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Smart4Sea

D1. Fishing Boats Technology Assessment Report (WP1, Activity Nr.1)

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1. ACTIVITY GOAL

Duration: Oct 2025 - Jan 2026

Responsible partner: ARVI-INNOVAPESCA & BITCLIQ with ANFACO and UC collaboration.

The objective of this activity is to assess the pre-project technological capacities of the selected fishing vessels and to identify the ICT upgrades required to meet the **SMART4SEA traceability requirements**. This activity started after ARVI identified the three vessels that met the project requirements and were therefore selected to participate in the pilot implementation phase.

An initial technical assessment was carried out to characterize the onboard equipment, existing digital monitoring systems, and available operational data sources. This assessment focused on identifying the current data acquisition capabilities of each vessel and evaluating their suitability for supporting automated traceability indicators required by the SMART4SEA platform. Based on this preliminary analysis, the gaps between existing onboard systems and the project's traceability data requirements were identified, allowing the definition of a roadmap for the integration of external data sources, automated data collection mechanisms, and potential ICT enhancements where necessary. The assessment also considered constraints related to vessel configuration, operational routines, and the feasibility of deploying additional monitoring technologies without interfering with normal fishing operations.

In February 2026, ARVI hosted a **WP1 project meeting** in Vigo with BITCLIQ to align activities under **Task 1.1**, with the participation and collaboration of **ANFACO** and the project coordinator, **UC**. The meeting focused on coordinating the initial implementation steps related to the technological assessment of the pilot vessels, the identification of available onboard data sources, and the definition of data acquisition strategies required to support the SMART4SEA traceability framework. It also provided an opportunity to clarify roles and responsibilities among partners involved in Task 1.1 and to ensure alignment with the overall objectives and expected outcomes of **Work Package 1**. This coordination meeting contributed to establishing a common understanding of the technical approach to be followed during the vessel baseline assessment phase and supported the planning of subsequent activities related to data collection, integration, and indicator development.



Figure 1 - WP1 Project meeting held at ARVI's headquarters with the participation of BITCLIQ, ANFACO and UC

Some key data elements (KDEs) were identified to be assessed, shown in Table 1.

Vessel Construction	
Hull Construction	Materials, dimensions, and capacity.
Engine	Engine type, power, materials, fuel type, maximum speed, and number of engines.
Paint and Antifouling	Types of paint and antifouling coatings used on the hull.
Fishing Nets	Number of nets, net length, and net materials.
Vessel Maintenance	
Hull Maintenance	Maintenance frequency and percentage of hull maintenance required.
Engine Maintenance	Service life of the main engine
Paint and Antifouling Maintenance	Maintenance and repainting frequency.
Fishing nets	Net service life, replacement rate, and whether nets are lost or discarded.
Vessel Use and Operation	
Inputs	• **Fuel** consumption. • **Lubricant oil** consumption. • **Ice** consumption (on-board ice production, electricity required).
Outputs	• **Total catch** and **Target species** composition • **Bycatch** and **discards** • **Crew waste generation,** including solid waste, liquid waste, hazardous waste (type of waste) • **Plastics removed** from the sea by the crew during operations.

Table 1 - KDE Identified

2. VESSEL IDENTIFICATION METHODOLOGY

ARVI identified three fishing vessels from its associated fleet to participate in the SMART4SEA project, in alignment with the target species and operational profiles defined within the project scope.

To support the technical and operational characterization of the selected vessels, BITCLIQ provided ARVI with a structured Excel template designed to collect the information required for vessel identification, classification, and baseline technological assessment. The template was prepared to capture key vessel attributes, including identification data, technical specifications, onboard equipment, propulsion systems, fishing gear configuration, operational characteristics, and certification-related information. This dataset constitutes the foundation for the vessel registry component of the SMART4SEA platform and supports the definition of traceability-related data requirements.

The collected information enables the classification of vessels according to their technical capabilities and operational context, facilitating the assessment of existing digital readiness levels and the identification of potential gaps with respect to the traceability indicators required by the SMART4SEA framework.

