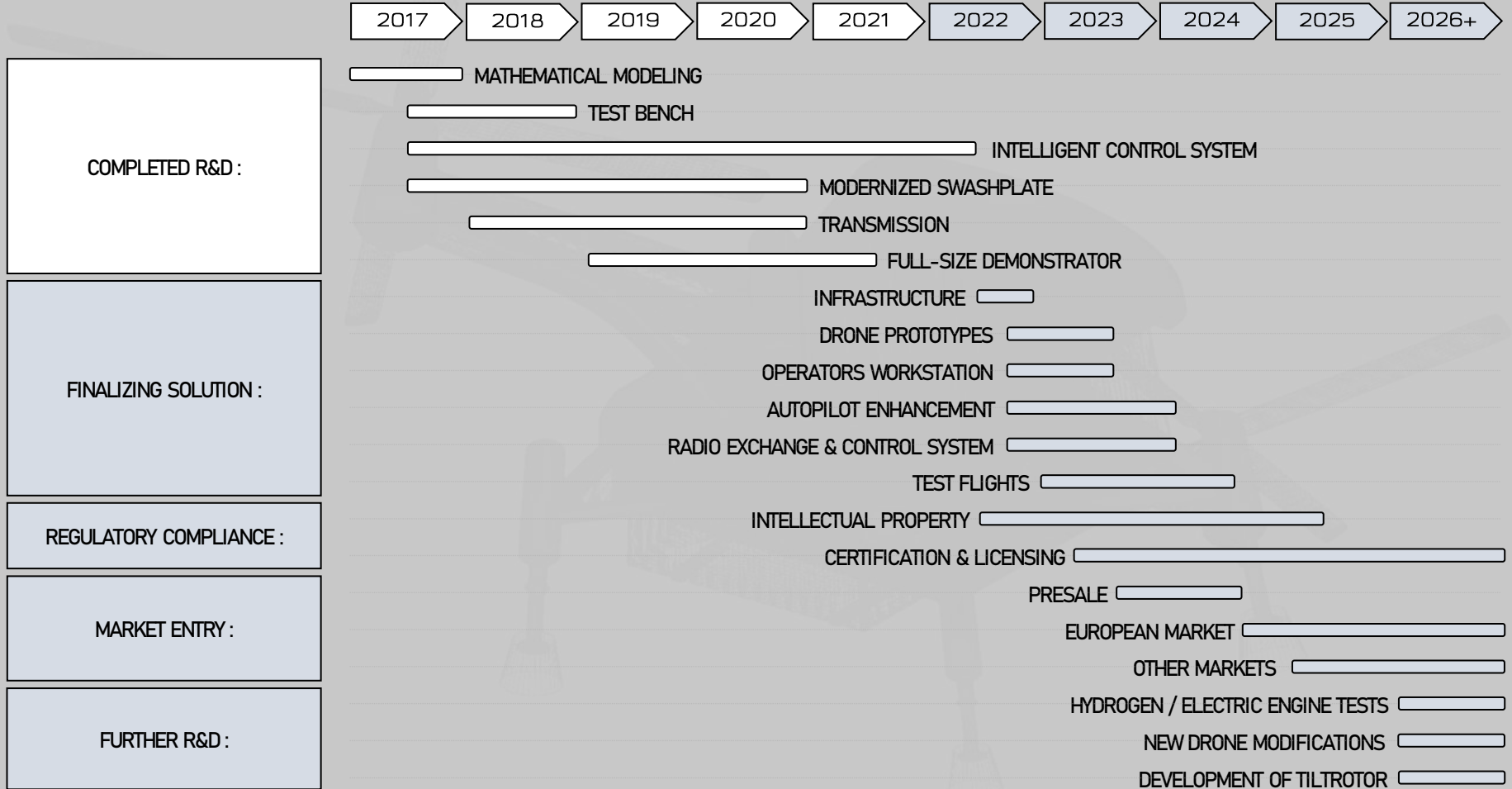


# KEY ADVANTAGES OVER OTHER INDUSTRY SOLUTIONS



	FLARGO	HELICOPTERS	eVTOL	FIXED WING	TILTROTORS	GROUND TRANSPORTATION
REDUCED HOURLY COSTS	✓	at least 40% higher	depends on the model	✓	high costs due to complex design	✓
ACCESS TO REMOTE AREAS (due to VTOL)	✓	✓	✓	require runway	✓	require roads
ALL-WEATHER (temperature, visibility, etc.)	✓	can't work in poor visibility conditions	highly dependent on the weather	can't work in poor visibility conditions	can't work in poor visibility conditions	hazards: flooding, snow drifts, fog
NO RISK TO THE CREW (unmanned technology)	✓	crewed	✓	crewed	crewed	crewed
HIGH PAYLOAD	✓	✓	40% less on average	depends on the model	✓	✓
LONG RANGE	✓	✓	30% less on average	✓	✓	✓
FAST DELIVERY SPEED	✓	✓	15% slower on average	✓	✓	highly dependent on traffic
WIDE SCOPE OF AERIAL WORK	✓	✓	limited scope and time of operations	hover operations are not possible	✓	n/a
AFFORDABLE PRICE	✓	2-3 times more expensive on average	depends on the model	depends on the model	several times more expensive	✓

# ROADMAP

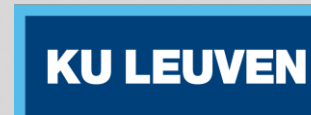


# KEY HIGHLIGHTS

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- 5 YEARS OF RESEARCH AND DEVELOPMENT
- DEVOTED TEAM WITH EXTENDED BACKGROUND IN AEROSPACE AND ENGINEERING
- INNOVATIVE AND SCALABLE TECHNOLOGY
- MULTITASKING AND EXTENSIVE SCOPE OF APPLICATION
- REDUCED HOURLY COSTS
- OPTIMAL TIME TO ENTER A NEW, INNOVATIVE AND VERY PROMISING MARKET
- GREAT POTENTIAL FOR DEVELOPMENT:  
MODULAR SYSTEM, NEW PROPULSION TECHNOLOGIES, COMMUNICATIONS AND CONTROL
- REAL INTEREST FROM POTENTIAL CUSTOMERS ALREADY TODAY

## OUR PARTNERS:



# YOU CAN SUPPORT THE DEVELOPMENT OF THE PROJECT BY PLACING A PRE-ORDER FOR THE FLARGO DRONE



- GET AN INNOVATIVE SOLUTION FOR A SIGNIFICANT EDGE OVER YOUR COMPETITORS
- RECEIVE THE DRONE IMMEDIATELY AFTER ITS RELEASE
- TAKE YOUR CHANCE TO RESERVE A VEHICLE OF THE NEW ADVANCED AIR MOBILITY ERA, AS THE PRODUCTION OF SUCH MACHINES IN THE NEAR FUTURE WILL NOT BE MASSIVE (WE IN FLARGO PLAN TO MANUFACTURE ONLY A FEW HUNDRED DRONES PER YEAR)



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<https://flargo.tech>