

MSP at the Electric City event – MU of Aquaculture and tourism in Greece

WINGS Activities Overview

Products: 4 areas, 7 own-products,
2 Spin-Outs, 1 joint-product



A Environment

- 1. **AIRWINGS**: air quality, contribution to civil protection (e.g., fires)

B Utilities (Networks) & Infrastructure

- 2. **ARTEMIS**: Water, Projects on Energy and Gas
- 3. **WINGSPARK**: Parking, Management of Transport Infrastructures

C Production Systems





- 4. **AQUAWINGS**: Aquaculture
- 5. **AGNES**: Food safety, agriculture, mines (primary sector)
- 6. **WINGS-Chariot**: Warehouse, “Corridors”, Industrial IoT

D Service Sectors

- 7. **STARLIT**: Digital health

WINGS Tools for Integrating Verticals & Infrastructures



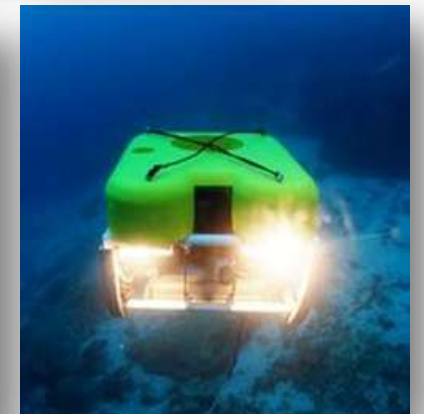
-  **System Level Simulation** – Performance evaluation through the Nestor suite, adapted to various diverse infrastructures
-  **Orchestration** – Delivery over public / private (on premise) clouds / edge-core cloud infrastructures
-  **Diagnostics** – Performance analysis and recommendations for performance improvement
-  **Intent**-oriented mechanisms

Greek Pilot

Greek multi-use pilot site

The pilot is situated in the marine area near islet “Patroklos”, Sounio, Eastern Attika district, Greece. The pilot expands tourism activities (leisure scuba-diving) at aquaculture site:

- **KASTELORIZO AQUACULTURE SA operates a fish-farming unit, on floating facilities. KASTELORIZO provides the aquaculture unit that shares the same marine space with the **touristic diving activities of Planet Blue SA.****
- The two companies perform a number of co-existence scenarios that are facilitated with the use of WINGS’ monitoring and management platform, AQUAWINGS, that is deployed to ensure:
 - best multi-use of aquaculture and tourist activities
 - minimization of environmental impact



Greek Pilot

The technical installations included

Underwater Cameras

- Inspection of living conditions and fish behaviour
- Monitoring the response of fish during diving expeditions
- Estimation of fish biomass
- Fish mortality inspection
- Fish waste inspection

Underwater Sensors

- Recording of environmental parameters
- Recording the speed and direction of submarine currents

WINGS Smart Gateway

- Data collection from sensors and cameras
- Transmission over any available network

