

Name of the entity	Type	Country	Creation date
MAGLINE COMPOSITES Y SISTEMAS, S.L.	SME	Spain	2008



SWARPAS: First Collaborative Remotely Piloted Aircraft System For Surveillance in Emergency Operations



COMPANY DESCRIPTION

MAGLINE is a Spanish hi-tech R&D limited liability company, which has conducted from the beginning RPAS systems integration to 3rd party designed aircraft. It **completed the process from design to market of a proprietary RPAS: CRUISER II, attaining European Aviation Safety Agency (EASA) Certificate of Airworthiness for Experimental Flights (CAE) and for first time in Europe, an RPAS - UAV Operational Authorization** which will allow to government agencies to **conduct civilian emergency missions**.

MAGLINE **markets different subsystems** used in customer's RPAS components (e.g. Flight Control System -FCS-, Computerized Fuel Injected Engine System). It has **invested in equipment** to promote operations and training (**Control Tower**) and establish modern production methods (**NC Equipment**). It participates of the equity in 2 companies to expand internal capabilities, critical for the growth strategy but not for the development path: FCU (Flight Control Unit-Autopilot) ('Applied Navigation, LLC') and NC equipment (Worldmaq 3, S.L.). MAGLINE has **7,500 m2 facilities** with **privileged access to the Aerodrome** at Villanueva de Gállego **over every other user**. During last 11 years, MAGLINE has **re-invested all profit into its own growth**, acquiring and designing all possible systems in order to develop the world's most advanced RPAS state of the technology.



swarpas

INNOVATION

SWARPAS by MAGLINE will **bring the first collaborative remote piloted aircraft system (swarm) of long- endurance fixed-wing RPAS for surveillance tasks** in the emergency services market. It is the definitive alternative to manned aircraft currently used in Search and Rescue (SAR) **civil emergency operations**, to **reduce crew risks, operation costs, and environmental impact**. It will be able to reach remote BVLOS locations where other solutions (e.g. drones, aerostat) cannot, while offering advantages like avoiding satellite imaging (less resolution) and widening and **speeding-up the emergency operations**.

Its **unique Swarm Guidance Module (SGM)**, based on artificial intelligence, statistical predictive maintenance, and advanced control for degraded flight modes, will make possible **remote piloting of a swarm of 7-25 fixed-wing RPAS**. This will **reduce mission time and costs, multiply x4-24 the surveillance area, and boost operability**, compared with traditional manned aircraft. Its **certified RPAS platform**, based on **ultra-rapid plug&play interchange of equipment and systems**, will allow for modularity, flexibility for end-users, and low-cost O&M and will ensure SWARPAS quick market uptake. Its use of **standard protocols** will **grant real time data sharing, interoperability and active identification**, and solve difficulties identifying group RPAS and individual aircraft, minimizing RPAS losses.

SWARPAS WITHIN MAGLINE'S STRATEGY

MAGLINE brings a unique approach to the RPAS business: become an aerospace company offering RPAS aviation products with the certification path in mind, which is a compulsory requisite for civil use of RPAS in non-segregated air spaces. MAGLINE's company development is grounded on **Certifiable Aircraft Design, Certifiable Systems, and Operations Safety**. Its strategy involves re-investing its profit in strategic companies equity and necessary R&D to continue developing new state-of-art products & services, and thus reach and maintain a leading position globally.

Collaboration with strategic technological and commercial partners and stakeholders is fundamental. MAGLINE's ambition is to grow finding synergies and evolve its innovation for new civil market niches. It aims to **gain a leader position** as RPAS manufacturer **in global markets, solving the current capacity gap detected** in the market of aerial emergency operators with RPAS. Fundamental **value of MAGLINE's equity lies on core innovation "CRUISER II" RPAS and side-products**: FCU, Engine Packages controlled electronically, NC manufacturing machinery, and after SWARPAS completion, on Swarm Guidance Module (SGM). Type Certification (JARUS) must be obtained to proliferate RPAS use, verifying Flight Safety and Production Control.

Abbreviations	A/C: Aircraft	EASA: European Authority for Aviation Safety	KET: Key Enabling Technology	UAV: Unmanned Aerial Vehicle
	AESA: Agencia Estatal de Seguridad Aérea	ESM: Emergency Services Market	MoC: Means of Compliance	RPAS: Remotely Piloted Aircraft System
	AVO: Air Vehicle Operator	FCU: Flight Control Unit-(Autopilot)	NC: Numerical Control	SAR: Search And Rescue
	BVLOS: Beyond Visual Line Of Sight	FCS: Flight Control System	O&M: Operations & Maintenance	SGM: Swarm Guidance Module
	CAE: Certificate of Airworthiness for Experimental Flights	FW: Fixed Wing	UAS: Unmanned Aircraft System	SUAS: Small UAS
				VLOS: Visual Line Of Sight

1. EXCELLENCE

1.1 IDEA AND SOLUTION

1.1.1 CHALLENGE & APPROACH: COLLABORATIVE RPAS IN SURVEILLANCE AS NEW MARKET NICHE

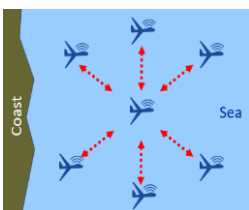
The **Emergency Services Market (ESM)**, including Maritime & Fire-fighting emergency, Search And Rescue (SAR), Surveillance and Border Security, is currently mostly based on manned aircraft technology. However, **manned aircraft** market is **concentrated in a small number of manufacturers, and shows signs of maturity**: lack of flexibility, service time limitations, risks for the crew due to environment and weather conditions, and, very often, **prohibitive costs** considering current national budgets. As an **alternative to it, remotely controlled unmanned aircraft i.e. RPAS** (Remotely Piloted Aircraft Systems) offer a **huge potential for innovative civil applications** in a wide variety of sectors that benefit European society, and will contribute to creating new businesses and jobs¹. In this market context, current **ESM's specific demands** are:

- **Eliminate avoidable risks for the crews**, by eliminating crew in aircraft in surveillance operations.
- **Wider zone cover**: Greater scope and endurance to cover much bigger areas per mission,
- **Flexibility** for deployment, response and operation: ability to carry and quickly change payload for different type of operations (S.A.R., border control...).
- **Polyvalence**: Ideally, End Users would like to use the same aircraft in different operational contexts.
- **Reduce CO2 footprint**: Reduce the environmental impact to meet the more and more rigid regulations.
- **Lower cost acquisition and operational & maintenance (O&M) costs**: mission time Improvement, while lowering operating costs to meet authorities and practitioners' requirements, and budgetary constraints.

The demand of **RPAS** is growing **across Maritime & Fire-fighting emergency, Search And Rescue (SAR), Surveillance and Border Security applications** focusing on **long range surveying** missions operating **beyond visual line of sight (BVLOS)**, to screen large areas as part of border security, maritime surveillance and environmental protection. Among the different types of existing RPAS, **small-class tactical RPAS (s-UAS)** are **the best option, due to endurance, payload capacity and cost characteristics** (as opposed to small drones - little payload and endurance- and Medium Altitude Long Endurance (MALE) -very high cost-).

However, **in order to ensure market uptake of RPAS as a feasible and effective solution** for the ESM market applications, **critical limitations must be yet overcome**:

- To **achieve Swarm flight*** capacities, which **would multiply surveillance area** coverage.
- To **solve operators' capacity gap**, offering at last certified RPAS, and capability for surveillance.
- To **overcome administrative hurdles** (certification and regulation for integration in air space).
- To **solve the integration in the air traffic space of RPAS and Swarms**, one of the main operational challenges that the European Aviation Safety Agency (EASA) and EU have identified for the next years.



* **Collaborative RPAS (swarm)** consists on a set of RPAS flying under a common flight pattern, one acting as a leader and the rest following it. Swarm flight allows covering large areas during surveillance missions and lower service cost. Flying in swarm formation (equipping the swarm leader with a large radar) would facilitate identification, thus reducing the impact on air traffic control. As of today, **nobody has ever released the ability to fly RPAS using the intelligence built in as swarm for civil applications**, other than implementing it in non certifiable micro UAS (**m-UAS**), drones.

Paradigm shift from manned aircraft to effective and affordable unmanned aircraft for ESM becomes now **feasible** due to SWARPAS solution based on 1) an innovative swarm flight capacity for fixed-wing s-UAS, RPAS swarms validated at TRL6; 2) a s-UAS (Cruiser II) certified by AESA-EASA². **No company in the world other than MAGLINE has currently such capability**, which is ensured due to strategic investment made along Cruiser II certification process and Flight Control Units' company "Applied Navigation" equity share (see LoC).

WHY THE RIGHT TIMING IS NOW? 3 main **market drivers in EMS** will accelerate the **transition to unmanned**:

1. **Operators need to innovate**: Emergency service operators are awarded contracts for the provision of public services. In this context, **companies need to reduce operating costs and increase their businesses profitability**. In addition to that, in mature markets operators need to differentiate to better compete in

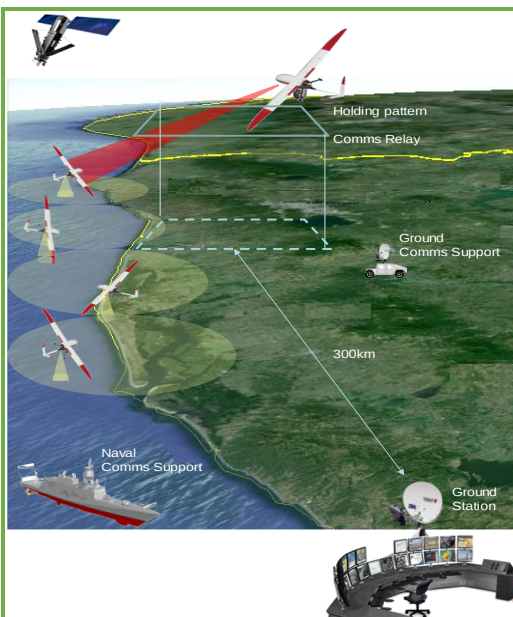
¹ https://ec.europa.eu/growth/sectors/aeronautics/rpas_en

² http://www.magline.es/assets/img/cert_aeronavegabilidad.pdf

a global market. Proof of it, is Babcock's interest and commitment with SWARPAS.

2. **Society demands efficient actions by public services:** emergency operations have an increasing public impact. Society demands efficiency even in **high-risk emergencies** where RPAS could, but still are not, be used.
3. **Agencies work to find innovative solutions:** Contracts with operators are extended annually, with the use of the same type of manned aircraft. **Market agents have already targeted RPAS as Key Enabling Technology (KET), to develop the next emergency services' generation.** In the security and civil surveillance's field, agencies have identified the need for high performance RPAS with the greatest scope and autonomy possible, which can be complementary to manned aircraft, or substitute them in certain missions particularly in surveillance operations.

1.1.2 SWARPAS SOLUTION: 1ST SWARM OF CERTIFIED FIXED-WING LONG-ENDURANCE SMALL CLASS RPAS



SWARPAS SOLUTION by MAGLINE will bring to market the **1st certified swarm of fixed-wing small class RPAS to immediately impact emergency services** (surveillance & fire-fighting emergency, SAR, maritime operations, border control, etc.):

- Its **unique swarm flight capacity** based on an innovative swarm guidance control system will allow **enhancing the area coverage and minimizing impact on air traffic control**.
- It is based on MAGLINE's low-cost RPAS platform "CRUISER II", already certified under EASA regulatory environment, which incorporates essential systems and **payload in a modular plug&play manner**.
- **Modularity** will enable low-cost maintenance and operation through ultra- rapid interchange of equipment and systems and flexible low- cost manufacturing process.
- It can be deployed in **remote environments without need for close Support Ground Equipment**.

MAGLINE'S STRATEGIC APPROACH is to **treat the ESM as an 'aviation market'**. Up until now most RPAS manufacturers (many of which are MAGLINE's current customer base), have conducted their RPAS product design approach either as a technology for military purposes or as an evolution from the hobby industry (which cannot ensure standardization levels required by civil EU Authorities). However, **EASA regulators** have established a **set of Directives and EU Regulations** to be met for **RPAS operated in civil applications**.

MAGLINE's strategy follows strictly the European Aviation Safety Agency **current regulatory environment**. Even more, Magline delivers in its single distinctive product, RPAS Cruiser II, all key technical features which have demonstrated to be efficient means to solve technical barriers to reach the market.

KEY TECHNICAL FEATURES that SWARPAS will offer are:

➤ ➤ ➤ **✓ Swarm flight:** allowing to **multiply the surveillance target area** (x6 for a SWARPAS of 7 RPAS) or **with 1 spare unit, or to reduce surveillance time**, which is critical for Emergency operations (e.g. reduction from hours to minutes is critical in both rescue and fire prevention missions).

✓ Scalability: easy to add up to 25 new RPAS to the swarm to achieve broader (x24) surveillance area.



✓ Suitable for VLOS and BVLOS operations: 200-500km, <10h.

✓ Simplifies the complexity of the flight authorization process: allowing for a **single flight authorization** including all member aircraft being part of a swarm. Authorization, NOTAM, etc, would be granted to **fly a corridor towards the operation scenario and back**.



✓ Enables high detection/identification grade: 1. **Active identification** due to ADS-B / transponder messages sent to Air Traffic Control, delivering group identification while solving the problem of single aircraft identification; 2. **Improving passive detection offered by ground radars**, allowing to detect for a group of aircraft, identifying both, the number of aircraft and a clear radar signature.

✓ Interoperability among RPAS and manned aircraft, brigades, ships, deployed in a mission will be based on a **standard protocol (STANAG 4586)** to grant real time data sharing among all of them.

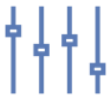




✓ **Low cost:** compared with manned aircraft currently used in SAR operations, **acquisition price will be 50-98% lower** and operating costs (based on the available flight hours number) will be 90 - 98% lower. Compared with other unmanned competitor solutions, **price of each of SWARPAS' RPAS will be 1/3**, due to manufacturing costs reduction thanks to high degree of modularity.



✓ **Ultra modularity and systems' ultra quick disconnect:** Ultra modularity allows for the **least investment in major high cost payload** (e.g. cameras). SWARPAS ultra modularity is a global innovation, as it allows for **optimized flexibility and expandability**, just ultra-quickly adapting the RPAS to different payload configurations.



✓ **Configurable:** Easy specific IoT embarked equipment integration in the RPAS to meet information requirements on specific operations. SWARPAS will allow to **demonstrate** various sensor **configurations** specific for different **emergency surveillance operations**: SAR, fire-fighting...



✓ **Maximized operational time:** due to almost RPAS 0 downtime at the maintenance or service levels. **All systems can be quickly interchangeable in a few minutes**, Engine (< 2 mins), Avionics, Payload, Gimbal, and equipment in Ground Station. Furthermore, the operator acquires 1 RPAS spare unit; in case 1 RPAS fails, it can be easily replaced without stopping the mission.



✓ **Sustainable:** the proposed solution will **save up to 85% in fuel consumption**, thanks to light weight composite materials construction, and its swappable engine modules, which allow reuse the electronic components of the engine control without scrapping the entire engine after engine overhauls. **SWARPAS will be able to reduce CO2 emissions a 98%** in 1,000 hours of flight: manned aircraft have 92 Tn of CO₂ emissions, while SWARPAS will reduce this to only 5 Tn of CO₂ emissions.



✓ **Able for non-segregated airspace (civil applications):** contrary to military context (flights in segregated air spaces), **civil applications require very strict certification requirements in order to be able to fly in non-segregated airspaces**. This can be achieved by attaining the **EASA Type Certificate (JARUS)**. MAGLINE has a **privileged starting point for this**, compared with other competitors, since in 2018 it attained the Certificate for Airworthiness for Experimental Flights (**CAE**) from EASA (Spanish branch AESA), and in 2020 the CEVE (special flight airworthiness certificates for experimental uses -or special operations-) for its "CRUISER II" RPAS. This will also allow **carrying out the demonstration flights** within SWARPAS project (WP4) both in Zaragoza's aerodrome and in CIAR's premises in Lugo.