The structure of the dataset used for vessel identification and classification can be found in Table 2.

Vessel identification	
Registry No.	Unique internal identifier assigned by the registry or management system.
Vessel Name	Official registered name of the vessel.
Registration Number	National vessel registration number issued by maritime authorities.
IMO Number	International Maritime Organization unique vessel identifier (for applicable vessels).
MMSI Number	Maritime Mobile Service Identity used for AIS and radio communication systems.
Call Sign	Official radio call sign assigned to the vessel.
Flag State	Country under whose jurisdiction the vessel is registered.
Port of Registry	Official home port where the vessel is legally registered.
Vessel Type	Classification of the vessel (e.g., trawler, longliner, purse seiner, cargo vessel).

Technical Characteristics	
Length Overall (m)	Total length of the vessel from bow to stern.
Beam (m)	Maximum width of the vessel.
Draft (m)	Vertical distance between waterline and keel.
Gross Tonnage (GT)	Measure of the vessel's total internal volume.
Net Tonnage	Measure of usable cargo or operational capacity volume.
Year Built	Year the vessel was constructed.
Shipyard	Shipyard where the vessel was built.
Hull Material	Primary structural material of the vessel (e.g., steel, fiberglass, aluminium, wood).
Fishing Equipment & Storage	
Fishing Gear Type	Type of fishing gear used (e.g., trawl net, longline, gillnet, purse seine).
Hold Capacity (m^3)	Total storage capacity available for catch onboard.
Storage Type	Preservation system used onboard (e.g., refrigerated hold, ice storage, freezer hold).
Propulsion & Performance	
Engine Power (kW)	Rated propulsion engine power output.
Fuel Type	Type of fuel used by the vessel's propulsion system.
Max Speed (knots)	Maximum operational speed of the vessel.

Licensing & Fishing Activity	
Fishing License No	Official fishing authorization issued by competent authorities.
Authorized Fishing Zones	Geographical areas where the vessel is permitted to operate.
Quota Allocation	Assigned fishing quota under national or regional fisheries management systems.
Ownership and operation	
Owner	Legal entity or individual holding ownership of the vessel.
Operator	Entity responsible for managing vessel operations (may differ from owner).
Owner Tax ID	Official tax identification number of the owner.
Owner Contact	Telephone or communication contact for the owner.
Owner Email	Official email address of the vessel owner.
Crew Information	
Master / Captain	Person legally responsible for vessel navigation and command.
Captain Tax ID	Official tax identification number of the captain.
Captain Contact	Telephone or communication contact for the captain.
Crew Size	Total number of crew members onboard during operations.
Certification & Compliance	
Classification Society	Organization responsible for vessel safety classification and technical standards compliance.
Safety Certificate	Certificate confirming compliance with maritime safety regulations.
Certificate Validity	Expiration date of the safety certification.

Insurance	
Marine Insurance	Type or provider of maritime insurance coverage.
Policy Number	Insurance policy identification number.
Insurance Validity	Expiration date of insurance coverage.
Inspection & Operational Status	
Last Inspection Date	Date of the most recent official vessel inspection.
Inspection Result	Outcome of the inspection (e.g., compliant, conditional approval, deficiencies noted).
Operational Status	Current operational condition (e.g., active, inactive, under maintenance, decommissioned).
Remarks	Additional notes or relevant operational comments.

Table 2 - Vessel Registry Data Fields

During the discussion, it was noted that the selected vessels — two trawlers and one purse seiner — are equipped with different technological solutions. As a result, the introduction of additional onboard equipment or data-intensive monitoring processes beyond the existing systems may be limited.

The operational data to be collected primarily relate to fishing trips and activities, including voyage records, catches, fuel consumption, distances travelled, and other relevant operational indicators.

The agreed approach prioritizes automated data acquisition whenever possible. In this context, AIS data will be used to determine vessel positioning, routes, and travelled distances. For the two vessels equipped with digital fuel consumption monitoring systems, exported data files from these systems will be integrated. Where such systems are not available, fuel-related information will be derived from operational logs and fuel supply invoices.