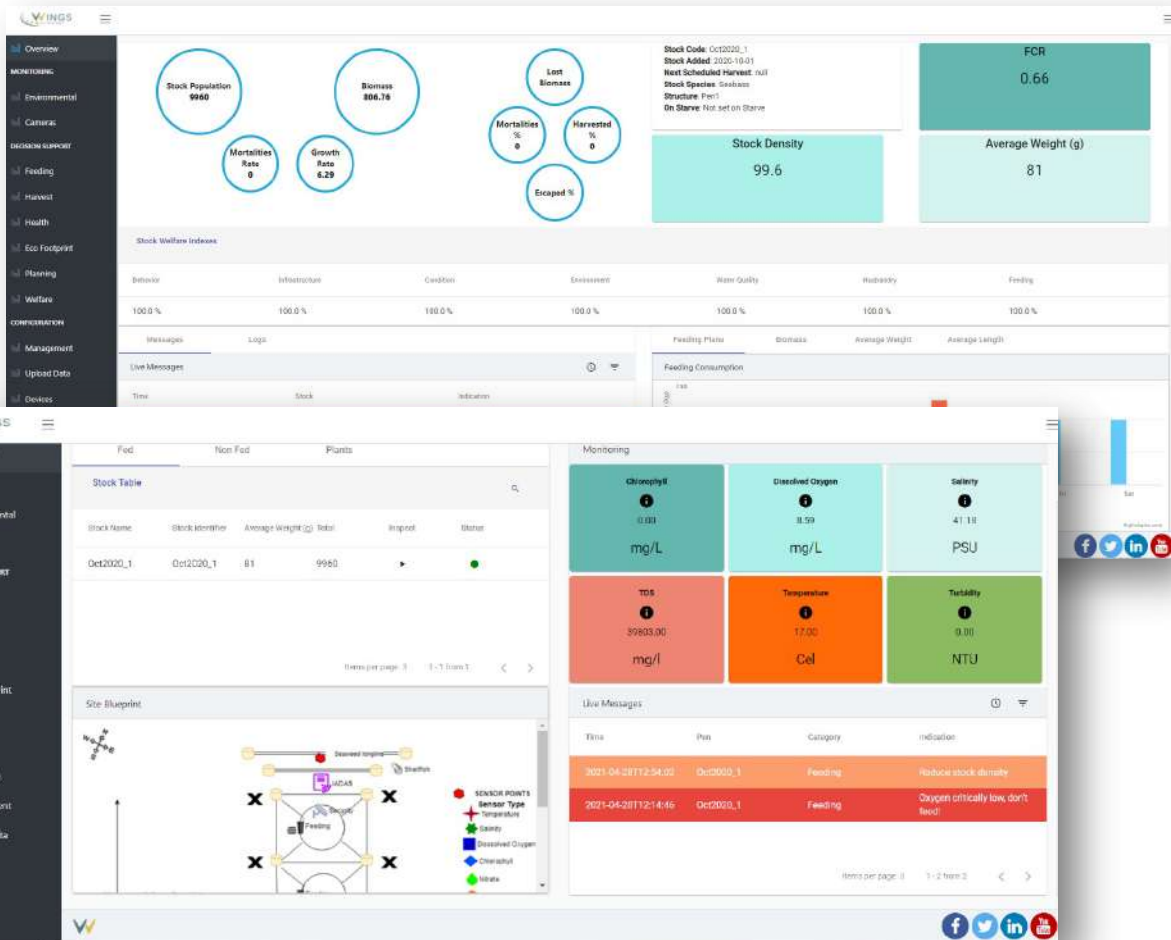


WINGS Smart Gateway installed in the site



Underwater Sensor

□ AQUAWINGS offered services



- **Advanced monitoring** of environmental parameters responsible for the farm's productivity and sustainability. Monitored data are processed for the development of **Predictive Analytics** for:
 - Fish behaviour monitoring
 - Disease diagnosis
 - Biomass estimation & forecasting
 - Water quality analytics
- **Decision Support System**, producing early warnings/alerts, and suggestions for:
 - Optimal Feeding
 - Optimal Harvesting & Seeding
 - Disease Prevention and Mitigation
 - Planning
- **Farm Performance and Assessment** provides records of farm performance by keeping farm and stock information such as:
 - Average weight biomass
 - Feed Conversion Ratio (FCR)
 - Fish volume
 - Stocking density