1.2 INNOVATIVENESS

1.2.1 FIRST SWARM OF EASA CERTIFICATED SMALL CLASS RPAS

SWARPAS will bring to the emergency services market the **first swarm of certified long-endurance SUAS RPAS for surveillance** tasks. It

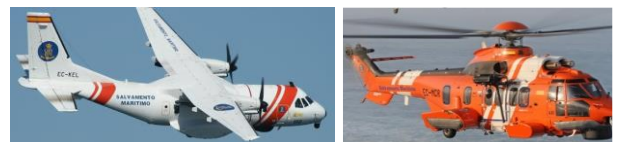
will be capable of **progressively substitute manned aircraft**, currently used in **long range BVLOS surveillance tasks of civil emergency operations** (S.A.R., fire fighting, border security,...), reducing crew risks and environmental impact, while maximising profitability



FIGURE 1. IMAGE OF THE SWARPAS RPAS PROTOTYPE

Main competing solutions are either manned solutions or unmanned technology based on RPAS, but without swarm flight capacity. None RPAS competing solutions have CAE - EASA and CEVE certifications.

Currently, means used in emergency operations (such as SAR) are based on manned technology (e.g. CASA 235, EC 225, AW139). Their **price range is 1-30 M€** (CASA 28M€; EC225 24M€; AW139 10-20M€),



significantly higher than the RPAS price in general (SWARPAS' RPAS estimated cost is 350 k€). SWARPAS solution will be an alternative for any emergency operation involving surveillance task, leaving rescue tasks - approx. 10% of the total of SAR- for manned aircraft. In such cases, **SWARPAS solution can multiply profitability up to x1650**, by increasing the number of monthly service hours x33 (potential flight hours' number/month guaranteed by the UAS compared to the number of flight hours/month allowed by a helicopter), and **reduce acquisition cost to 1/50 part**.

Among the RPAS incipiently used by ESM agents, it is remarkable the low weight VTOL HC of rotary wing, with which Babcock MCS has started a program in collaboration with MAGLINE. Such solution, however, is

suitable for a much **lower range (<90 km)**. In any case Helicopters would be a complementary solution, and not substitutive, of SWARPAS.

Non certifiable s-UAS (drones) currently in the market or under development are not considered an alternative to SWARPAS solution, since they **cannot bring enough endurance and payload capacities to cover ESM needs**, in which airworthiness certification is a must.

	Agility Fault tolerance	Endurance Payload
	MULTIROTOR	FIXED-WING
POWER SOURCE	Electric	Electric / Combustion
ENDURANCE	10' to 50'	45' to 10+ h
PAYLOAD	up to 15 Kg	0,5 Kg to 50+ Kg
GROUND SPEED	0 (hovering) to 75 km/h	45 km/h to 200+ km/h
ALTITUDE (ceiling)	Up to 3000 m	Up to 5000+ m
SIZE	6 cm to 1,6 m (frame diameter)	1 m to 20+ m (wingspan)

As for global-approach competing small class (SUAS) fixed-wing RPAS by other manufacturers, **none** has managed to introduce its solution in the market, beyond restricted environments (military or large uninhabited areas...), **due to the barrier of aeronautical certification**. For example, EMSA REACT consortium³ has a R&D non-certified solution (by TEKEVER) which does not provide response to the limitations exposed before; Aertec TARSIS 25 and 75 have only been tested for specific applications in segregated air spaces, **but do not own certification for civil purposes**.

So, currently available RPAS lack both airworthiness certification for non-segregated air spaces and swarm capability. The possibility for them to obtain a CAE or TC would require too much investment and resources at this point. It is essential that the aircraft is designed and manufactured with the Certification Processes in mind. All these limitations will prevent end-users to adopt non-certified RPAS; therefore **RPAS developments other than MAGLINE's have no clear road to market**.

1.2.2 PLUG&PLAY MODULAR CONFIGURATION TO ATTAIN POLYVALENCE AND LOWER COSTS

Existing modular RPAS **solutions do not apply** the plug&play concept to each of the basic configuration elements (i.e., the engine module, the gimbal and the FCS), **or the specific configuration elements** (i.e., payload). This **adds complexity, time and therefore costs at the time of changing configurations**, as well as during **maintenance tasks** (i.e., replace a damaged component).

SWARPAS plug&play ultra modular design will allow for ultra polyvalence. The autopilot architecture allows to create an **onboard network where nodes are able to operate all necessary equipment, engine, sensors...** transferring the information through CAN buses, Ethernet and RS485. An operator will be able to easily and ultra quickly modify the configuration of its systems, thus being able to use the same SWARPAS for different types of applications (S.A.R., fire prevention, etc.). Moreover ultra **modularity will simplify manufacturing process**, thus leading to significant cost reduction and the possibility to offer highly competitive **lower-costs** (-50-98% than manned aircraft; -66% than other RPAS).

1.2.3 SWARM CAPABILITY TO WIDER ZONE COVERAGE RANGE AND TO SOLVE AIR TRAFFIC INTEGRATION

There are **on-going projects** exploring swarm flight capabilities, but those **are associated to military applications**. There is great opacity around such projects, but even when they arrive to feasible solutions, they can not be implemented in the civil market, since **certification (essential for civil applications, particularly considering the new Regulation) is not in the development Roadmap of companies focused in the Military**, since this market niche still offers them good growth perspective. Also, RPAS provenient from military application are made optimizing resources and for a quick turn around, thus **leaving behind important safety issues like robustness and durability, essential for a civilian certifiable product**.

SWARPAS' swarm guidance module (**SGM**) will allow **remote piloting of a Swarm of fixed-wing RPAS, reducing mission time and costs, multiplying x6-24 the surveillance area, and boosting operability**, compared with manned aircraft and other unmanned solutions based on single RPAS. The **RPAS swarm's primary concern is the guidance configuration control; related research** mainly focuses on mathematical modeling, control strategies and collision and obstacle avoidance algorithms⁴.

The fact is, **until today, nobody has released the ability to fly RPAS swarms in civil applications**, other than implementing the intelligence in non-certifiable m-UAS for applications with much fewer risks, e.g. fireworks. **No company in the world other than MAGLINE can currently offer such capability implemented in SUAS RPAS**.

³ <http://www.emsa.europa.eu/operations/rpas.html>

⁴ Zhao et al. "Modeling and Flight Experiments for Swarms of High Dynamic UAVs: A Stochastic Configuration Control System with Multiplicative Noises" Sensors, 2019 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6695994/>).

Magline can ensure it due to strategic investments made on Cruiser II certification and in FCU's company "Applied Navigation" equity share (Applied Navigation has shown its intent to support MAGLINE in the project, see Lol). The SGM will be integrated in 'Quattro' Autopilot⁵: as opposed to other competing solutions, is able to control loops over roll, pitch and yaw rates, and therefore, to allow for transition modes (as discrete modules that pass the control from one to another), ideal for swarm manoeuvre.

SWARPAS's swarm guidance module is the intelligence to be integrated in each RPAS autopilot for swarm flight:

- **Layer 1: Lower level control through way points**, is given by a simple RPAS guidance loop flying a certain flight plan under an ADS-B / transponder squawk code for Air Traffic Controller identification (active monitorization). Passive monitorization will be delivered by ground radars.
- **Layer 2: Higher level control, of relative movements among aircraft**, overrides layer 1 when the aircraft is accepted to be guided by a higher level guidance module capable of identifying aircraft, and controlling the separation among aircraft within the same swarm.

The SGM allows that active monitorization delivers a plus of identification, with each swarm aircraft identification. Passive monitorization for ATC becomes more visible now, as radars will be capable of identifying a larger group of aircraft compared to the radar signature of single aircraft.

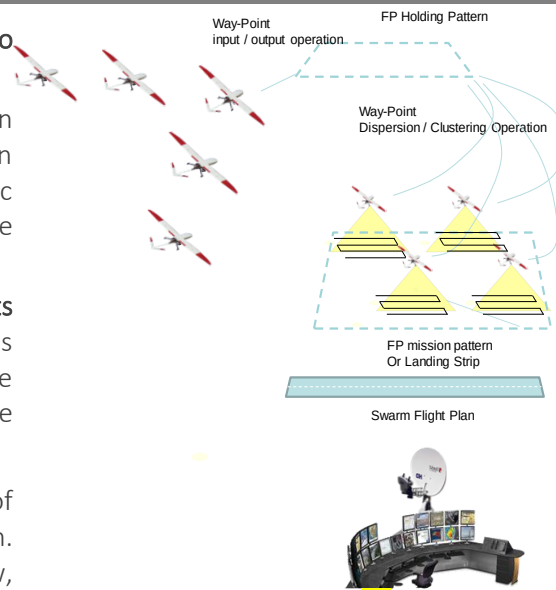


FIGURE 2. SWARM FLIGHT PLAN (FP MEANS 'FIXED POINT')

SWARPAS software application for swarm flight runs on top of embedded Linux on the i.MX8 application processor. The application can run in 2 configurations corresponding to the role in swarm (leader/follower):

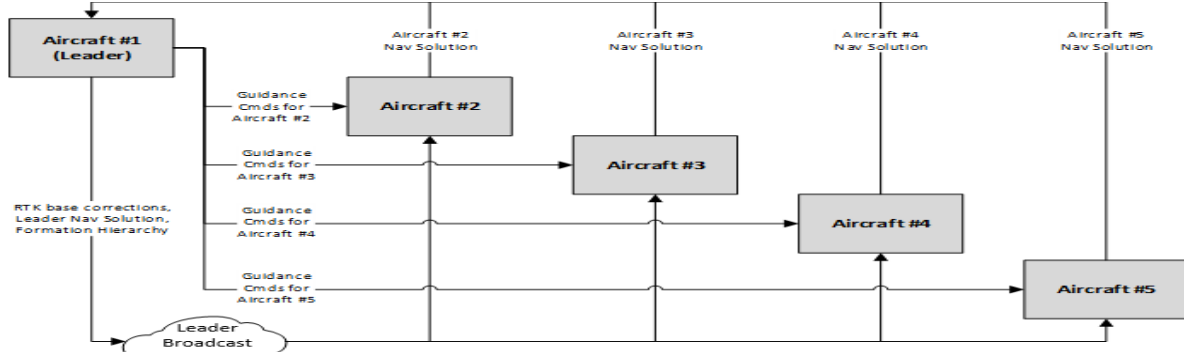


FIGURE 3. FORMATION COMMUNICATION ARCHITECTURE

Operations' parameters	Manned HC/aircraft	RPAS with no swarm capability	SWARPAS
Surveillance area	Medium	Medium	Large
Surveillance duration	Long (3hrs)	Medium (2hrs)	Very Long (>6hrs)
Distance	Medium - High	Medium	Medium/High
Aerial platform cost/unit	> 10 M€	1 - 5 M€	< 1 M€ (<2.5/swarm)
Change time (engine)	N/A	4 hr	< 2 min
Change time (gimbals)	N/A	N/A	< 5 min
Visibility	BVLOS	BVLOS	BVLOS
Swarm flight capacity	✗	✗	✓
Configured to ESM	✓	✗	✓
Certified	✓	✗	✓
Technology	Expensive high-tech	Medium cost range high-tech	Economic high-tech
Deployment distance	To cover Short/Medium/High range	To cover Medium range	To cover Short/Medium/High range
Area to be covered	Medium size areas	Medium size areas	Large areas
Target Operations	For Rescue of people	For Remote First Response Operations	For Remote First Response Operations

FIGURE 4. SWARPAS VS OTHER SOLUTIONS AVAILABLE IN THE MARKET

⁵ QUATTRO autopilot is the result of MAGLINE's strategic investment into the company "Applied Navigation". As sole investor on this technology, MAGLINE has direct access to it and can create market barriers to competitors. Moreover, this makes MAGLINE capable of governing the direction of further developments of the technology.

SWARM BEHAVIOR involves the following **BENEFITS**:

- ✓ Allows to multiply the surveillance target area (e.g., x6-24 for a +7-25 RPAS SWARPAS).
- ✓ Allows to reduce surveillance time, which is critical for Emergency operations.
- ✓ Avoids satellite imaging need, with much less resolution. For the first time, close surveillance could be conducted in large areas without in a much precise, easier, wider and persistent way.
- ✓ Allows for a cost reduction tool and for more efficient equipment for SAR application
- ✓ Enables high detection/identification grade and
- ✓ Simplificates the complexity of the flight authorization process.

SWARPAS solves all the problems that emergency services operators face up with, in surveillance operations, meaning a **HUGE REVOLUTION COMPARED WITH AVAILABLE STATE-OF-ART solutions in the market.**

1.2.4 RIGHT-TIMING

- **No current direct competition**: US and European competitors are consolidating their RPAS and reducing costs, but at the moment no manufacturer is offering swarm guidance capabilities to the market.
- **Strong regulation compliance**: The EU has published new regulations articulating the need for RPAS' certification as a condition to fly them in non-segregated areas⁶. MAGLINE has an unmatched position in the certification path, and this gives the company surpassing advantage.
- **Low cost – high tech and scalable solution**: Cost reduction makes SWARPAS highly competitive vs manned aircraft. Operators will look into large RPAS acquisitions whenever certificated systems irrupt the market.
- **End users / Clients readiness**: emergency services agents and public agencies are ready for RPAS adoption (e.g. Babcock MCS, has shown interest in SWARPAS) once it is veriflicated and certified). Surveillance niche market operators need to overcome their current capacity gap to lead the next emergency services generation. They are already taking first steps towards unmanned technology (i.e. Babcock's VTOL LUA). Specific configurations must be initially conceived and verified for each mission/application. **Babcock MSC has already shown its intent to verify SWARPAS in emergency operations**: verification tests will be performed in various configurations proposed by the operator, who has specific knowhow about operations' needs.

In conclusion, **SWARPAS by MAGLINE offers a new concept solution to meet emergency services operators and agencies demands**, by demonstrating and introducing in the market for the first time a **certified long-endurance small-class RPAS swarm**. By developing and demonstrating specific sensors' configurations, SWARPAS will overcome current operators' capacity gap for collaborative RPAS surveillance, becoming a revolution not only in the emergency services market, but also in safety and security markets.

1.3 STAGE OF DEVELOPMENT

SWARPAS solution is currently at a TRL 6 stage of development. SWARPAS's RPAS platform, CRUISER II, began its development in 2014 with a 1st RPAS design which, prior to any commercialisation action, was completely redesigned anticipating many of the modularity and plug&play aspects that will be part of SWARPAS solution.

- ✓ After 5 years under development, **SWARPAS' RPAS "CRUISER II" platform prototype development phase is finished**, and MAGLINE has started the Type Certification. The RPAS Aeronavigability has been tested in various environments (Spain, India, Norway...) until attaining a CAE and further Operational Authorization (http://www.magline.es/assets/img/cert_aeronavegabilidad.pdf). A technical sheet of it (<https://magline.es/assets/img/Products/Magline%20Cruiser%20II%20Data%20Sheet.pdf>) is available at the MAGLINE's website. However, the RPAS platform needs to be equipped with sensors and payload for specific Emergency Services operations, and the control system for swarm flight capacity has not been integrated and demonstrated in an operational environment yet.
- ✓ **Swarm Guidance technology to be able to fly swarms of many RPAS has been developed, simulated, and tested in an industrially relevant environment (TRL6).**

The following milestones have led MAGLINE to its current state:

⁶ <https://www.easa.europa.eu/newsroom-and-events/news/easa-publishes-proposed-standards-certification-light-drones>

Innovation Milestones	Business Milestones
2012-2017	
2014: CRUISERII RPAS design. TRL3 2014-16: CRUISERII development: chassis & wings materials and design, plug&play concept. TR3 →5 2017: CRUISER II Engine Package totally controlled electronically. TRL4 →5. Prototype 1st aerodrome flight tests to attain AESA and operational authorization (TRL5→6)	2012: Investment in NC machinery developer & 100% investment in its machinery IP, WORLDMAQ-3,S.L. 2013: CRUISERII presence in Shows and International events. Early prototype sales: prototypes tested (<u>Tata Power SED</u>, India and <u>Norut&Andoya</u>, Norway) under extreme climate conditions. 2014: acquisition of 100% CRUISER II design Manufacturing Rights. Signed license agreement for using CRUISERII exterior design: full rights for subsequent systems integration, manufacturing and CRUISER II commercial exploitation as RPAS granted.
2018	
Plug&play connection development for engine and gimbals, and its integration in CRUISER II (TRL6).	CAE from EASA & Operational Authorization. Register nº 005650405-0002 (RPAS design) in European Patents and Trademark Agency. Investment in RPAS assembler (VEOLINE, S.L.) & production means.
2019 & 2020	
Autopilot FCU by Applied Navigation integration in CRUISER II (Fixed Wing configuration)(TRL 6) Development of SGM architecture (TRL6).	Investment in Autopilot developer, Applied Navigation US Company Agreement (LoI and MoU) with Babcock for a swarm of RPAS verification process to be launched in 2021. Launching of the company's equity participation process to gain financial strength for the coming growth.

