BUSINESS BRIEF

ULTFARMS FluoroProbe



KER 14

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What is FluoroProbe?

FluoroProbe is an autonomous, cost-effective monitoring system that enables offshore mussel and shellfish farms to detect and classify harmful microalgae, particularly dinoflagellates, in real time. By continuously analysing the fluorescence excitation spectrum of seawater at the point of deployment, it provides early warning of harmful algal blooms, helping producers protect food safety, reduce economic losses and support compliance with EU monitoring requirements.



WHAT CHALLENGE DOES IT SOLVE?

- FluoroProbe delivers reliable, real-time phytoplankton monitoring for offshore aquaculture, enabling the simultaneous detection and differentiation of green algae, diatoms, dinoflagellates, cyanobacteria, and cryptophytes.
- It uses multiwavelength LED excitation and fluorescence emission analysis to measure the concentration of each algal group in situ, expressed as chlorophyll-a equivalents, without requiring laboratory processing.
- The sensor features an autonomous wiper mechanism and remote data transmission, supporting continuous, long-term offshore monitoring without the need for on-site personnel.
- Its immersible design is compatible with offshore mooring systems and can be integrated with data-processing platforms, ensuring flexible deployment and efficient management of monitoring data.

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TECHNOLOGY READINESS LEVEL: TRL 6 → targeting **TRL 7-8**

Core solutions

COMPARED WITH CONVENTIONAL SAMPLING AND LABORATORY-BASED ANALYSIS, FLUOROPROBE PROVIDES CONTINUOUS, REAL-TIME PHYTOPLANKTON MONITORING WITH REDUCED OPERATIONAL EFFORT. COMPARED WITH SATELLITE-BASED MONITORING, IT DELIVERS RELIABLE GROUND-TRUTH DATA AND OFFERS A SCALABLE BUSINESS MODEL BASED ON HARDWARE SALES, TECHNICAL SERVICES, AND FUTURE SUBSCRIPTION-BASED DATA ANALYTICS.

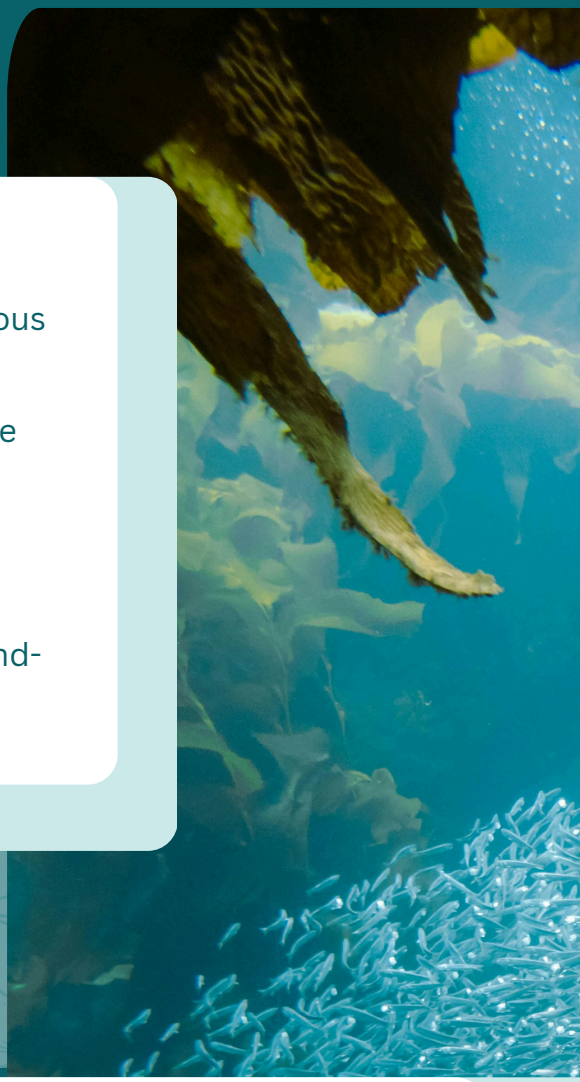
1. Continuous phytoplankton monitoring detects changes in algal-group distribution and provides early warning of harmful algal blooms, supporting ecosystem-based aquaculture management, marine biodiversity monitoring, and climate adaptation.