Greek Pilot

Multi-use activities are now carried out as planned

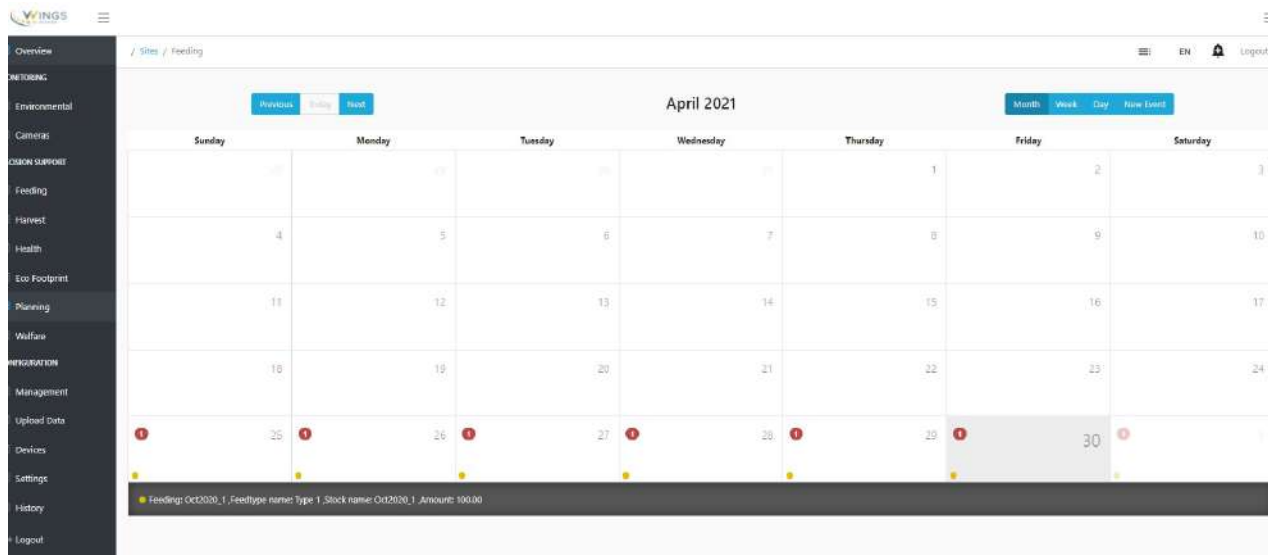


- Diving expeditions to the aquaculture site
- Infrastructure monitoring using diving equipment and resources
- Mapping of underwater landscape of aquaculture site with the use of ROV (owned by Planet Blue)
- Inspection with the use of ROV of the aquaculture diver while repairing the infrastructure
- Inspection with the use of ROV of the aquaculture infrastructure that are placed in great depths (anchors)

Greek Pilot



Planning tool



AQUAWINGS Dashboard

Planning tool: A scheduling system, to plan the multi-use activities. Planet Blue and KASTELORIZO can have access to the calendar and be able to check availability of the aquaculture and book a co-use activity. These activities could be:

- Mapping of underwater landscape of aquaculture site with the use of ROV (owned by Planet Blue)
- Diving expeditions to the aquaculture site (unique wetland for divers to see)
- Diving expeditions for cleaning aquaculture area from waste
- Inspection with the use of (Remote Operating Vehicle) ROV of the aquaculture diver while repairing the infrastructure
- Inspection with the use of ROV of the aquaculture infrastructure that are placed in great depths (anchors)

Greek Pilot

Multi-use business plan

Indicatively, challenges to be investigated are:

- How to increase profit of operations
- In what way to spread costs of operations across the maritime activities
- How to balance the demand on marine space between the two operations
- What type of multi-use business model would reduce the risks for operators and investors

Business model Canvas		Aquaculture and tourism Business Plan (Pilot: Patroklos)		
Problem <ul style="list-style-type: none"> • Lack of societal acceptance of aquaculture unit • Lack of new scuba-diving attractions • Difficulty in monitoring aquaculture infrastructure in great depths • Limited monitoring of environmental footprint in aquaculture site 	Solution <ul style="list-style-type: none"> • Combination of aquaculture and scuba-diving, using software platform for scheduling activities • Scuba-diving tourist visits to the aquaculture site • Aquaculture farmers used as tour guides • Scuba diving equipment (ROVs) to be used for aquaculture monitoring • Installation of sensors in farm to track environmental footprint • Installation of cameras to monitor fish stress levels 	Unique Value Proposition <ol style="list-style-type: none"> 1) Clean water 2) Increased touristic activity in site 3) Social acceptance of aquaculture farm 4) Cost reduction of infrastructure failures 5) Increased revenue 6) Increased crop yield 	Unfair Advantage <ul style="list-style-type: none"> • Introducing an alternative touristic attraction • A potential win-to win combination compared to same activities existing individually in the pilot site 	Customer Segments <ul style="list-style-type: none"> • Foreign tourists • Local tourists • Local residents • Regional authorities
	Key Metrics <ul style="list-style-type: none"> • Number of scuba-diving tourists • Number of aquaculture infrastructure failure cases • Revenues 		Channels <ol style="list-style-type: none"> 1) Local newspapers/ press 2) Partners 3) Website / social media 	
Cost Structure <ol style="list-style-type: none"> 1) Marketing costs 2) Licensing costs 3) Sensors and cameras installation 4) SW development costs 5) Deployment/Hosting costs 		Revenue Streams <ol style="list-style-type: none"> 1) Scuba diving participation fees 2) Fish products sold 3) Grants 		
PRODUCT		MARKET		

Greek Pilot

Social acceptance

The social acceptance of the multi-use is of high priority for the pilot, as the local community's opinion on the existing aquaculture operations are fluctuating from neutral to negative. Stakeholders involvement is also crucial for the success of the multi-use. The challenges to be faced are:

- How to secure consistent and coherent stakeholder involvement (investors, tourist offices, scuba-diving communities, local hotels, restaurants etc.)*
- What communication and marketing channels to use for gaining acceptance*

Offered solutions:

- Training workshops on scuba-diving expeditions*
- Tourist experience after diving in the aquaculture site*
- Expected synergies from activity combination: This information will enhance the relationships between different economic activities that could benefit from the multi-use by understanding the mechanisms of each activity influencing the operation of the other.*