1.3.1 NEXT STEPS PLANNED TO TAKE SWARPAS TO THE MARKET

In order to bring to the market SWARPAS solution, is necessary to:

- Integrate sensors and payload configurations for ESM & Swarm Guidance tech in the RPAS platform.
- Build real-scale 1:1 prototypes on which conducting verification flights in operational environment.
- Prepare the solution to **meet the requirements to achieve the Type Certificate** and thus become the first swarm of certified long endurance RPAS for ESM surveillance operations.

The table below shows the **steps planned, and KPIs to measure the successful accomplishment** of results:

Nº	STEPS PLANNED	KPIs
SO1	To demonstrate Swarm Guidance Module for fixed wing RPAS (TRL6 → 7) and implement SGM FW.	
SO1.1	TRL6→7: Real environment Swarm flight demo test flights)	Real environment demonstration ok (1/0)
SO1.2	SGM Fixed-wing (FW) development	SW architecture implementation in HW.
SO2	To implement ESM configurations & Swarm Guidance Module (SGM) on RPAS CruiserII.	
SO2.1	Design of new sensor configurations on CRUISER II for surveillance - ESM operations (TRL7)	ESM CONOPS Matrix designed (1/0)
SO2.2	SGM prototyping for 4 RPAS (3 RPAS already available)	4 SGM prototypes implemented (1/0)
SO2.3	SGM and ESM configurations, installation & integration	SGM integration in A/C #1... A/C #7. (1/0)
SO3	To validate autonomous Swarm capacity while verifying configurations on RPAS CruiserII for emergency operations (TRL6 → 7)	
SO3.1	TRL 6 -> TRL7: ESM-CruiserII-Swarm Verification flights	Interoperability & Interaction validation (1/0); SAR configuration verification (1/0)
SO4	To comply with airworthiness certification requirements. (TRL 6 → 8)	
SO4.1	TC prescriptive requirements compliance . TRL 7 → 8	Compliance matrix fulfilled (1/0)
SO5	To make contracting civil services of EU countries and worldwide aware of new SWARPAS by MAGLINE	
SO5.1	Project results dissemination (EU countries & worldwide civil services provision shows and events). Announce SWARPAS availability in contracting civil services.	Participation in 5 Exhibits (1/0)
SO5.2	Formalization of agreements with distributors to offer the new solution within their client portfolio.	3 agreements (2022: 2; 2023: 1) (1/0)

Strategically, MAGLINE will benefit from Verification tests for the RPAS certification to demonstrate Swarm guidance capability for a quick project turnaround. **VERIFICATION WILL BE ACHIEVED THROUGH MONITORIZATION OF ALL POSSIBLE SWARM FORMATIONS.** This will allow the operator and the Air Traffic Controller (ATC) to identify at any circumstances the type of flight that is being conducted, from single RPAS up to a group of 7 (preliminarily). **Real environment demonstration will be done with the support of an Emergency Services operator, Babcock MCS, Spanish branch of Babcock International, which has already shown its commitment with SWARPAS project** (see LoC in Annex 3).

Demo Site #1 (Zaragoza, Spain)	Demo Site #2 (CIAR Lugo, Spain)
 AERODROME OF VILLANUEVA DE GÁLLEGO (ZARAGOZA)	 CIAR - CENTRO DE INVESTIGACIÓN AEROPORTADA DE ROZAS
■ Air traffic verification (monitorization to ensure higher level of active and passive safety is achieved. Prove aircraft safety to operate under all circumstances). Sensors and payload testing for land surveillance SAR operations.	■ Air traffic verification test of a 7-RPAS swarm. Sensors and payload testing for maritime surveillance SAR operations.

TABLE 1. SWARPAS DEMO SITES DESCRIPTION

1.3.2 PROJECT OUTCOMES

TECHNICAL	■ First long-endurance Small RPAS with Swarm Guidance demonstrated capabilities (allowing for enhanced surface area covering in surveillance environments). ■ Validated & with AESA operational authorization. ■ Swarm Guidance Module for fixed wing RPAS demonstrated for +7 RPAS. ■ Verificated in real environment of sensing and payload configurations for ESM operations. ■ Suitability for medium and long range: fixed wing design enables it especially for medium-range operations (200-500 km) typical of emergency services. In small RPAS category, it will be unrivaled. ■ Ultra-quick change of engine, gimbals and payload due to modular design. ■ -66% cost reduction compared with other small RPAS (small UAS category: sUAS).
COMMERCIAL	■ Formalisation of 2 agreements with distributors: 2021 (Optimum Solutions for US, Canada & LATAM) and 2022 (PT Solid Base Technologies for Australasia); ■ 15 units of RPAS with SGM sold in 2023 to services operators i.e. Babcock, CHC Helicopters, Cobham SAR Services. Growths at a CAGR rate of 207.46% (2023 - 2026). ■ 4 large tenders won for RPAS with services operators and government agencies in 5 years. ■ Access to 4 international markets (Europe, US&Canada, Australasia and LATAM) by 2025. ■ Participation in 5 fairs and in 1 special sports event (Dakar), to show the new product worldwide.

1.3.3 PROJECT FEASIBILITY

- **Technological feasibility:**
 - **Swarm Guidance Module (SGM):** MAGLINE has developed the SGM to a TRL6. Its 2-layer architecture has been tested in virtual environment simulating the autopilot control of the RPAS successfully. SWARPAS EIC Accelerator project will allow to demonstrate it to TRL8 and to develop the firmware.
 - **Verification Flight Plan deployment** is feasible as MAGLINE has already developed several systems integration programs for high level international clients, and led demonstration flights, i.e. UK UAVAid flight demonstration in Malawi for humanitarian application (Kasungu-Unicef). Commitment of a global Services Operator (Babcock International) to support MAGLINE is shown in the LoC (see Annex 1-3).
- **Practical feasibility:** R&D Flight Plan deployment is feasible considering issues like:
 - **Experience:** as services provider, MAGLINE has great experience developing and adapting RPAS control solutions, as well as in design, manufacturing and testing. It also counts with the support (as shown in the Applied Navigation LoC Annex 3) with a team which can credit unequalled experience in the sector.
 - **Administrative:** MAGLINE attained EASA Operational Authorization for RPAS Experimental Flights.

- **Resources:** MAGLINE's facilities next to Villanueva de Gállego Aerodrome (Zaragoza) are ready for segregated airspace flights (MAGLINE has already deployed all resources required). Additional crew will be trained for real operations verification flights at Villanueva de Gállego Aerodrome and CIAR, Lugo.

■ **Economic feasibility:**

- MAGLINE expects SWARPAS' sales growth at a CAGR of 207.46% in the period 2023 – 2026. The business model in the 4 year period (2023 – 2026) is based on the following hypothesis: 1) Revenues model based on SWARPAS sales [platforms + associated payload + GCS (Ground Control System)]. These revenues will be completed by current MAGLINE's incomes (3rd parties design services'). 2) Sales Price: 2,45 M€ per SWARPAS (considering a 7-RPAS swarm). Unit price / RPAS platform: 0.35 M€.
- MAGLINE current net equity valuation (2019-2022): 51.75 M€.
- Initial equity value investment offer (EIC equity): 11 M€ (21.26 %)

1.3.4 RISKS AND OPPORTUNITIES WHEN BRINGING INNOVATION TO THE MARKET

FINANCIAL

Opportunity 1: MAGLINE (start-up with 51.75 M€ equity value) has a stable Clients' portfolio for engineering services provision, owns certified RPAS platform 'CRUISER II', and has a strategic capital participation in relevant actors of its value chain, with privileged access to technology and production means → **great leverage potential**.

Opportunity 2: Global context of crisis will imply adjustment in public budgets, promoting the adquisition of more economic solutions, such as SWARPAS. Investment in MAGLINE's equity will benefit from a **high-rate business growth in the next years, thus obtaining a very attractive return of investment**.

Risks	Impact	Contingency measures	Odd
Not-bankable: the market does not assume high costs of SGM validation & verification flights.	High	To apply for public financing (EIC Accelerator Pilot grant + equity).	High
Lack of financial leverage at this stage, will slow down further innovation in the next years.	High	To apply for extra financial leverage through national and european funding dual-use programmes. Active search of private investors to share MAGLINE's equity with EC: initial discussions with Babcock MCS about equity co-funding.	High

TECHNOLOGICAL

Opportunity 1: Swarm Guidance tech has not been implemented and tested by any other competitor in small-class RPAS (sUAS) for emergency services market applications. SWARPAS brings the opportunity to implement and test in operational environment MAGLINE's swarm technology, developed to TRL 6.

Opportunity 2: MAGLINE's shared capital in Applied Navigation company, brings the opportunity to be the 1st to deploy Flight Control Unit "Quattro Autopilot" on the swarm, as well as be supported by a top-leading team whose commitment with SWARPAS project is shown in the Letter of Commitment (see Annex 1-3).

Risks	Impact	Contingency measures	Odd
Emergency situations may produce single aircraft control loss.	Medium	SGM guides the aircraft to detach from formation and then allows the aircraft to fly solo back to recovery point, to avoid RPAS loss .	High
Adverse propeller wake effects while swarm aircraft manoeuvring.	High	Assess avoidance manoeuvres which need to be always synchronized to avoid adverse propeller wake effects .	High
Specific risks associated to different types of formation.	High	Assess every type of formation, and identify specific and different challenges to be covered in full .	High

PRACTICAL

Opportunity 1: EASA Certification & Operational Authorisation attained for Cruiser II. STANAG 4586 offered by Quattro autopilot. Both, certification and interoperability, are guaranteed.

Opportunity 2: strategic investment on certification and in Applied Navigation ensures freedom-to-operate.

Risks	Impact	Contingency measures	Odd
High impact of regulation in RPAS adoption.	High	Use of certificated RPAS, Cruiser II.	Medium
		STANAG 4586 protocol will guarantee SGM interoperability with other participants in the operation.	

COMMERCIAL			
Opportunity 1: Great knowledge of the sector, where MAGLINE operates since 10 years. Opportunity 2: International SAR operator BABCOCK has shown interest in being first adopter once the solution is verified. Once the solution is adopted by a first operator, First Response Maritime Surveillance and Emergency Services niche market is to be boosted.			
Risks	Impact	Contingency measures	Odd
Possible long endurance RPAS swarm competing solutions.	High	First to the market with IP protection . Control new arising solutions	Low
Authorities and air traffic controllers' interest is very dependent on swarm guidance capability being demonstrated through early adopters (this implying high cost).	High	Applied Navigation commitment to support Magline's team along the SGM development process. A low-cost demonstrator will be used before high-cost real-scale verification Flight Program. Cruiser II RPAS Swarm Verification Flight Program. Joint MAGLINE's effort with a potential First Adopter.	High
Babcock MCS interest declines	High	Involve Babcock in verification Flight Program and secure willingness to invest to reduce cost for RPAS use, instead of manned aircraft. Invite other ESM global operators to verification Flight Program/ inform about the results.	Low
ENVIRONMENTAL			
Opportunity: RPAS improve manned aircraft CO ₂ foot print, notably.			
Risks	Impact	Contingency measures	Odd
Other competing solutions (solar RPAS) improve fuel engine powered RPAS climate benefits vs. current manned aircraft.	Low	Dissemination plan explaining RPAS require fuel engine power to be certifiable: electrical engines do not offer certification guarantee, a must for long-endurance first response in highseas surveillance & emergency operations.	High
STRATEGICAL			
Opportunity: SWARPAS Business Plan demonstrates sustainability over time.			
Risks	Impact	Contingency measures	Odd
Expected high company growth could be associated to high structural costs.	Medium	SWARPAS business plan scalability is ensured because: 1) SWARPAS involves higher sales than RPAS alone (typical swarm will be of 7 RPAS, but scalability ensures no limit); 2) Magline's production means ensure efficiency in high product demand scenarios. Production plant as a unit production cell replicable all over the world, also addressing governments' request to manufacture in-land.	High

2. IMPACT

2.1 MARKET AND CUSTOMERS

2.1.1 EMERGENCY SERVICES MARKET

SWARPAS will be focused on the **AIR EMERGENCY SERVICES MARKET**, in particular to the **new market niche of remote unmanned surveillance in maritime & land operations** e.g. SAR, fire fighting, border surveillance ...

According to 'The Drone Market Report 2020-2025' (<https://droneii.com/product/drone-market-report-2020-2025>) the RPAS global market will grow from 22.5 bil. \$ (2020) to over 42.8 bill. \$ in 2025 at a 13.8% CAGR. However, according to BisResearch report (<https://bisresearch.com/industry-report/autonomous-bvlos-drone-market.html>), which has **already taken into account the effect of the Covid-19** pandemic, the Global Autonomous sUAV - BVLOS market **will be 25,440 M€ in 2026 and will have a CAGR of 5.94%**.

Within civil applications, air emergency services, BVLOS, is the target market niche of SWARPAS. The demand for the small RPAS (sUAS) (on which SWARPAS technology is based) from the commercial sector is increasing, as these can be used in SAR, firefighting, law enforcement, precision agriculture, logistics & transportation, wildlife survey, etc.⁷.

⁷ https://www.marketsandmarkets.com/Market-Reports/unmanned-aerial-vehicles-uav-market-662.html?gclid=EAlalQobChMI7-mnjuaR7AlVx_hRCh0u-gQVEAAYASAAEgLa4vD_BwE

Main market demands for civil applications are low price, and ease to use for wider zone cover. This opens the market to public funds, like **Emergency Services's** funds. In addition, European border protection requires the development of systems, equipment, processes, and methods for rapid target identification. As explained in previous sections, **neither manned aircraft currently used nor currently available unmanned solutions, are capable of giving response to the new demands of the ESM agents**. Nevertheless, **long-endurance RPAS (sUAS on which SWARPAS is based)** are recognized by SESAR European Drones Outlook Study (*Error! No se encuentra el origen de la referencia.*) as the best unmanned aircraft technology for **border control, maritime and environment surveillance**. Within the value chain, MAGLINE is an "RPAS manufacturer". **MAGLINE'S CLIENTS' PROFILE** are **services providers (Operators) with subsidiaries in countries around the world, as well as national Agencies**. Each subsidiary must certify that among its assets has the necessary technology for the provision of services awarded to them by public bodies in each country. **Each customer replicates its business in the different countries** where it has presence and, in turn, in the different administrative divisions of the country. MAGLINE's clients for SWARPAS can be classified as:

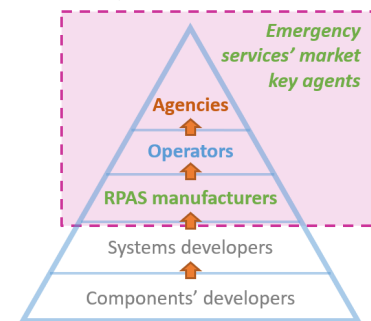
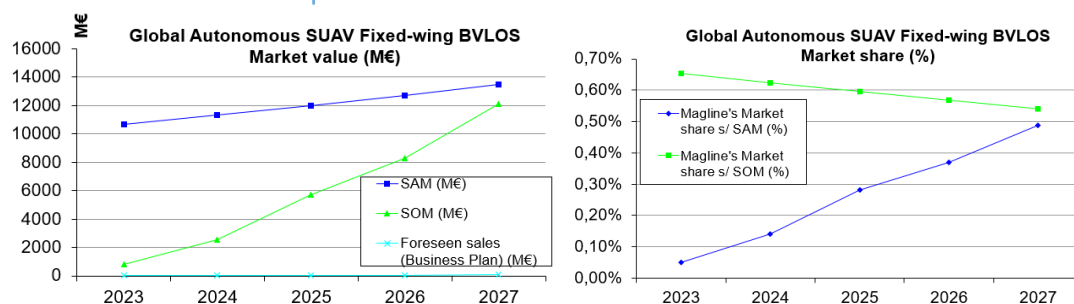


FIGURE 5. ESM VALUE CHAIN SCHEME

- **Services Operators** which are awarded the corresponding public contracts. EMS Operators are usually multinationals with subsidiaries in different countries. The **European leader in emergency services, Babcock International**, is being awarded of SAR public services in Europe and the rest of the world. **Babcock MCS** is its subsidiary in Spain and the first **MAGLINE's already paying-customer in the ESM** (CRUISER II product). Other remarkable Emergency Services operators, potential clients for MAGLINE are Bristow Helicopters Limited (*UK*), *CHC Helicopter (Canada)*, Cobham SAR Services Pty (*Australasia*); other smaller companies are Faasa, Hasa, Habock (*in Spain, apart from Babcock MSC*).
- **Public agencies**: depending on the country, these responsibilities can be held by national or supra-national agencies: in some cases they are part of the direct responsibilities of the ministries of Defence or the Armies; in others, i.e. France, Italy, Portugal, Sweden, end-users are SAR Government Organizations.