2. Real-time data strengthens seafood safety and improves the knowledge available to aquaculture operators, environmental managers, and regulatory authorities.

3. Automated in situ assessment reduces manual sampling, site visits, laboratory processing, and product waste, lowering monitoring costs and helping producers limit losses associated with harvesting bans.

4. A diversified revenue model combines hardware sales, EU-funded R&D, and technical services, with future subscription-based data services supporting recurring income, commercial scalability, and long-term customer relationships.

Market Opportunity



TARGET CUSTOMER SEGMENTS

- Environmental monitoring agencies requiring continuous time-series data with a reduced sampling burden
- Maritime regulatory authorities supporting compliance with EU monitoring requirements
- Marine research institutes requiring high-resolution phytoplankton data
- Satellite-data analysis companies seeking in situ ground-truth data for calibration

MARKET CONTEXT



- Focused on mussel and shellfish production across the Atlantic Arc, North Sea, and Mediterranean
- Responds to the increasing frequency and geographic spread of HABs linked to ocean warming
- Supported by EU policies promoting robust water-quality monitoring in food-producing marine environments
- Positioned between aquaculture safety monitoring and data infrastructure for satellite-based marine services

Market Potential & Revenue Strategy

1 SCALABILITY APPROACH

- Standardised, immersible sensor compatible with offshore mooring systems and data-processing platforms
- Replicable deployment across aquaculture sites, cultivation species, and geographic regions
- Autonomous cleaning and remote data transmission support long-term, unattended monitoring
- Partnerships with regulators, researchers, and satellite-data providers extend market reach

2 REVENUE STREAMS

- Direct sales of sensor systems equipped with the autonomous wiper module and accompanying software
- Co-funding through participation in European R&D projects
- Installation, calibration, and consultancy services
- Future subscriptions for continuous data analysis and operational decision support

3 MARKET ENTRY PLAN

- Leverage ULTFARMS pilot relationships to secure early commercial sales in the offshore mussel sector
- Engage regulatory authorities to integrate FluoroProbe into official HAB monitoring frameworks
- Partner with satellite-data companies seeking reliable ground-truth calibration instruments

FluoroProbe combines hardware sales, R&D co-funding, technical services, and future data subscriptions with a clear commercialisation pathway from ULTFARMS validation to wider deployment across European offshore aquaculture markets.



Sustainability Contribution

- **Environmental:**

Enables continuous, real-time detection of phytoplankton dynamics and early warning of harmful algal blooms, supporting ecosystem-based aquaculture management, marine biodiversity monitoring, and adaptation to climate-driven changes.

- **Social:**

Strengthens seafood safety for coastal communities and provides aquaculture operators, environmental managers, and regulatory authorities with better information for more effective water-quality assessment.

- **Economic:**

Reduces monitoring costs, product waste, and HAB-related losses while improving the resilience of aquaculture operations.

Alignment with the UN Sustainable Development Goals

SDG 3	**Good Health and Well-being** Reduces public-health risks associated with toxic algal blooms in shellfish and seafood supply chains.
SDG 9	**Industry, Innovation & Infrastructure** Advances digital marine-monitoring infrastructure through autonomous in situ sensing, automated classification, and remote data transmission.
SDG 14	**Life Below Water** Supports marine biodiversity monitoring and ecosystem-based management through continuous, real-time assessment of phytoplankton dynamics.

What's next?

- Complete long-duration offshore validation under real sea conditions and publish peer-reviewed performance results and calibration protocols to strengthen scientific credibility and customer confidence.
- Engage national competent authorities and EFSA to embed FluoroProbe within official shellfish safety and harmful algal bloom monitoring protocols.
- Quantify environmental and economic impacts, including HAB events detected, harvesting bans avoided, and associated economic value, while developing a circular product-design roadmap.
- Explore subscription-based data services to complement hardware sales, generate recurring revenue, and support the transition towards digital ocean-monitoring services.