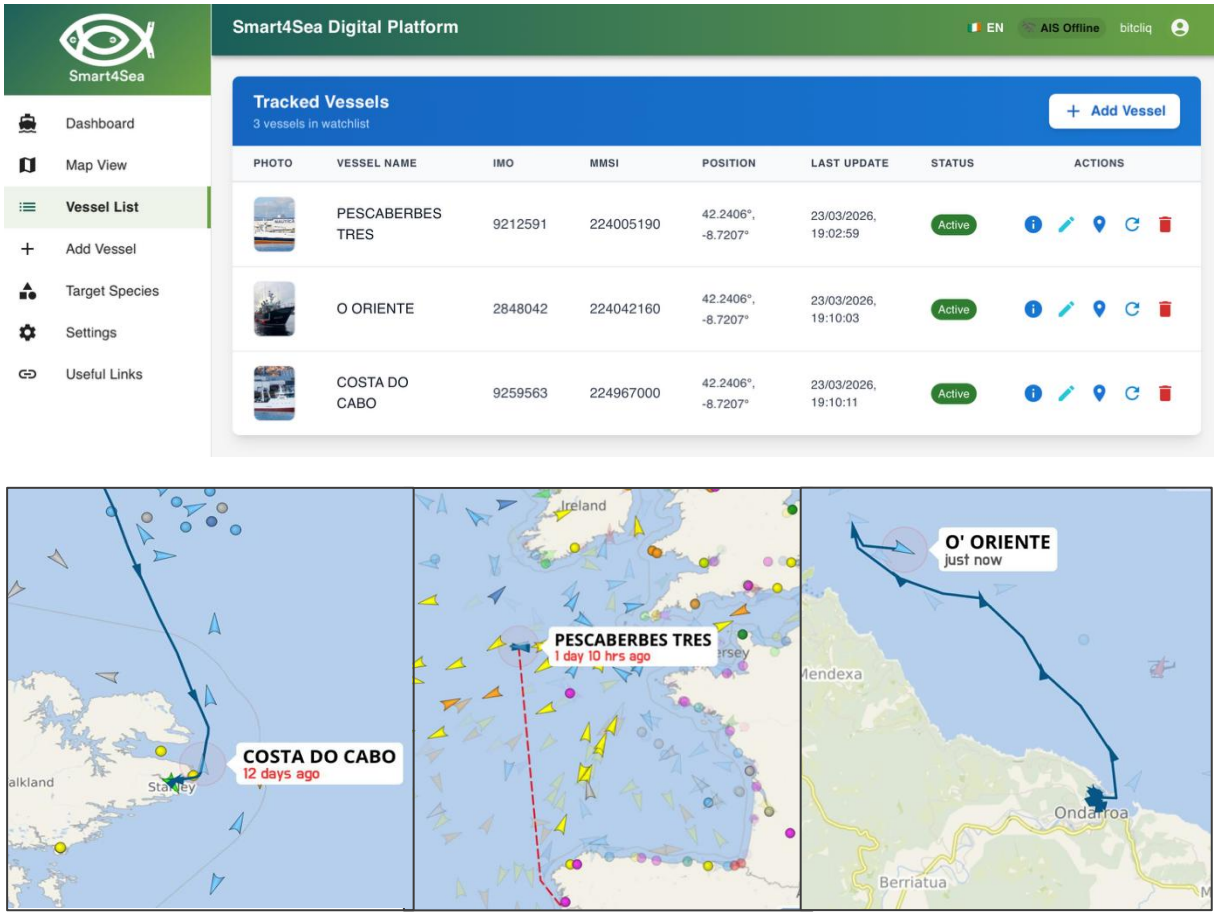


Figure 2 - SMART4SEA Digital Platform (Beta)

3. AVAILABLE KEY TECHNOLOGIES / SYSTEMS

3.1. ABOUT AIS



Figure 3 - AIS (Automatic Identification System)

AIS (Automatic Identification System) is a maritime tracking system that automatically transmits and receives vessel information via VHF radio (sometimes reinforced by satellites). It is widely used to improve **navigation safety, vessel monitoring, and maritime situational awareness**.