<i>International</i>	<i>Europe</i>
International agencies (UN, UNICEF, World Bank) are either adopting RPAS or exploring how to integrate them across their operations ⁸ . Each country's public administration carries out Emergency services by itself (either through their Ministry of Defence or the Army, or through services' operators).	Agencies like EMSA (European Maritime Safety Agency) ⁹ and Frontex ¹⁰ are moving ahead with plans to deploy RPAS (see EMSA tender page http://www.emsa.europa.eu/rpas-background.html) but they are not market deployed due to the currently solutions' immaturity.

According to BisResearch report, **SAM (Serviceable Available Market)** will be 25,440 M€ in 2026. **SOM (Serviceable Obtainable Market)** has been estimated corresponding to an optimistic % of substitution of manned aircraft flight hours by RPAS flight hours, foreseen by ESM market operators, from 7,5% until 90% in the 2023 – 2027 period. **SWARPAS business model sales correspond to a conservative % of substitution of manned aircraft flight hours by RPAS flight hours foreseen by ESM market operators (e.g. Babcock) from 0,9% until 11% in the 2023 – 2027 period**. In this context, **Magline's average market share would represent a 0,22% of SOM in the 2025 – 2027 period**.



⁸ <https://www.commercialuavnews.com/infrastructure/teal-group-analyzes-and-predicts-drone-market>

⁹ <http://www.emsa.europa.eu/operations/rpas.html>

¹⁰ <https://frontex.europa.eu/media-centre/news-release/frontex-begins-testing-unmanned-aircraft-for-border-surveillance-z5Q26A>

European Regulation: harmonization of European national regulations for small RPAS across the European Union is absolutely critical for the development of the European industry. The current system makes it difficult for companies to operate across individual EU border, so the result is that the market is extremely fragmented. In **June 11, 2019** the European Union Aviation Safety Agency (EASA) **published EU wide rules on drones**¹¹ ("Commission Delegated Regulation (EU) 2019/945" & "Commission Implementing Regulation (EU) 2019/947") and, **as of June 2020**, certifications of RPAS will be a mandatory requirement for the operators. In EU, only Spain has regulated it in the form of Law (RD1036/17) (also for RPAS with MTOM (Maximum Take Off Mass) ≤ 150 Kgs). **Since there is a pan-European market**, Europe could be in a better position to develop its UAS markets and **compete with the United States for investment capital**.

Currently, **venture capital (VC) is reluctant to invest in European companies mainly because of this fragmented market**. According to Teal Group Corporation report¹², over the period 2012 - mid 2019, Europe attracted only 9% of VC funding. By comparison, the US attracted more than 7x that amount. As a result, a **number of these European companies recognized that a United States presence is critical, so many of them have chosen to move entirely to the United States or open branches or make acquisitions in the US**.

2.1.2 MAIN COMPETITORS

Manned aircraft (helicopters and light aircraft) solutions (by AIRBUS Helicopters, AUGUSTA WESTLAND, BELL, CASA, CIRRUS...) are currently the only aircraft equipment providers for the Emergency Services sector. SWARPAS **more economic, safer and more effective unmanned solution** will compete with them. **No other long-endurance fixed-wing RPAS company** has developed **swarm guidance technology**. Besides, **no other RPAS** have been introduced up to date in EMS for SAR and **borders security**. **Larger and more expensive RPAS (MALE)** could compete with SWARPAS in some contexts, but its **size limits** the type of applicable operations.

SALES PRICE		MANNED	UNMANNED	
M€ 25.0			Northrop Grumman Corporation (U.S.) Lockheed Martin Corporation (U.S.) Israel Aerospace Industries Ltd. (Israel) Watchkeeper - Thales EU	
M€ 5.0	  	 		
M€ 1.0	NOT SUITABLE FOR MIDDLE AND LONG RANGE		Elbit Systems Ltd. (Israel), General Atomsics (U.S.), AeroVironment, Inc. (U.S.), Textron Inc. (U.S.), Aeronautics (U.S), Saab AB (Sweden), Turkish Aerospace Industries (Turkey), Atlantic, Tucan - Everis Luna - EMT Tarsis – AERTEC, Aerosonde – TEXTRON	 
M€ 0.5			 CRUISER II 	
	VTOL	FIXED WING	SWARM	TECH

2.1.3 SWARPAS UNIQUE SELLING POINTS

1. SMART: ENHANCED CAPABILITIES

- **First in the market medium-high range RPAS with Swarm flight capacity** (7 - 25 RPAS)
- **Extended zone's cover:** multiplies x6-24 the surveillance area.
- **Extends the operations' portfolio:** including operations not developed these days due to the high cost of helicopters: persistent surveillance, night search...
- **Fast-track to permission for operations:** better RPAS identification, as they flight as a unit in a swarm, will ease Air Traffic Control, simplifying procedures **and reducing time to get permissions for operations**.

2. EFFICIENT

- **High modularity:** modules' ultra quick-change and plug & play of engine, gimbals and payload will achieve 1) maintenance cost reduction; 2) Enhanced versatility; and 3) Improved adaptation to customers' needs.
- **Configurable:** easy IoT shipping equip. integration to meet information requirement on specific operations.
- **Low cost:** Its modular design allows to simplify manufacturing process, saving manufacturing costs, and thus involving significantly lower acquisition (1/3) and maintenance prices than those of the competitors.
- **Sustainable:** Efficient operational lifecycle of 10 years.

¹¹ <https://www.easa.europa.eu/newsroom-and-events/press-releases/eu-wide-rules-drones-published>

3. ACCESSIBLE

- **Made in EU:** Development and manufacturing 100% European.
- **Ready to fly:** Airworthiness Certification & AESA Operational Authorization for Experimental Flights in non-segregated spaces.

Emergency market operators are willing to operate ready-to-use (certified and integrated with a verified specific sensors' configuration) solution for civil applications as SWARPAS, with a price adapted to the civil scope. SWARPAS will bring a 66% lower price than regular prices of RPAS developed by competitors. Through SWARPAS, operators will be able to achieve new sources of income thanks to the possibility of carrying out new types of operations, until now unfeasible due to the administrative limitations of available RPAS to operate in non-segregated airspace without airworthiness certificate. Likewise, they will be able to increase the profitability of most of their traditional services.

COMPETITORS' solutions (per technology) →	MANNED A/C	FW RPAS	VTOL RPAS	MALE	SWARPAS
Certified solution	✓	✗	✗	≈	✓
Swarm flight capabilities	✗	✗	✗	✗	✓
Crew risks mitigation	✗	✓	✓	✓	✓
Able for S.A.R	✓	✗	✗	≈	✓
Able for border security	✓	✗	✗	≈	✓
Low O&M costs modular concept	✗	✗	✗	✗	✓
Link range (+250km)	✓	✓	✓	✓	✓
Low-cost solution	✗	≈	≈	✗	✓
Easy identification for Air control	✓	≈	≈	✓	✓

FIGURE 6. SWARPAS FEATURES VS COMPETITORS IN THE CIVIL MARKET (CLASSIFIED BY TYPE OF AIRCRAFT TECHNOLOGY)

2.1.4 MARKET BARRIERS AND PLAN TO OVERCOME

MARKET BARRIER	PLAN TO OVERCOME
1. National standards and regulations' particularities and restrictions in the distinct target markets.	To meet airworthiness conditions of the target country for export (as already done for Norway, India, Egypt, Malawi, Sierra Leone, Thailand or Indonesia agencies). Also, to observe the regulations for dual use technologies exportation to different target countries (see Annex 1.2) for the export of RPAS, where Magline is an active Operator having obtained licenses to export RPAS to more than 10 countries so far.
2. Need for certification (high investment levels) to reach the market.	In Task 4.4 of the EIC Grant phase of the Project, to comply with the verification process set forth in EASA Part 21, and prescriptive requirements for achieving Type Certificate, an extended CAE for which MAGLINE has previous experience in product and production certification to meet EASA regulations
3. Possible distrust of ESM operators towards RPAS use in SAR and border surveillance operators.	To conduct the verification flights for Certification, guided by Babcock's know-how, in this project to demonstrate the maturity level of this product, therefore allowing other to embrace the technology.
4. ESM operators demand already tested solutions in operational environments.	To involve an ESM operator, as Magline has already done with Babcock MCS (see LoC), in the implementation of a test plan for the SWARPAS configured systems. It will be performed in operational environments simulating, as emergency services experienced operator, real conditions and scenarios.

2.2 GLOBAL COMMERCIALISATION STRATEGY

2.2.1 OBJECTIVES

MAGLINE will seek to open a gap between SWARPAS' Certified RPAS and other competitors, to become at medium-term the **small RPAS global leader manufacturer for civil applications**. To achieve this, it has designed a business strategy with an ambitious commercialisation plan for the next 8-years horizon.

The **specific objectives of SWARPAS global commercialisation strategy** are:

- To deploy a **business-to-business (B2B) direct marketing** channel, as usual in MAGLINE. B2B channel is in line with MAGLINE's policy of direct communication with engineers and purchasing departments of its customers and suppliers, all over the world.
- To enable **tech support teams for the distributors** in US and Asia (Singapore), for an immediate commercialisation step, to:
 - Make more effective the penetration in the US, Asian and LATAM markets.
 - Provide number of systems that can be loaned to customers for operations' demonstrations.
 - Serve as link with the customer for the necessary tech-talk prior to get sales down.
- To use the **own existing Commercial structure** of MAGLINE for **central, south Europe and Middle East**.
- To design a commercial action to attract sales of SWARPAS from **Ministries of Defence and defence Contractors now in its customer list**, which in the last years have demanded from MAGLINE low cost RPAS and engineering services (Babcock Internacional, Andoya Space Center, Royal Thai Airforce, Egyptian MoD, Indonesia BPPT, etc.). This positioning of MAGLINE as services and solutions' provider paves the way for presenting them the new solution.
- To **demonstrate SWARPAS capabilities in sound sports events**, that will send the message: "SWARPAS CRUISER II IS READY FOR OPERATIONS".
- To **disseminate SWARPAS' results** and MAGLINE's products' portfolio through:
 - **Fairs** and international renowned shows:
 - Paris - Le Bourget Airshow (2023, 2025, 2027, 2029)
 - London-Farnborough Airshow (2024, 2026, 2028)
 - Singapore Airshow (2023, 2025, 2027, 2029)
 - ILA Berlin (2024)
 - AUVERSI EXPONENTIAL (US)
 - UNVEX
 - **Dissemination materials**, face-to-face **presentations**, video **conference meetings**, demonstrations in **other key events**, **corporate social networks**, offline materials exploitation and continuous **website updates**.

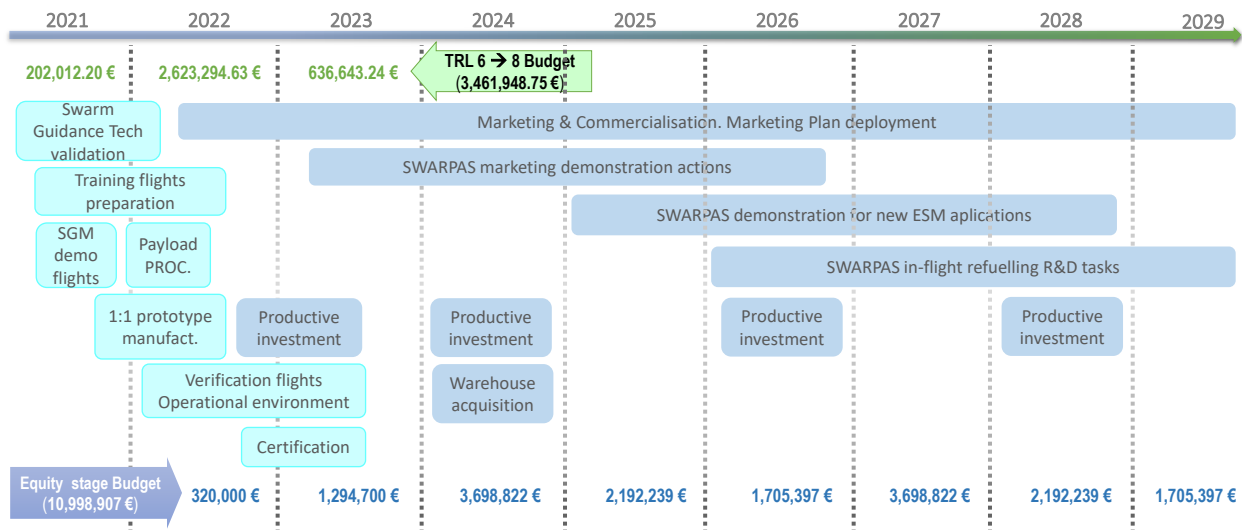
First adopter: MAGLINE expects to be able to sell the first commercial SWARPAS units to **Babcock MCS** (as first adopter). These units could be destined to the different Babcock International's subsidiaries in Europe (UK, where the parent company is located, Spain, France, Italy, Portugal, Norway, Finland and Sweden) and rest of the world (Canada, Australasia, Middle East, LATAM, Africa). Also, **other emergency services in the world will be targeted through concessionaires of this type of services**.

2.2.2 TASKS AND BUDGET: MARKETING PLAN

A marketing plan has been designed to achieve a **high revenue growth during the short - medium term**, by ensuring a **quick global positioning** of the company while the innovation and the uniqueness of the solutions bring more commercial development. This marketing plan will consist of the following **main actions**:

- **Direct commercial Events:** Participation with SWARPAS in major sports events (**Dakar Rally 2024**) as participant will help spread the word that the RPAS are market ready [**486 k€**]
- **Development of a distribution net** supported by well renowned global commercial agents (see letters of Intent in Annex 3) [**1.06 M€**]:
 - PT Solid Base Tech: In Singapore (for **Australasian market**)
 - Optimum Solutions: In San Diego (for **US, Canada & LATAM markets**)
- Continuous promotion actions through **attendance to sectorial fairs/shows** [**867 k€**]
- Purchase and adaptation of a truck-container (dry storage container) **to deploy inside an RPAS station**, including RPAS, for a **visual and effective marketing action**. [**1.55 M€**]
- Other dissemination actions: face-to-face presentations, video conf. meetings, demonstrations in key events, corporate social networks and offline materials exploitation, continuous website updates (min 12/year). Elaboration of **dissemination materials** (leaflets, posters, RPAS miniatures, etc.) [**1.11 M€**]

To maintain a high-growth company profile, MAGLINE will continue investing resources in R&D during the years after SWARPAS' development and demonstration for SAR and border security applications, thus broadening the product family by opening it to other applications, and developing new capabilities, i.e. in-flight refuelling, allowing MAGLINE keeping a leading position in the small RPAS global market. [**3.46 M€**].