NEXT

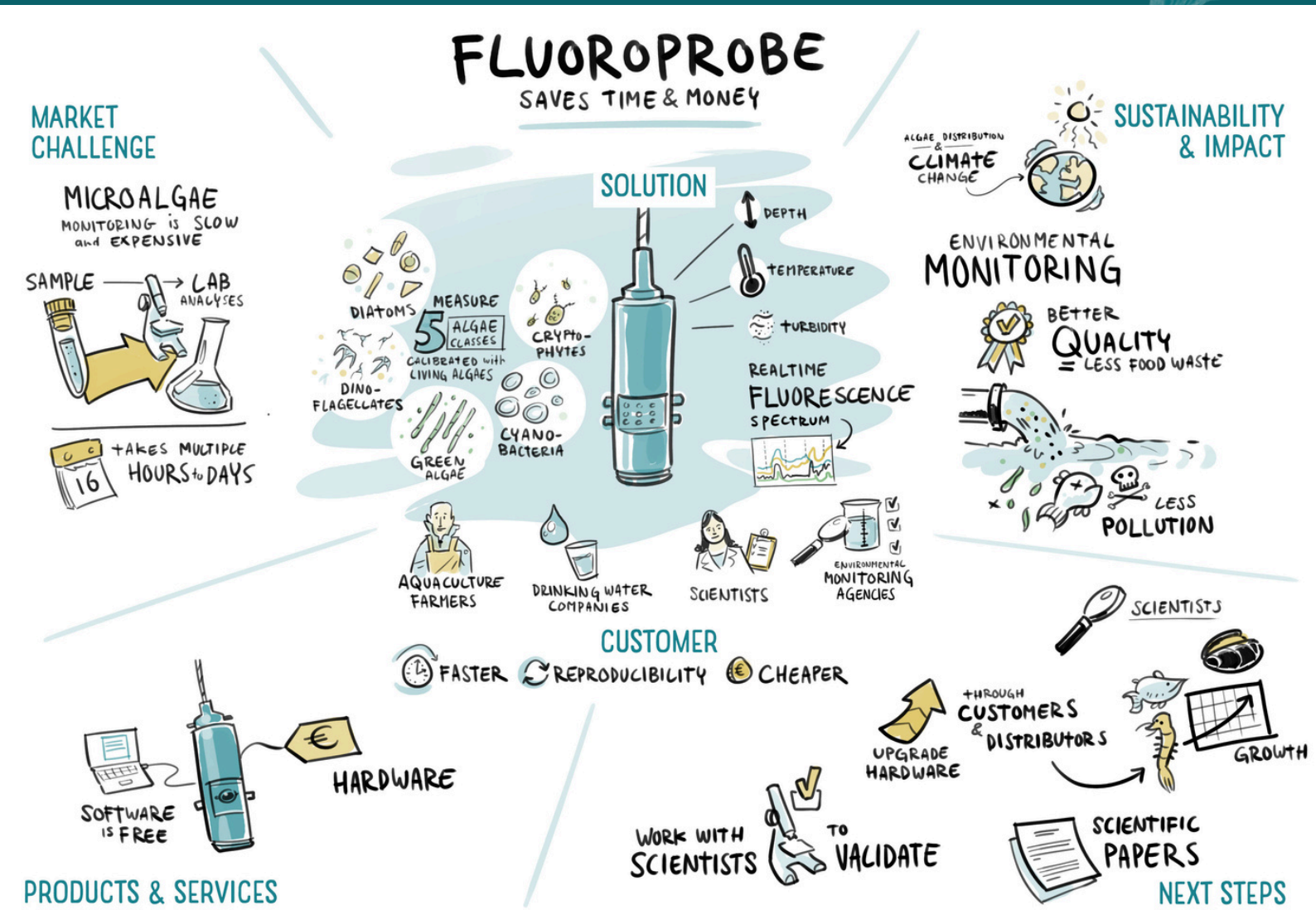


Illustration © Tomas Pasma

Method developed by: bbe moldaenke

Project coordinated by: Deltares

Flyer designed by: SUBMARINER NETWORK



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