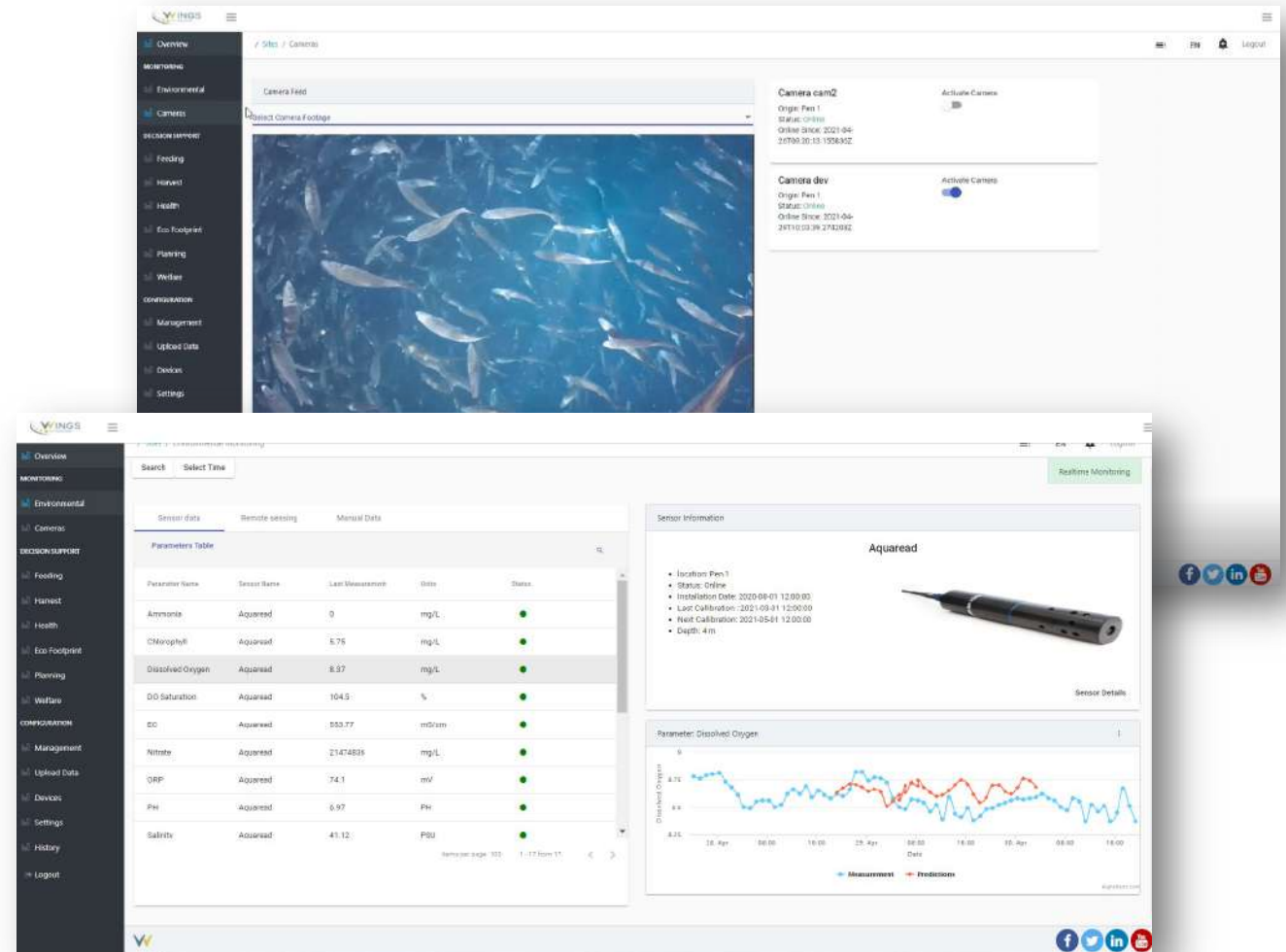
Greek Pilot

Legal and insurance aspects

- *Both activities individually are fully covered by **private insurance** for their own activities*
- *Aquaculture site is also covered by **Hellenic Agricultural Insurance Organization***
- *For environmental inspections and permits, the responsible carrier is Hellenic Ministry of Agricultural Development and Food*
- *Health and safety of scuba-diving expeditions:*
 - *Planet Blue is a certified provider of diving services with Bureau Veritas certification EN 14467, a standard outlining the requirements for equipment, risk assessment, and emergency provision to ensure that all activities are carried out safely.*
 - *Also Planet Blue is certified for its ISO 9001:2015 Management System for:*
 - *Scuba training*
 - *Recreational diving*
 - *Scuba gear rental*
 - *Filling of tanks*