2.2.3 STAGES OF THE COMMERCIALISATION PLAN

The commercialisation strategy will have **3 stages**:

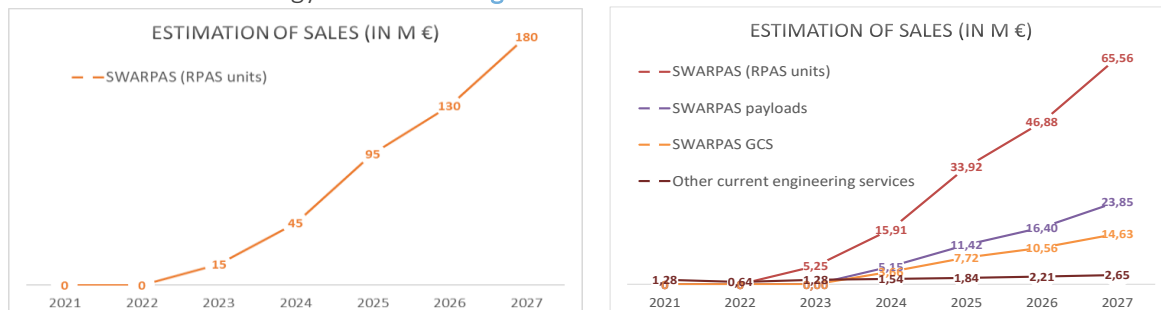


FIGURE 7. SWARPAS SALES EVOLUTION (LEFT); SWARPAS REVENUES EVOLUTION + CURRENT MAGLINE'S INCOMES (RIGHT)

- **At a first stage** (2023-2024) of the commercialisation strategy, the strategy will be focused on sales of SWARPAS for **SAR and maritime applications**, since these two applications will be the first to be developed and demonstrated in real operational context during the period 2021-2022. Thus, MAGLINE will concentrate its commercial efforts in them, **serving as an "entry door" into the market**.
- **As a second stage** (2025-2026) once the solution has proven to successfully integrate sensorics configurations for the first applications, MAGLINE expects a willingness from the emergency services market to use it in other applications (fire prevention, border control,...). Then, the commercial strategy will extend its resources to catch share in those markets too; this is expected to be achieved even faster with greater guarantees of success. The introduction and implementation of MAGLINE's solution in other ESM applications will be facilitated thanks to the pre-existing agreements that the company will have in this period with different stakeholders (operators, public agencies).
- **As third stage** (2027-2029). Configurations and adaptations for new applications will be developed and tested expanding the number and type of potential clients demanding the product. New high added value features for RPAS swarms such as in-flight refuelling will be developed, tested and offered to the market.

2.2.4 REVENUE MODEL

SWARPAS business model envisages **2 types of revenues** (sales of SWARPAS and integration of technology):

- **SWARPAS sales**: sales of SWARPAS, configured for each clients' application needs. There will be a standard configuration per application, and the possibility to include optional payload.
- **Integration of swarm guidance tech in 3rd party aircraft**: MAGLINE envisages a demand of specific types of customers (mainly, current customers, as MoD) of swarm flight capacities integration in their current aircraft. MAGLINE estimates these services could reach a 10% of the revenues of SWARPAS product sales.

It must be remarked that apart from the revenues associated to SWARPAS, MAGLINE has other revenue sources (which will be considered in the global numbers of Section 2.5's table, to show a realistic and global view of MAGLINE business). Such other revenue sources are:

- Technology integration (other than swarm guidance) services in 3rd party aircraft,
- Subsystems sales: mainly related to current company activity and portfolio. MAGLINE predicts that current customers will still require subsystems for the RPAS previously purchased to MAGLINE (Engine

Packages, FCS, Landing Gears, or Ground Stations): this will represent a substantial income for MAGLINE. Other components of the GCS such as antennae, trackers, etc. are not included, since MAGLINE uses 3rd party equipment without much markup.

2.2.5 PRICING STRATEGY. WILLINGNESS TO PAY

Pricing strategy: one of the value propositions is to provide a solution which is 1/3 price (each of the SWARPAS platforms will be sold, without payload, at 350,000 €) compared with the competing solutions. MAGLINE will obtain the highest commercial margin in the RPAS platforms (37,8%), thanks to their modular design allowing for an easier and more effective manufacturing process. **Payload and Ground Control Station (GCS)** will be equipment purchased and integrated, with lower added value to the customer (margin for them will be 25% and 33%, respectively). Payload and GCS will be either sold together with the SWARPAS' RPAS or not, depending on the customer and application. **MAGLINE will adopt a controlled sales margin strategy in the beginning, just in case using an aggressive "low-cost" approach for a quick market entry is required.**

COST BREAKDOWN	per RPAS unit	SWARPAS
RPAS platform materials	184.000 €	1.288.000 €
SGM Xquattro	15.000 €	105.000 €
Manufact. Personnel cost	14.924 €	104.468 €
Indirect costs	3.731 €	26.117 €
Total costs (aircraft)	217.655 €	1.523.585 €
Payload	87.200 €	610.400 €
GCS	487.500 €	487.500 €
Total costs (+ payload & GCS)	792.355 €	2.621.485 €
SALES PRICE (without payloads & GCS)	350.000 €	2.450.000 €
Margin	37,8%	37,8%
SALES PRICE (with payloads & GCS)	1.109.000 €	3.863.000 €
Margin	28,6%	32,1%

FIGURE 8. SWARPAS COSTS, SALES AND MARGIN

Willingness to pay: Considering swarm benefits of multiplying x6-24 the surveillance area, willingness to pay is assured. Other customers' needs are availability, operability, cost reduction in acquisition and O&M, safety for the personnel (operators) and ease of use: compared with current very high costs of manned aircraft, the emergency services operators will be willing to acquire SWARPAS to progressively substitute manned solutions in a relevant range of operations. This tendency and willingness to pay have been already checked with specific operators (e.g. Babcock MCS).

Bespoke solutions: the costs' reducing and pricing strategy will be possible thanks to the ultra modular design and a manufacturing process designed to standardise all assembly tasks. Thus, bespoke solutions will be offered within the possibilities available by the standard process. Personalised demands will be also responded, negotiating the prices and terms.

2.2.6 OTHER KEY ASPECTS FOR THE COMMERCIALISATION STRATEGY

The commercialisation strategy will be based on the following key aspects:

- **Certification:** Through task 4.4, MAGLINE will extend current CRUISER II's Airworthiness Certificate and Operational Authorisation granted by AESA-EASA to SWARPAS, to carry out specialized air operations and experimental flights of remote piloted aircraft system's swarms. It will also have to comply with the SGM certification and the Commission Delegated Regulation (EU) of 12.3.2019 on RPAS and on 3rd-country RPAS's operators.
- **Distribution channels & Logistics considerations:** SWARPAS will be crated in single containers to include entirely each of the aircraft. These will be palletable and stackable for ease of stock and shipment in both terrestrial and maritime transport.
- **Other regulatory aspects:** For production for sales, SWARPAS will comply with EASA regulation to guarantee airworthiness in accordance with EASA Part 21 Subpart G (POA) certification, related to production organization specifications. In 2007, MAGLINE's CEO (Miguel A. Gómez, see Section 3.1) led the team that obtained VLA EASA and Part 21 Subpart G (DOA & POA) certification for Very Light Aircraft.
- **IP protection:** (see detail in section 2.4).



2.3 EXTERNAL STRATEGIC PARTNERS

SWARPAS project's success will require the collaboration of external strategic partners with MAGLINE in certain tasks. During the development and demonstration stage, MAGLINE will require the involvement of the following partners (see LoC, Annex 3):

- **APPLIED NAVIGATION** is a US based company (<https://www.appliednav.com/>) in which MAGLINE holds full control of the strategic investments. It is the manufacturer of Quattro Autopilot, perceived as the high end successor of highly successful 'Piccolo Autopilot'. Applied Navigation has the highest qualified team

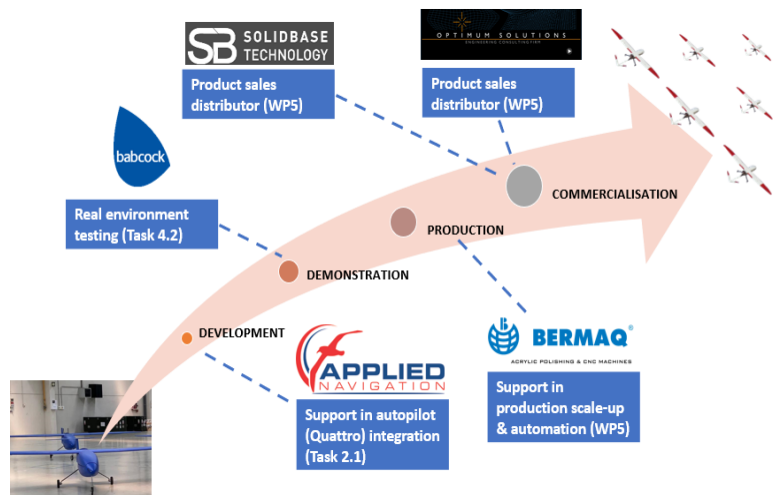
of professionals, which once designed and supported deployment of Piccolo Autopilot. **Swarm Guidance Module (SGM) for Quattro Autopilot** is to be implemented within WP2, and Applied Navigation will collaborate giving support for the activities carried out within Tasks 2.1, 2.2 and 2.3.

■ **BABCOCK INTERNATIONAL**

(<https://www.babcockinternational.com/>)

is the European leader in emergency services, and has been awarded public services SAR in Europe and the rest of world. Babcock MCS is its subsidiary in Spain and will be involved in ESM configurations (WP3) giving advice, participating in the requirements stage, and in verification flight tests in real operational environments (WP4).

- **WORLDMAQ-3 S.L.** (<https://www.bermaq.com/en/>) is a Spanish company, participated by MAGLINE. It develops and manufactures NC production machinery and Autoclaves required for components manufacturing in composites. It will be an strategic partner mostly after the project development stage, during the production process scaling-up, giving support and providing bespoke production means for the process automation.



For a successful market penetration and commercialisation strategy deployment, MAGLINE has **strategic partnerships**, which are the **poles of its distribution network in different global areas**:

- **PT SOLID BASE TECHNOLOGY** (<http://www.solidbasetech.com/>). MAGLINE will develop an agreement for Singapore and **Asian market**, to accelerate its access there.
- **OPTIMUM SOLUTIONS** (<http://optimumsolution.com/>). Based in San Diego US, has developed a number of integrations with RPAS as consultant firm, and now it provides Ground Station equipment to complement MAGLINE business. They will cover **US, Canada, and LATAM markets**.

2.4 INTELLECTUAL PROPERTY

✓ **Exclusive manufacturing and commercialisation of SWARPAS' RPAS design IS ENSURED**: as said in Section 1.3, since 2018 MAGLINE is 100% owner of the manufacturing rights for current "CRUISER II" RPAS design, which is registered as "RPAS design" in the European Patents and Trademark Agency since 2018 (<https://euipo.europa.eu/eSearch/#details/designs/005650405-0002>). Register nº 005650405-0002.

✓ **Exploitation of the Quattro autopilot where the SGM is deployed IS ENSURED**: As for the solution for the **Quattro autopilot source code, the IP is currently protected by the shareholders' agreement** in Applied Navigation (company participated by MAGLINE). According to such agreement, in case the company ceased activity or would be sold to a 3rd party, **MAGLINE will retain the autopilot design and source code property**.

✓ **SWARPAS's Swarm Guidance Module (SGM) and its integration in the Autopilot will be IP PROTECTED**). A devoted task (1.1) has been planned to study the best IP protection strategy for the SGM. The **preferred strategy** for MAGLINE will be to obtain a **patent for SGM's SW, HW and FW**. It is relevant to remind that although software patentability is still a debated issue given its exclusion as subject matter patentability, it is possible as long as the claim defines or uses technical means (a hardware element)¹², which will be the case for SWARPAS' SGM. **In case patentability was not possible, the best alternative strategy** will be adopted. In addition to this, **MAGLINE will analyse the best strategy** focused at **ensuring** a competitive position of the company and **freedom to operate for each of the target markets**. MAGLINE has analyzed in previous phases the needs to extend CRUISER II IP registration to other countries. The company will update this analysis prior to project completion. **In previous feasibility analysis** accomplished, MAGLINE has **identified regulatory requirements for each target country**, having defined measures to ensure the "Freedom to Operate" status for CRUISER II, and the commercial exploitation planned in each target country, with positive results.

¹² <https://www.iprhelpdesk.eu/Fact-Sheet-IP-Management-H2020-Project-Implementation-and-Conclusion>

2.5 FINANCIAL PLANNING

As a result of the business strategy, **the commercialisation plan will generate a net income of around M€ 27.73 at the end of 2026**. The EIC Accelerator will ensure that the accumulated profit is positive after end of the project (in 2022) and will increase progressively during the years thanks to the foreseen internationalisation of the product.

P&L	2018	2019	2020	2021	2022	2023	2024	2025	2026
Revenues	961,08	1.575,13	1.920,00	1.280,00	640,00	6.530,00	26.250,00	54.896,66	76.056,58
Gross Margin	514,42	1.176,77	1.168,74	1.166,00	526,00	3.359,25	14.236,56	29.722,72	41.677,30
Selling, General and Administrative expenses	- 48,05	- 78,76	- 345,40	- 383,37	- 419,52	- 2.074,47	- 4.402,77	- 5.002,75	- 5.971,52
R&D expenses	- 155,00	- 189,00	- 150,00	- 202,01	- 2.698,29	- 749,14	- 918,75	- 1.413,13	- 789,69
Other operational expenses	- 154,25	- 296,31	-	-	-	-	-	-	-
EBITDA	157,11	612,70	673,34	580,62	2.591,81	535,64	8.915,04	23.306,85	34.916,09
Interest	- 4,25	- 45,98	- 44,90	- 44,90	- 44,90	- 44,90	- 44,90	- 44,90	- 44,90
Other revenues/expenses (including grants)	- 136,08	- 250,16	-	- 141,41	- 1.816,31	- 425,65	- 112,70	- 127,70	- 207,70
EBT	16,78	316,57	628,44	677,13	820,41	916,39	8.757,44	23.134,25	34.663,49
Taxes	- 5,41	- 63,31	- 115,61	- 135,43	-	- 183,28	- 1.751,49	- 4.626,85	- 6.932,70
Net Income	11,37	253,25	512,83	541,70	820,41	733,11	7.005,95	18.507,40	27.730,80
Cumulative net income	11,37	264,62	777,45	1.319,15	498,74	1.231,85	8.237,81	26.745,20	54.476,00

Even though in the second year of the project (2022) MAGLINE will have negative net income (associated to the high R&D budget, since 2023 the project **will start generating positive net income**. Since then, the net income will progressively increase thanks to the foreseen internationalisation of the product and a sustained growth in market share. The **main aspects of the Financial Plan** are summarized in the following table, showing the **economic sustainability of MAGLINE's new product thanks to its business strategy approach**:

Business metrics and ratios	2018	2019	2020	2021	2022	2023	2024	2025	2026
Cash and cash equivalents	80,76	62,95	204,29	2310,32	1629,91	4439,42	15819,36	40431,37	75170,83
Total debt	1564,83	2363,58	2236,55	1983,35	1983,35	1983,35	1983,35	1983,35	1983,35
Total Equity	216,43	533,00	1136,33	2862,17	2361,76	4545,43	16739,67	41373,98	76705,74
Gross Margin, %	54%	75%	61%	91%	82%	51%	54%	54%	55%
EBITDA Margin, %	16%	39%	35%	45%	-405%	8%	34%	42%	46%
Debt-to-Equity ratio	7,23	4,43	1,97	0,69	0,84	0,44	0,12	0,05	0,03
Return on Equity, %	5%	48%	45%	19%	-35%	16%	42%	45%	36%
Return on Capital Employed, %	1%	9%	15%	11%	-19%	11%	37%	43%	35%
Break-even (operating cashflows)	Y	Y	Y	Y	N	Y	Y	Y	Y

The expectation in financial ratios such as EBITDA Margin, is that they will be increased from year 2022 as higher sales are expected. As per the **Return on Equity ratio**, MAGLINE envisages to obtain **16% in 2023, increasing to 42% and 45% in 2024 and 2025**, so that shareholders and investors can obtain earnings from the Company. In addition, according to the expectation of the company valuation, it is expected a **Return on Capital Employed (ROCE) ratio of 11%, 37% and 43% in years 2023, 2024 and 2025**: this would show a more efficient use of capital, and the growth trend in the following years after the EIC Accelerator is an important indicator of financial strategy. Investors will tend to favour MAGLINE with the stable and rising ROCE numbers in future years, supported by the market opportunity based on the potential users and the expectation in sales. Moreover, **according to the expectation in higher cash flow from operating activities, MAGLINE will be profitable from year 2023**. This means that the **EIC Accelerator can help the company to increase its benefits and become a leading company in the small RPAS solution for ESM market**.

2.6 SCALABILITY

2.6.1 SCALE-UP TRACK-RECORD

SCALE-UP (track record)	2017	2018	2019	2020
Milestones	1st Cruiser II prototype	1rst. Cruiser II EASA (AESA) CAE	2nd. Cruiser II EASA (AESA) CAE	Cruiser II production set up (3 pre-serial units)
	Cruiser II flight tests in aerodrome	Investment in RPAS assembler (VEOLINE, S.L.)	Investment in Autopilot developer, Applied Navigation	SGM architecture development (TRL6)
	Cruiser II Engine Package totally controlled electronically.		Autopilot QUATTRO integration in Cruiser II	
Income (€)	575.859,06 €	961.080,00 €	1.573.130,00 €	1.920.000,00 €
EBITDA (€)	25.730,00 €	157.110,00 €	612.700,00 €	673.340,00 €
Financial needs (€)	809.333,33 €	500.000,00 €	0,00 €	0,00 €
Leverage	External funds' origin	MINECO Public funds	ARQUIA Bank funds	-
	Loan (€)	607.000,00 €	300.000,00 €	0,00 €
	Loan objective	Loan for industrialisation	Loan for Cruiser II devel.	-

2.6.2 SCALE-UP POTENTIAL

In terms of potential business scalability, **as MAGLINE gets SWARPAS to be successfully used by 1st adopters**, the market potential will increase exponentially due to the engagement of the service operators subsidiaries

and the **replicative behaviour of different public agencies**, once that first experiences constitute success stories and define Best Practices. In a second stage, the **development and validation of new configuration for other ESM applications** will contribute to increasing the demand, which will come from:

- **The services operators themselves**, which in general provide not only SAR and fire prevention services, but also many other types of services, such as border security, humanitarian actions, emergency medical services, etc.
- **The engagement of public agencies** responsible for such new validated ESM applications

In addition, MAGLINE predicts that **disemination of the results will be most efficient bringing the RPAS use to be known by the mass public using the inertia provided by International Sports events**. MAGLINE foresees that participating in a global broadcasted event, Dakar Rally, for instance, is a great opportunity to show case the RPAS swarm technology in countries where its benefits are much needed. Images from a swarm of RPAS following a rally car or dispersing in many directions would run around TVs all over the world without the need for extra investment in marketing campaigns. As a result, enquiries from all over the world would be received, but not to demonstrate the technology again, as it has been witnessed, but to establish a commercial contract with customers to adopt the technology through an appropriate training plan.

All this will result in a **SAM increase** since MAGLINE will offer its product to a broader range of clients in the market and, therefore, an increase in the company's turnover. On the other hand, since the company's target market is global, **the geographical scalability of the business is unlimited: the ESM is a global market, and the end-users needs are very similar worldwide**. For this reason, the **expansion of SWARPAS as a worldwide solution in different countries will boost the massive growth of users**. This strategy includes strategic partnerships (see Section 2.2) with key players worldwide. As a consequence, the structure generated along the project will be the basis for the mid/long-term growth, reinforcing the national/global presence in the main markets and the after-sales services. The **exponential growth in demand volume will require**:

1. **Production equipment investment** (NC machining equipment, working bays) to increase current production capacity.
2. **Increase of staff costs of production department** (+5 new jobs in 2022, after end of project), and +25 new jobs in Quality, R&D department and transversal departments (sales, procurement, administration, legal, etc.) during the 2023-2025 period.

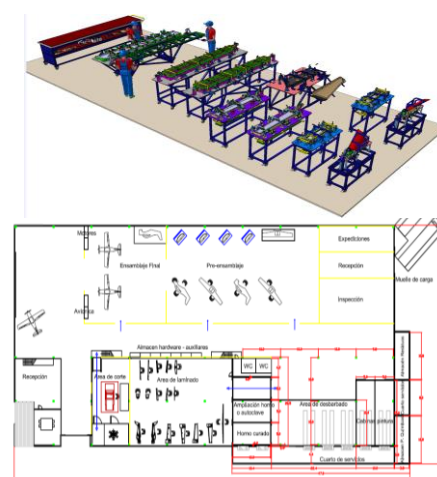


FIGURE 9. WORKING BAYS (UP) AND PLANT LAYOUT (DOWN) FOR LARGE SCALE PRODUCTION

However, **high productivity rates** of the automatic manufacturing equipment, **as well as the benefits of the ultra modular RPAS design**, which allows for ultra quick assembly operations, **will result in a significant reduction of the manufacturing unitary costs** as sales increase (applying economy of scale). MAGLINE already has a **complete production process and layout** designed, optimised to achieve production cost reductions and margins' increase, as the number of units increases.

SCALE-UP POTENTIAL		2021	2022	2023	2024
Milestone	Swarm Guidance Tech validation				
	Verification flights - operational environment				
	Compliance for Type Certificate				
	Productive investments				
	Warehouse acquisition				
Income (€)		1.280.000,00 €	640.000,00 €	6.689.080,25 €	28.810.582,68 €
EBITDA (€)		782,63 €	31,48 €	1.331,36 €	11.475,62 €
Financial needs (€)		2.916.462,55 €	1.294.700,00 €	4.564.309,52 €	2.192.239,00 €
Leverage	External funds' origin	EIC Accelerator	EIC Accelerator	EIC Accelerator	EIC Accelerator
	Grant (€) (assuming a prefinancing of 75%)	1.817.523,79 €	0,00 €	605.841,26 €	0,00 €
	Equity funding (€)	320.000,00 €	1.294.700,00 €	3.698.822,00 €	2.192.239,00 €

2.7 KEY PERFORMANCE INDICATORS

In the table below, a series of KPIs are defined, in order to measure the success of the strategy proposed by MAGLINE, related to the technology development, market applications, sales and financial aspects:

Area	KPI description	Current Value	Target Value	Date
Technology	Swarm flight dimension	None	+7 - 25 RPAS swarm flight dimension	2022
	Endurance	6 hrs	6 h: same endurance with higher capabilities (i.e. BVTOL)	2022
	Fuel economy	0 (fuel waste)	>0 (to be valued)	2022
	In flight refuelling	No one	In flight refuelling	2027
Market	EMS civil applications	No one	SAR, Fire prevention.	2022-23
	Other civil applications	No one	2: Border Security, Humanitarian..	2026
Sales	ESM operators contacted	3	24	2024
	Nr. of tenders applied	0	20	2024
	Unit sales (swarm RPAS)	0	15 (2023); 45 (2024); 90 (2025); 145 (2026); 180 (2027)	2023-27
	Nr. of agreements signed	0	4	2024
Financial	Variable cost / Unit [€]	Does not apply	217k€ (w/o payload&GCS) → SWARPAS (x7): 1,523,585 €	2023
	Profit margin [%]	Does not apply	37.8% (w/o payload &GCS); 30.4% (w/ payload &GCS)	2023-25
	Break even (operating CF)	Does not apply	Yes	2023
	ROCE	15%	+35%	2026

2.8 BROADER IMPACT

Apart from business part, the technology also generates benefits for society in a socio-economic term:

- **Environmental impact:** compared with manned aircraft currently used for ESM, small RPAS in ESM applications will result in **great fuel consumption savings**, due to high weight reduction. Compared with MALE unmanned solutions, the SWARPAS solution also reduces fuel consumption, in its fixed-wing flight.
- **Health, Security and Environment:** currently, most of the ESM operations require direct participation of personnel (as aircraft crew) exposing them to highly risky situations which may put their lives in danger. The emergency services' operators will be able to send SWARPAS at a longer range and reaching extreme locations, **avoiding the need to send manned aircraft with the subsequent high risks**.
- **Creation of qualified jobs:** although unmanned, **each RPAS** within a swarm must be remotely operated by **1 pilot**. This solution eliminates the need of involving personnel in some risky operations, but instead contributes to create **new qualified job profiles**. Also more Ground Station operators can be required to exploit and disseminate the large amounts of data obtained by the RPAS during operation.
- **Security and civil applications:** SWARPAS **responds to the operators' demands in the security and civil operations** by providing a high performance RPAS swarm with the greatest scope and autonomy possible. Its capacities for surveillance (detection, identification and monitoring) are useful for security applications -i.e., border security- and civil applications – SAR, fire prevention, humanitarian applications and safety-.

3. IMPLEMENTATION

3.1 TEAM AND CAPABILITIES

Miguel Á. GÓMEZ (MAGLINE's founder, CEO & CTO) **leads SWARPAS core team of engineers**, where Félix BARRAO (Product Engineer since 2008), and Daniel FERNÁNDEZ (Systems Engineer since 2017), are key profiles. The team is composed of **highly qualified personnel of both MAGLINE and its LTP VEOLINE**. It comprises **all the profiles which jointly will ensure SWARPAS success** (business development, R&D, commercial, financial, IPR...). MAGLINE+VEOLINE currently employs 10 fulltime engineers; new personnel will be contracted to develop SWARPAS. The table below summarizes SWARPAS team functions (CVs in Annex 2):

Team member	Function/ key competences
	Miguel A. GÓMEZ [CEO & CTO Executive Management / R&D] presides over MAGLINE's daily operations (business development, finance, commercial and R&D). He is fully involved in R&D management and execution. In SWARPAS he will be Project Coordinator and be involved in financial, technological, practical, economic and commercial areas, and in the certification phase. <u>100% committed to SWARPAS.</u>
	Félix Barrao [Senior RPAS and R&D Engineer in MAGLINE] is in charge of electrical and mechanical components for RPAS A/C and subsystems development. In SWARPAS, he will be involved in SGM validation, ESM configurations, and swarm guidance SWARPAS verification in operational environment: resources for operations and flight demo sites set up. <u>100% committed to SWARPAS.</u>

Team member	Function/ key competences
	Daniel Fernández [Senior Systems R&D Engineer in MAGLINE] is in charge of electronics and telecommunications. In SWARPAS he will be involved in the SGM validation (WP2), implementation of ESM configurations (WP3) and WP4: resources for operations, set up of sites for demonstration flights deployment. <u>100% committed to SWARPAS.</u>
	José María Tierra [Senior Electronics specialist R&D MAGLINE] is in charge of the electronics developments. In SWARPAS, he will be involved in the electronics designs and implementations related to ESM configurations and verification in operational environment, including the resources for operations, flight demo sites set up, and verification flights. <u>100% committed to SWARPAS.</u>
	Javier Sánchez [Senior Designer R&D in MAGLINE] is in charge of the prototype and components' design and the integrations. In SWARPAS, he will be involved in the implementation of the SGM, as well as in the rest of integrations of mechanic modules. <u>100% committed to SWARPAS.</u>
	Alejandro Domínguez [Senior Production technician in MAGLINE] is being in charge of the RPAS's prototypes manufacturing and involved in the production processes design. In SWARPAS, he will be involved in the WP4 (resources for operations and RPAS manufacture for System integration). <u>100% committed to SWARPAS.</u>
SW & FW developer	MAGLINE will hire 4 sw & fw engineers to be involved in SWARPAS, particularly in WP2 (Swarm Guidance Tech Validation), Task 2.3 Guidance Module HW development and Task 2.4 Guidance Module FW development. <u>100% committed to SWARPAS.</u>
Operations manual developer	MAGLINE will hire 4 Operations' engineers to be involved in SWARPAS, particularly in WP4, Task 4.2.1 Operations manual implementation. <u>100% committed to SWARPAS.</u>
	María Jesús Gómez [Senior Controller in VEOLINE] manages financial control for R&D and TI projects and strategic projects deployment. In SWARPAS she will be Finances and expenditures Control manager. She will also be responsible for project results IP management (Task1.1 & 1.3). <u>100% committed to SWARPAS.</u>
	Olga Bienzobas [Senior R&D Engineer in VEOLINE] is in charge of developing efficient production processes, ERP Development adapted to RPAS manufacture and systems integration, and outsource components. In SWARPAS, she will participate in prototype production and technical management. <u>100% committed to SWARPAS.</u>

MAGLINE's success is mostly due the **highly skilled team capacity in the tech area**, which has been capable of a very quick provision of aircraft prototypes applying modular concept approach. Successful stories have contributed to consolidate a loyal customers' base. This **has allowed MAGLINE to award and fulfil contracts for RPAS systems integration programs of European, Middle East and Asian customers**. To obtain such results, **HR management has been key to obtain and preserve a highly motivated team with outstanding strengths** (innovation, team and project management) acquired carrying out flagship projects for international customers. **MAGLINE is to implement a plan to acquire personnel management competencies in the context of business growth** and it will also take advantage of EIC Accelerator coaching sessions, to develop necessary skills for the future. Along SWARPAS project, Magline **is to contract 4 engineers with SW & FW competences and 4 more engineers with RPAS operations' knowhow**. Not only Magline's team core, but also **core partners' teams have shown its motivation and commitment towards SWARPAS project** (see **Applied Navigation** and **Worldmaq's LoCs** – Annex 3). Besides, Babcock's commitment is a clear proof of the right time for SWARPAS development, and a **trigger of internal and external teams' motivation**.

3.2 FINANCING NEEDS

For the accomplishment of SWARPAS project, MAGLINE is looking to raise an approximate amount of M€ 13.42 (M€ 2.42 Grant –M€ 11 Equity). The use of **equity component** is explained in section 3.3.1. The **grant component** will be used for the development, validation and certification compliance of SWARPAS, to reach the optimum level for global commercialization. Tasks to be carried out by SWARPAS team will be:

- 2-layer Swarm Guidance Module (SGM) development compatible with the autopilot, and test it virtually.
- Implementation of the SGM on the currently existing CRUISER II prototype.
- Manufacturing and set up of prototypes for testing.
- Flight testing to demonstrate the swarm flight technology in aerodrome.
- Design of new sensor configurations for 2 SAR operations, and integration in RPAS prototypes.
- Swarm flight capabilities and sensors configurations for surveillance emergency services verification in operational environment.
- Compliance prescriptive requirements for TC.