Environmental monitoring

- **Fish behaviour monitoring:**
 - Live camera footage is accessible from AQUAWINGS Dashboard. Computer vision analytics are executed on the collected video data to produce automatic observations, giving alerts and recommendations regarding the fish behaviour status.
- **Real-time advanced monitoring** of environmental parameters responsible for the farm's productivity and sustainability. Namely, these parameters are:
 - Temperature, pH, Salinity, Current, Dissolved oxygen, Turbidity, Chlorophyll, Nitrate, Ammonium, Meteorological Data
 - Prediction diagrams for each parameter, so as to encourage proactive decision making from aquaculture farmer

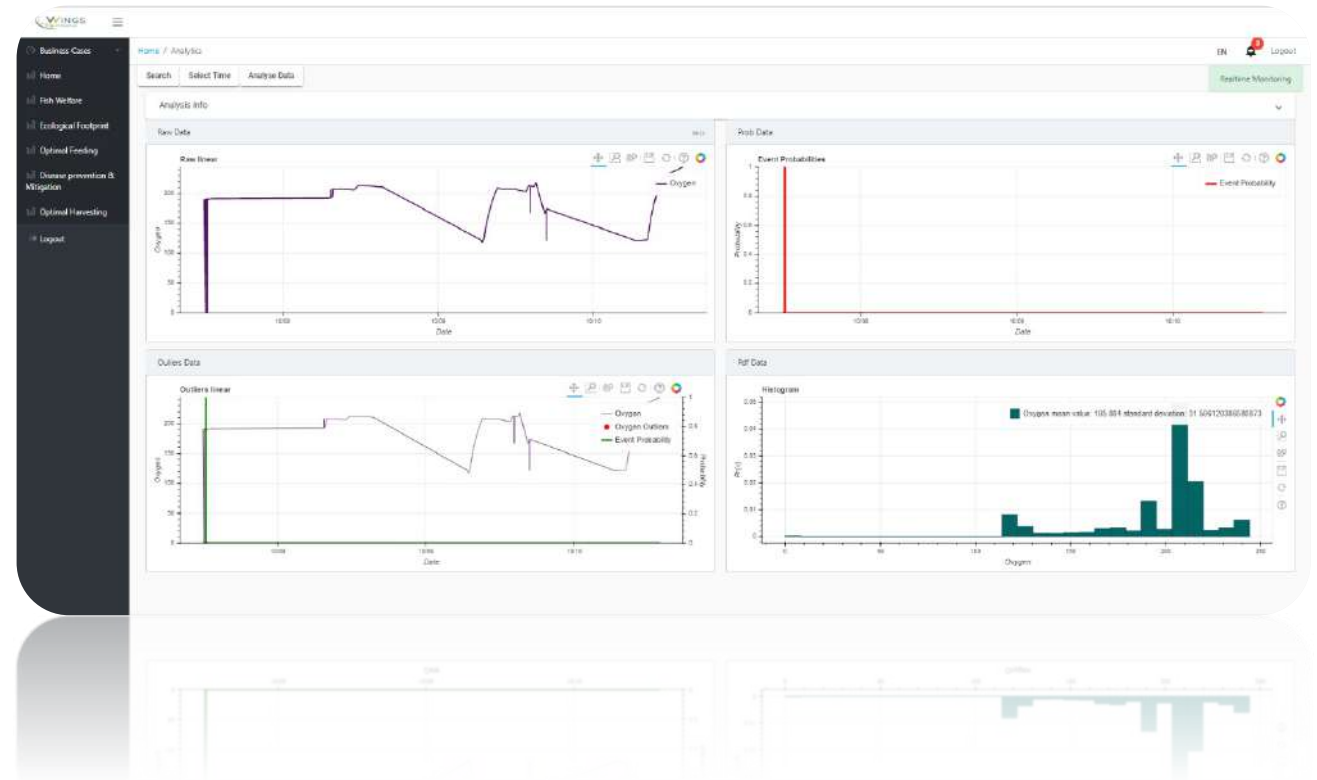


Greek Pilot

Data extracted from the AQUAWINGS platform would be used to closely monitor the water quality of the aquaculture site:

Water Quality Analytics for the identification of quality problems in the water. This feature performs:

- Water quality evaluation based on multi-parameter analysis
- High accuracy predictions of parameter values to ensure normal operation conditions
- Notification of users in case of an event
- Constant adaptation to background changes



Greek Pilot

Way forward

To re-structure the technological installations in the site:

- Stop using the existing wired connection between cameras/sensors with power and internet
- Add solar panels for power supply
- Re-structure the WINGS Smart Gateway to receive wireless internet in order to transmit data from sensors and cameras from each cage
- Virtual tour with QR code to be created as in Danish pilot
- To contact the local stakeholders in order to advertise the on-going activities