After these actions, the system will be complete and qualified. The equity component invested by the EIC on the company will make reach the break-even point in 2023. Considering the estimation of revenues for the period 2023-2026, in the pessimistic and optimistic scenarios, and maintaining the current valuation of the product, the investment in other companies [Applied Navigation, Worldmaq-3 and Veoline] (conservative scenario, since it is also expected to grow), the post-money valuation in 2023 is estimated in M€ 51.75. Considering the equity component requested, the company does not require additional financing rounds, until the moment of the EIC exit. Figure 10's cashflows statement shows the financing activities pre-post break-even point (full table in Annex 4):

CASHFLOWS	2022	2023	2024
Cashflows from operating activities (net)	- 800,41	753,11	7.118,65
Cashflows from investing activities (net)	- 200,00	-	- 927,00
Cashflows from financing activities (net)	320,00	2.056,40	5.188,29
of which			
Proceeds from grants	-	605,84	-
Proceeds from issuance of debt	-	-	-
Repayment of debt	-	-	-
Proceeds from issuance of equity	320,00	1.294,70	3.698,82
Dividends	-	155,86	1.489,47
Net increase/decrease in cash and cash equivalent	- 680,41	2.809,51	11.379,94

FIGURE 10. MAGLINE CASH FLOW STATEMENT

3.3 EQUITY

3.3.1 VALUATION OF THE COMPANY

The **valuation of MAGLINE is 51.75 M€** (average of optimistic and pessimistic scenarios). Optimistic and pessimistic accounts for the overall Net Equity plus current contract value, multiplied for a parameter "3" or "1,5" (where typical multiplier for this kind of advance technology sectors is 4-5). Neither of the scenarios accounts for the market trend or current status of negotiations between Magline and Armed Forces in Spain (through Babcock) and El Salvador, to name a few customers with which discussions regarding systems acquisition are more advanced. Magline's **valuation** is supported by different **drivers**:

- **Market opportunity:** current positioning of Magline (with relevant customer base including government agencies, MoD and services operators), added to the products' and services' available, and credited experience, are key intangible asset that contributes to the company's evaluation.
- **Current won contracts for services,** with which Magline has been awarded in the next 5-years horizon.
- **IPR Valuation:** the freedom-to-operate that Magline already holds thanks to the registered Cruiser II design and the IP agreements for the Quattro Autopilot, that guarantee the access to worldwide markets.
- **Participation in companies which contribute to vertical business integration** (10% shares of WORLDMAQ-3; 20% shares of Applied Navigation).

Relevant aspects considered for the valuation of MAGLINE:

- Fundamental value of Magline's Equity lies on the **IP of the Products developed so far**, in particular Cruiser II RPAS and side products (Autopilot, Engine Packages, NC Machinery...). Actual IP value is projected from current customer commitments oriented to the acquisition of Products.
- Although MAGLINE has been working so far in a systems integration business for 3rd party aircraft, **other business lines have been secured** in order to build up an strategic approach to the market.
- Most part of MAGLINE's strategic value in the market comes from the fact that facilities, 7500m² next to Aeródromo at Villanueva de Gállego (Zaragoza, Spain), are under a 10-year low-cost rent from Local Aragón Government, including **private and privileged access to the Aerodrome over every other user**.
- The facilities are also **next to CENAD**, Spanish MoD Shooting Range used for NATO Troops Training, and MAGLINE has been **granted access to fly over it in support of experimental and training exercises**.
- **Applied Navigation:** 20% partnership shares in US based LLC to design and develop latest generation of

autopilots. Most important, MAGLINE is the main investor, hence technology is also property of MAGLINE which retains commercial rights to the product in EU and South East Asia. Investment 0.8MUSD.

- **MAGLINE owns the IP Property on Applied Navigation's Autopilot;** in an eventual Buyout, MAGLINE will recover the initial investment (800.000€), and will retain the ownership on the product.
- **Worldmaq: 10% shares in Spanish**
- **NC equipment Ltd Company.** MAGLINE completes the required offering to customers, that require to have their own production center in-land (almost every customer).

In addition, MAGLINE is **well-connected with relevant players and has already conversations with key players in the sector** (e.g. Babcock International) and **distribution partners** (e.g. Solid Base Technology and Optimum Solutions). Finally, MAGLINE's **team credits great knowledge of the RPAS market due to its great experience as engineering and design services providers** (the founder, in the steering committee, is a business expert with deep technological background) both since 2008 in MAGLINE and before.

3.3.2 COMPANY OWNERSHIP AND CAPITAL STRUCTURE

Shareholdername	Gómez Arranz, MiguelÁ.	Other	EIC Accelerator Fund	Total
Type	founder	family office	public investor (EC)	
Ownership % Fully-Diluted (application date)	96	4	0	100
% of voting rights, as of application date	96	4	0	100
Ownership % Fully-Diluted (after 12 months)	74,74	4	21,26	100
% of voting rights (after 12 months)	74,74	4	21,26	100

FIGURE 11. COMPANY OWNERSHIP AND CAPITAL STRUCTURE

Successive investments to attain expertise and register IP, and on other strategic companies, have resulted in a solid list of clients and a growing number of contracts won. All of which has made reach a M€ 62.75 post-money valuation. The table below includes current ownership composition and the expected (12 months):

3.3.3 REQUESTED EQUITY COMPONENT

The **high-growth profiles business strategy** planned by MAGLINE to reach the market and ensure the accomplishment of the foreseen commercialisation objectives, **requires an injection of capital of 11 M€**. It will allow **carrying out the marketing plan, investing for the industrial scaling-up**, as well as **developing a wider product's family to reach new market niches in ESM**. Considering the current valuation of the company (51.75M€), the **equity shares to be given in return is 21.26%**. The equity requested by MAGLINE will be mainly dedicated to:

MARKETING & COMMERCIALISATION STRATEGY	2022	2023	2024	2025	2026	2027	2028	2029	Total
Due diligence & Legal and Financial management	45.000,00 €	1.016.900,00 €	1.568.818,00 €	47.754,36 €	48.709,45 €	49.683,64 €	50.677,31 €	51.690,86 €	4.362.844,61 €
Due diligence management		12.000,00 €							12.000,00 €
Legal and financial mgmt	45.000,00 €	45.900,00 €	46.818,00 €	47.754,36 €	48.709,45 €	49.683,64 €	50.677,31 €	51.690,86 €	386.233,61 €
Marketing Strategy		165.300,00 €	284.254,00 €	451.360,00 €	67.000,00 €	181.300,00 €	45.097,00 €	159.300,00 €	1.353.611,00 €
Main Annual event: i.e. Paris-Dakar			194.060,00 €	292.060,00 €					486.120,00 €
Exhibitions attendance & airshows		159.300,00 €	90.194,00 €	159.300,00 €	67.000,00 €	181.300,00 €	45.097,00 €	159.300,00 €	861.491,00 €
Marketing sales microsite		6.000,00 €							6.000,00 €
Distributores Network deployment		959.000,00 €	1.522.000,00 €						2.611.000,00 €
SWARPAS sample for Distribution network			1.050.000,00 €						1.050.000,00 €
Mkt equipment (onboard CRUISER demo fleet)		250.000,00 €	250.000,00 €						500.000,00 €
EU		375.000,00 €	222.000,00 €	130.000,00 €					727.000,00 €
Asia (Singapore)		164.000,00 €							164.000,00 €
LATAM & US		170.000,00 €							170.000,00 €
BUSINESS DEVELOPMENT STRATEGY	2022	2023	2024	2025	2026	2027	2028	2029	Total
Investments in properties and equipment	200.000,00 €		927.000,00 €	150.000,00 €	800.000,00 €	150.000,00 €	800.000,00 €	150.000,00 €	3.177.000,00 €
Industrial warehouse purchase			150.000,00 €	150.000,00 €	150.000,00 €	150.000,00 €	150.000,00 €	150.000,00 €	900.000,00 €
Productive investment (NC equipment, working bays, mission command room, solar installation)	200.000,00 €		777.000,00 €		650.000,00 €		650.000,00 €		2.277.000,00 €
Innovation activities	75.000,00 €	112.500,00 €	918.750,00 €	1.413.125,00 €	789.687,50 €	150.000,00 €			3.459.062,50 €
New SWARPAS ESM configurations development and demonstration	75.000,00 €	112.500,00 €	168.750,00 €	253.125,00 €	379.687,50 €				989.062,50 €
Maritime configurations demonstration ship integration and lease				1.000.000,00 €	150.000,00 €				1.150.000,00 €
Unmanned aircraft for demonstration tasks			750.000,00 €	60.000,00 €	60.000,00 €				870.000,00 €
In-flight refueling (IFR) R&D project				100.000,00 €	200.000,00 €	150.000,00 €			450.000,00 €
TOTAL	320.000,00 €	1.294.700,00 €	3.698.822,00 €	2.062.239,36 €	1.705.396,95 €	530.983,64 €	895.774,31 €	360.990,86 €	10.998.907,11 €

- **Marketing & Commercialisation Strategy:** commercial agreements with distributors, for an effective penetration in the US, Canada, LATAM and Australasian markets. Strengthen MAGLINE's commercial

structure for EU market. SWARPAS demonstrators transport costs to distributors for exhibition during direct contacts with clients and presence in shows, including travel & subsistence; fairs passes and materials; participation in a big sports event (Dakar) to achieve a powerful impact worldwide. Due diligence and legal & financial management.

- **Business development Strategy:** purchase of the industrial warehouse (currently it is rented) is crucial to have a mortgageable property and be able to get bank loans (to have liquidity to face contract initial investments). To cover production capacity after 2023, new productive investments will be done; investment to automatise processes. Innovation (development and demonstration of new SWARPAS configurations for new market niches (security, humanitarian), and R&D (in-flight refuelling) tasks will maintain MAGLINE's competitive positioning.

MAGLINE has defined the following **strategic milestones to be achieved during the equity stage:**

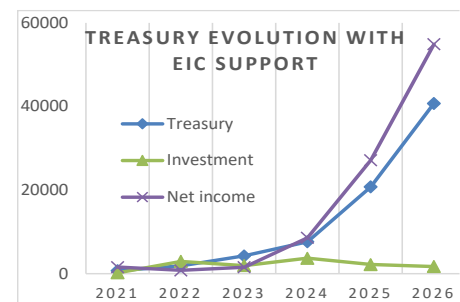
- MS 5.1 "Go" decision by EIC- Agreement with the EIC after due diligence (mid-2021)
- MS 5.2. Agreement with distributors for US, LATAM, Asian markets (2023)
- MS 5.3. Presence in a major sports event (Dakar rally or equivalent) (2024)
- MS 5.4. Purchase of industrial warehouse (2024)
- MS 5.5. Demonstration of new SWARPAS configurations (Security, 2025; Humanitarian, 2026)

3.4 NEED FOR EIC SUPPORT

Technology verification is a market exigence by all emergency services operators before buying the product, and therefore is a go-no go customers' decision that affects the company strategy evolution. It is a highly costly action, because it requires accomplish all the project objectives and tasks:

- To develop Swarm Guidance Technology from TRL 6 to TRL 8.
- To manufacture SWARPAS prototypes (at least 7 to prove swarm flight): MAGLINE already has 3 pre-series units, but 4 more are needed. Each RPAS A/C has an estimated manufacture cost of 217.655 €.
- To manufacture Swarm Guidance Module (SGM) prototypes: each has an estimated cost of 14.924 €.
- Acquire instrumentation, payload and GCS, needed to test SWARPAS and perform validation tasks for ESM operations. An average configuration (1 swarm RPAS) reaches a 792,355 € cost.
- Hire and train qualified personnel to perform the flight tests.
- Set up the flight sites to perform the validation actions.
- Deploy verification flights.

For a company of the size of **MAGLINE**, it is currently not possible to get funding from the market for a such ambitious project as SWARPAS.



3.4.1 NON BANKABILITY

Since 2018, MAGLINE is working on obtaining financing from private international investors for global market scale-up. Some European venture capital companies have been valuating the possibility of sharing Magline's capital. Also operators like Babcock MCS have shown interest in sharing Magline's equity at some point. Nevertheless, despite the acknowledgment of the unique opportunity ahead, the high level of investment required (3.6 M€) for the last phase of the innovation development and (11 M€) for market deployment, and the high technological risk associated to this development, are being main barriers for private investors to participate in Magline's equity at this point. Besides, bank financing does not cover such level of investment without real estate or industrial properties to be mortgaged, which is the case of Magline.

Up to now MAGLINE has attained to leverage its activity through bank resources and national public financing (1.28 M€ during the 2008–2018) while having on-going revenues from awarded services contracts.

However, in order to bring its developments from the current TRL6 stage of development to a TRL8, being able to demonstrate and verify swarms of RPAS configured for emergency operations in real environments, the company itself has concluded an inner "non-bankability" assessment at this stage.

3.4.2 EIC SUPPORT

Taking into account both non-bankability and the opportunity cost, the company considers that **MAGLINE definitely needs institutional support to solve its financial gap** in order to carry out the ambitious Commercialization strategy and Marketing Plan, and so ensuring the sound potential company growth and

market expansion, at the right time. These are the reason of applying for EIC support, through the concession of a grant (2.42 M€) ,at a first stage, and through equity funding (11 M€), at a second stage. Should EC funds as equity the TRL8-9 proposal activities, MAGLINE is:

- to keep on leading the daily management of the company
- to accept private co-investors along with EC
- to accept the exit of EC and the entry of private investors
- to embrace EC Coaching (12 days) and mentoring as a unique opportunity.
- to accomplish with up to 5 milestones identified in Requested Equity Components (see 3.3.3)

	With EIC support	Without EIC support
Technology Developm. & Validation	TRL6 → TRL 9	TRL6 -> TRL7
Time-to-market	2 yrs	4 yrs considering private investment entry (not sure)
Company growth	Exponential	Steady

3.5 RISKS TO BE CONSIDERED

Risk envisaged, Odd; Impact	O	I	Contingency actions
Magline fails to contract top talent. Loss of competitive advantage due to inability to attract and retain top talent.	L	M	Develop an incentive plan for employees in order to favour work environment and enrollment as stake holders in the company.
Difficult to sell the innovation.	M	M/H	Involve the most prestigious EMS operators (i.e. Babcock) in the last phase of the innovation development and commercial partners with relevant positioning in US & LATAM and Asia.
New low-cost competitors	M	M	Anticipate the demand to give quick response to the market, before competitors. Increase the products' portfolio to cover the ESM operators' needs. Plan to develop and test configurations for new applications (border control, humanitarian services).
Magline's SGM fails to achieve proper swarm flight capability, in accordance with sector demands	L	M	Involve Applied Navigation team in SGM development.
Technological Obsolescence & New Unforeseen Patented Solutions - Emerging technologies and solutions can make Magline not up to date with innovation.	L	H	Perform technology surveillance of current and new competitors, and in particular monitor market trends, in order to pilot, test and adopt new technologies in the solution. Update and monitor the IPR strategy constantly, to maintain the most important asset: SUSTAINED MARKETING ADVANTAGE
Difficulties for attaining the AESA Airworthiness Certificate and Operational Authorisation, and Dual use technology export.	L	H	Comply with the verification process set forth in EASA Part 21. Adapt them to meet airworthiness conditions of the target country for RPAS export (Observe the regulations for dual use technologies exportation to different target countries (see Annex 1.2).

3.6 FINANCIAL OPPORTUNITY FOR PRIVATE INVESTORS

At this crucial point, investors have the opportunity to be part of a new global market, RPAS civil market, blast-off. Institutional EIC investment can be a trigger for private investors, so that these can even consider the possibility of co-funding together with EC during the "Equity phase". Financial opportunity for investors is defined by the following hypothesis and SWARPAS business metrics:

- **Hypothesis:** It is expected that external investment in Magline's equity will be until 2027 approximately.
- **Business metric 1:** Magline is expected to perform a high growth at a CAGR of 226.68 % (2023-2026), so that at medium term Magline can attain the objectives of ensuring its expansion worldwide, reaching new geographical markets (US & Canada, Asiapacific and LATAM,) and boosting new market niches (unmanned ESM).

- **Business metric 2:** Business Model's Return on Equity will be positive since 2023, at a rate of 11% (2023), 37% (2024), 43% (2025), 35% (2026).

3.7 EXIT STRATEGY

While negotiating with VCs Magline defines the following exit strategy:

- **Exit:** The business metrics reflect that those investing at this initial stage, will be able to disinvest and get a return since 2023. A minimum of 5 years of permanence is required and no pre-defined level of return is fixed, as the Company is looking for "impact investment" investors more than "return on investment" investors.

For the EIC investment on MAGLINE equity, the following exit strategy could be considered:

- **Exit:** At the moment of the EIC exit, a **financing round will be conducted**, allowing for the entrance of a new investor/s. Positive trend of ROE (42% in 2024, 45% in 2025) will encourage investors to invest in Magline. **Another possible scenario is the acquisition by another larger company.** These scenario could be possible since larger companies would have reasons to acquire Magline: as a way to enter a new market niches (since Magline will have penetrated into the RPAS market for ESM in various applications, having potential for even more), as a growth strategy (in order to incorporate Magline into its revenue stream as a new way to profit) or to gain new technologies (without having to invest in developing them and assume risks already overcome by Magline).

3.8 APPROACH

3.8.1 WORK PACKAGES

WP NR AND TITLE	MILESTONE	PM	BUDGET (€)	G/E
WP1 - Project & IPR Management	M1.1 Project Report (M24). M1.2 SGM Tech IP assured (M13)	51	231,007 (100%)	Grant
WP2- Swarm guidance tech validation	M2.1. R&D Test flights for SGM demonstration (M7). M2.2. GM HD and FW developed (M13).	62	298,301 (100%)	Grant
WP3-SGM & ESM configuration implementation	M3.1. SGM & ESM Configuration ready to fly (RTF) - Flight Readiness Review - A/C #1 ...#3 (M12)	14	752,462 (100%)	Grant
WP4- SWARPAS verification in operational environment	M4.1. CRIL #1...#3 configured for ESM & Swarming (M24). M4.2. SWARPAS MoC fulfilled (M24)	217	2,180,180 (100%)	Grant
WP5- Commercialisation Plan, Marketing and customer base increment	M5.1 "Go" decision by EIC (M12). M5.2 Marketing Plan started (M12). M5.3 Business development Activities started (M12)	-	10,998,907	Equity

Following a Gantt chart and a detailed explanation of the tasks within each of the Work Packages is shown:

		2021												2022												2023											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12												
WP1	PROJECT & IPR MANAGEMENT	M1																							M24												
T1.1	Project management	M1																							M24												
T1.2	Technical management	M1																							M24												
T1.3	IPR management											M11	M13																								
WP2	SWARM GUIDANCE TECH VALIDATION	M1											M12																								
T2.1	Development of small-scale technological demonstrator	M1	M3																																		
T2.2	TRL 6 -> TRL7: Swarm Guidance Demonstration				M4			M7																													
T2.3	SGM HW development	M1			M4																																
T2.4	GM fw development					M5							M12																								
WP3	SGM & ESM CONFIGURATIONS IMPLEMENTATION				M4								M12																								
T3.1	CONOPS Matrix Design				M4																																
T3.2	Payload Procurement					M5																															
T3.3	SGM prototyping for +4 RPAS (SGM #4...SGM #7)					M5		M7																													
T3.4	SGM and ESM configurations, instalation & integration in A/C #1 ... A/C #3								M8				M12																								
WP4	SWARPAS VERIFICATION IN OPERATIONAL ENVIRONMENT	M1																							M24												
T4.1	Development of large-scale (1:1) technological demonstrator									M9								M16																			
T4.2	Preparatory actions for verifications flights	M1																				M21															
T4.3	TRL 6 -> TRL7: ESM-CruiserII-Swarm Verification flights																						M22		M24												
T4.4	Compliance prescriptive requirements for Type Certificate (TC) (TRL 7 -> 8)																M15								M24												
WP5	COMMERCIALISATION PLAN, MARKETING & CUSTOMER BASE INCREMENT												M13												2029 -->												
T5.1	Due Diligence Management												M13												2029 -->												
T5.2	Marketing Strategy												M13												2029 -->												
T5.3	R&D Activities												M13												2029 -->												
T5.4	Investments (production equipment and facilities)												M13												2029 -->												

WP number and title		WP1 – PROJECT & IPR MANAGEMENT				
Start month	M1	End month	M24	Person months	51	
Budget			231,007 €	Grant/Equity	GRANT	
WP description: To manage the overall project administrative, financial and technical issues, to ensure highest quality of service and to complete deliverables according to time frame, the foreseen budget. To monitor and report the status of the project to take corrective actions, if necessary.						
Task 1.1 Project Management (M1-M24) a Project Management Handbook will be elaborated (guidelines for financial reporting, deliverables and reports to EC templates, measures to ensure timely reporting, etc.). This task includes coordination and financial management, compilation and submission of deliverables and periodic reporting to EC, and the update of unexpected risks to be managed.						
Task 1.2 Technical coordination and reporting on technical progress (M1- M24) This task will entail the technical management and will ensure that the project is carried out as planned. This will include taking any corrective actions needed to meet the plan, coordinating internal project communication, identifying and managing technical risks. This task will also deal with the reporting on the technical and financial progress of the project (to be included in the progress report (M12) and updates (M24).						
Task 1.3 IPR Management (M1-M13) This task will identify the designs and technologies susceptible of being protected, and will study the different possibilities according to the exploitation strategy and the market. MAGLINE will collaborate with an IP Services expert company in this task.						
Deliv. nr.	Deliverable name			Type	Dissemination level	Due date
D1.1	IP registration			OTHER	CO	M13
D1.2	Progress Report			R	CO	M24

WP number and title		WP2 – SWARM GUIDANCE TECH VALIDATION			
Start month	M1	End month	M12	Person months	62
Budget			298,301 €	Grant/Equity	GRANT
WP description: To identify the precise RPAS-RPAS and RPAS-crew interactions for their implementation in the autopilot SGM, to validate SGM in operational environment. (TRL 6 → TRL7).					
T2.1. Development of small-scale technological demonstrators, in order to support decision making during design phase: Installation of SGM in radio-controlled (RC) aircraft. This will include 4 RC A/C, 1 Quattro SGM unit/ aircraft, 4 Differential Global Positioning System (DGPS) Align unit/ aircraft, 4 DGPS antennas/aircraft.					
T2.2. Swarm Guidance Demonstration: To verify requirements compliance in operational environment via test flights of the small-scale demonstrator platform. The tests will be done in the Aerodrome of Zaragoza (adjacent to MAGLINE’s premises).					
T2.3. SGM HW development: development of improvements of HW to better support SGM.					
T2.4. SGM FW development: development of improvements of FW to implement SGM control parameters.					
Deliv. nr.	Deliverable name		Type	Dissemination level	Due date
D2.1	Swarm Guidance Tech demonstration in operational environment Report		R	CO	M9

WP number and title		WP3 – SGM & ESM CONFIGURATIONS IMPLEMENTATION			
Start month	M4	End month	M12	Person months	14
Budget			752,462 €	Grant/Equity	GRANT
WP description: To implement SGM & payload configurations for emergency services operations in surveillance environments. WP3 includes the CONOPS matrix design, to define all type of ESM operations to be covered. It also covers payload procurement and the integration of 3 SGM in 3 RPAS prototypes already available and prototyping of 4 SGM to be integrated in the 4 RPAS prototypes to be manufactured (WP4).					
T3.1. CONOPS Matrix Design: SAR swarm requirements definition: CONOPS identification & definition, operational case matrix, detailed requirements review, identify and select the payload & systems suitable for the operational scenarios. Detailed system specification. Detailed planning of subsequent project phases, including identification of implementation priorities according to operational needs of a reference end user (emergency operator), e.g. EU agency or any Member States' agencies (e.g Sasemar, Spain).					
T3.2. ESM Systems & Payload Procurement: To acquire the necessary systems and payload to design the ESM configurations (SAR, firefighting) and the Ground Control Station (GCS) for real environment (Lugo, Spain) flights deployment. Best-value for money approach will be considered (see budget, Sect.3.9).					

T3.3. SGM prototyping for 3+ RPAS (3 units, 4 already available): for a 7 RPAS swarm (incl. 1 spare unit).

T3.4. SGM and ESM configurations instalation & integration in [A/C #1] ... [A/C #3]: the development cycle to obtain a RPAS capable of swarm flight and configured for ESM applications will be completed by integrating the SGM module and the corresponding payload to 3 already available RPAS (at disposal with no imputed cost to the project). SGM & payload integration will require mechanical assembly, electrical connections and communications set up.

Deliv. nr.	Deliverable name	Type	Dissemination level	Due date
D3.1	D3.1. Report on systems' configurations	R	CO	M12

WP number and title		WP4 – SWARPAS VERIFICATION IN OPERATIONAL ENVIRONMENT			
Start month	M1	End month	M24	Person months	217
Budget			2,180,180 €	Grant/Equity	GRANT

WP description: to demonstrate the system prototype in an operational environment, with 2 configurations (SAR and Fire prevention). In addition, all JARUS prescriptive requirements will be accomplished to obtain a Type Certificate of airworthiness for RPAS and authorisation for SWARPAS operation. Operations manual implementation developed by a 4 young engineers team led by senior Electronics specialist José María Tierra.

T4.1. Development of real-scale (1:1) technological demonstrator to support flight tests : Manufacture of 4 RPAS (3 RPAS are already at disposal with no imputed cost to the project) to complete the swarm prototype.

T4.2. Preparatory actions for verifications flights: *T4.2.1. Operations manual implementation for crew. T4.2.2. Set-up & flight readiness review:* GCS setup (Site #1 Zaragoza, Spain) and Aircraft Flight Readiness review: a) Test bidirectional link between the leader RPAS to the GCS; b) Test bidirectional commands between RPA leader and each of the swarm RPAS. *T4.2.3. Crew Training to be trained on Cruiser II Swarm (8 pilots).* Systems and equipments already installed in Magline's Control Room at Zaragoza. *T4.2.4 Set-up & flight readiness review:* 1st, flight tests GCS setup (Site #2 Lugo, Spain); 2nd, Aircraft Flight Readiness review. *T4.2.5. Crew Training to be trained on Cruiser II Swarm (4 pilots)* in facilities at Lugo.

T4.3. Verification flights: Verification tests of the autonomous Swarm flight considering real procedures to be conducted for future certification. Prototypes will include all required HW for the mission (DGPS align and 3x antennae). Test Site #1 for Verification Flights will be Zaragoza, next to Magline's facilities. Test Site #2 will be Lugo, Spain, where SASEMAR (Spanish Coast Guard Service) has a permanent base for SAR missions and there is a local aerodrome next to the sea shore, allowing for real environment operations.

T4.2. Preparatory actions for verifications flights: *T4.2.1. Operations manual implementation for crew. T4.2.2. Set-up & flight readiness review:* GCS setup (Site #1 Zaragoza) and Aircraft Flight Readiness review: a) Test bidirectional link between the leader RPAS to the GCS; b) Test bidirectional commands between RPA leader and each of the swarm RPAS. *T4.2.3. Crew Training to be trained on Cruiser II Swarm (8 pilots).* Systems and equipments already installed in Magline's Control Room at Zaragoza. *T4.2.4 Set-up & flight readiness review:* First, flight tests GCS setup (Site #2 Lugo); second, Aircraft Flight Readiness review. *T4.2.5. Crew Training to be trained on Cruiser II Swarm (4 pilots)* in facilities at Lugo.

T4.3. Verification flights: Verification tests in Test site #1 and #2 of the autonomous Swarm flight considering real procedures to be conducted for future certification. Prototypes will include all required HW for the mission (DGPS align and 3x antennae). In site #2 SASEMAR (Spanish Coast Guard Service) has a permanent base for SAR missions and a local aerodrome next to the sea shore, allowing for real environment operations.

- **Air Traffic Verification:** Flight tests in real scenario allow aircraft monitorization to ensure higher level of active and passive safety. Active monitorization will be achieved with an ADS-B/ transponder squawk code for Air Traffic Controller identification; passive monitorization will be attained with ground radars.
- **Prove aircraft safety to operate under all circumstances:** considering different payload conditions, and weather conditions where it will be demonstrated that the protocols can address all circumstances found in the defined aircraft flight envelope. Verification flight results will be kept as records and presented along with other tests previously done. Compilation of all these records as passed tests are presented to the Authorities showing the aircraft meets the safety and operational requirements to be granted a TC.

T4.4. Compliance prescriptive requirements for Type Certificate (TC): in parallel with the previous tasks, focused on product, Magline will work on the compliance of JARUS prescriptive requirements for attaining a Type Certificate related to Procedures (DoA & PoA following EASA Part 21 Subparts G&J). TC will prove the aircraft is manufactured according to an approved design, including all the integrated systems, and production methods. Certification process will involve fulfilling a compliance matrix following EASA checklists.

Del. nr.	Deliverable name	Type	Diss. level	Due date
D4.1	D4.1. Development of large-scale (1:1) technological demonstrator	R	CO	M16
D4.2	D4.2. Report on test flights results	R	CO	M24

WP number and title		WP5 – Market deployment		
Start month	M16	End month	End 2029	Person months
Budget		11,00 M€	Grant/Equity	EQUITY

WP description: to succeed in the preparation and “Go” decision of the due diligence as well as carry out the marketing plan and business development activities to scale-up SWARPAS in a 9 years period (2022-2029)

Description of tasks – TRL9 Activities:

Task 5.1 Due Diligence Management. Preparation of the equity investment agreement in which the terms and conditions for the equity part will be established. Monitoring will be performed between MAGLINE, the Commission and the EIC Fund through regular progress meetings. Implementation of the activities in close coordination under the authority of the European Commission.

Task 5.2 Marketing Strategy deployment. The already defined Marketing Plan will be reviewed and deployed to foster commercialisation and distributors network deployment.

Task 5.3 R&D activities: ST5.3.1. Cruiser II ESM configurations demonstration for Governments. ST5.3.2. Maritime configurations demonstration ship integration and lease. ST5.3.2. A demo fleet will be produced to test configurations to increase the number of applications and reach new market niches; new configurations (Border control, Humanitarian services) will be tested and validated for customers. ST5.3.4. R&D activities: new areas of application for RPAS swarms, and new systems to increase endurance (e.g. in-flight fuelling).

Task 5.4 Business Development, Sales & Investments in properties and equipment

ST5.4.1. Investments in industrial property: MAGLINE will purchase the industrial building (see section 3.3.1). ST5.3.2,3,4. Productive investment (2024, 2026, 2028): In addition, it will invest on more NC machinery and working bays to increase industrial capacity and allow for the business scaling-up.

Deliv. nr.	Deliverable name	Type	Dissemination level	Due date
D5.1	D5.1. Report on the results achieved based on the Due Diligence contract	R	CO	M24

3.9 RESOURCES

Category and costs	Justification				
Personnel: Magline: <u>959,605</u> €; Veoline (LTP): <u>179,772</u> €	PM	WP1	WP2	WP3	WP4
	MAGLINE	13	62	14	201
	VEOLINE	38			16
Travel & Transport: <u>[2,100]</u> €: Travels to flight site #2 set up (Lugo, Spain - 3 engineers) (<u>900</u> €); Travels to flight site #2 (Lugo, Spain - 4 AVO) (<u>1,200</u> €)					
Other Goods & Services <u>[1,630,182]</u> €: SGM module material (Autopilot: 26,017 € x4 (3 available now) (<u>104,068</u> €); SGM prototyping: 150x7 (<u>1,050</u> €); Aircraft fungible material: 4 RPAS (3 available now) (<u>756,000</u> €); ESM payload (<u>348,000</u> €); Ground Control Systems (<u>181,097.65</u> €); Spare parts (<u>92,366.84</u> €) for flight tests; Transport of 7 Aircraft Site#2 (<u>21,000</u> €); Crew accommodation in flight sites (<u>109,500</u> €); IP Services (<u>7,500</u> €)					
Ind. Costs (25%): 692,389.75 €: 25% of eligible costs					
TOTAL: 3,461,948.75 €					

THIRD PARTIES INVOLVED

Do you plan to subcontract any tasks?	NO
Will any of your linked third parties work in the action tasks?	YES
VEOLINE SISTEMAS AERONAUTICOS, S.L. is 100% shared by MAGLINE company founded in 31/05/2018. Based in Lugo (Spain), at the Aeronautics Hub, this company is Magline’s subsidiary responsible for projects management, engineering services and test programmes design. 2 People from Veoline will be in charge of:	
- WP1: R&D project coordination (in Task 1.1), budget & timing fulfilment control and R&D flights coordination (in Task 1.2), Support in IRP management (in Task 1.3) [38 PM] - WP4: Task 4.2.5 Site #2 Training Flights and Task 4.3.2 Verification Flights deployment in site #2 (Lugo) - WP5: Legal & financial Project management (in Task 5.1) [16 PM]	
Will you use contributions in kind provided by third parties?	NO