What does AIS do?

AIS enables vessels and coastal authorities to **identify, track, and monitor ships in real time** by exchanging structured digital messages that include:

- Vessel identity (name, MMSI number, call sign)
- Position (GPS coordinates)
- Course and speed
- Heading and navigation status
- Destination and estimated time of arrival (ETA)
- Vessel dimensions and type

These data are broadcast automatically at regular intervals.

3.1.1. MAIN PURPOSES OF AIS:

1. Collision avoidance (primary purpose). AIS allows ships to:

- see nearby vessels
- predict their movement
- improve situational awareness
- support safe navigation, especially in congested areas or poor visibility

It complements radar but provides **identity + intent**, not just location.

2. Vessel traffic monitoring, used by:

- coast guards
- port authorities
- vessel traffic services (VTS)

to manage maritime traffic and improve safety near ports and coastal zones.

3. Maritime security and surveillance, used by authorities to:

- monitor vessel movements
- detect anomalies
- support border and fisheries control operations

4. Fisheries monitoring support. In fishing contexts (like **SMART4SEA**), AIS helps:

- reconstruct fishing trips
- calculate travelled distances
- estimate operational activity patterns
- support traceability indicators
- complement VMS (Vessel Monitoring System)

5. Environmental and operational analytics. AIS data are commonly used to:

- estimate fuel consumption proxies
- calculate emissions
- analyse fleet behaviour
- support digital twins of vessels
- feed dashboards and traceability platforms

Why AIS is important for SMART4SEA?

AIS provides a **non-intrusive, already-available data source** that can automatically supply:

- vessel routes
- trip duration
- fishing effort proxies
- port calls
- spatial activity patterns

without installing additional onboard sensors in many cases.

In short: AIS is one of the most valuable baseline digital data sources for vessel traceability and operational monitoring. All vessels assigned to the project have this technology.

3.2. DEA ARMADOR

DEA Armador is a **web-based fisheries electronic logbook access platform** provided by the Spanish fisheries authority that allows vessel owners to consult operational trip data recorded in the vessel's **electronic fishing logbook (DEA)**. It provides access to **active and historical fishing trip information**, inspection documents, landing declarations, discard records, and origin certificates. Its main purposes are shown in Table 3.

Main Purposes of DEA Armador	
Function	**Description**
Trip monitoring	Access data from active and closed fishing trips
Catch tracking	View historical catches by period
Landing verification	Monitor landed weights after official weighing
Discard monitoring	Access discard records
Quota follow-up	Track quota consumption via landings
Compliance support	Access inspection reports and certificates
Documentation management	Attach trip-related files (photos, environmental interactions, reports)
Origin certification	Generate and download EU-compliant catch origin certificates

Table 3 - Main Purposes of DEA Armador

The platform provides structured datasets directly relevant for **traceability indicators and fisheries analytics**. The fishing operation data available from DEA Armador is shown in Table 4.

Trip-Level Data (Fishing Effort)	
Data	**Use for SMART4SEA**
Trip start/end dates	Fishing activity duration
Trip status (active/closed)	Operational timeline reconstruction
Vessel identification	Dataset linking across systems
Catch data	
Data	**Use for SMART4SEA**
Species caught	Target species traceability
Catch quantities	Production indicators
Catch period filtering	Temporal activity analysis
Export available in Excel format.	
Landing Data (Official Weighed Catch)	
Data	**Use for SMART4SEA**
Landed quantities by species	Verified production metrics
Landing date	Supply chain traceability
Landing history	Quota tracking
Official weighed values	Regulatory compliance dataset
Important: landing weight is the **legal reference value under EU Control Regulation 1224/2009**.	

Discard Data	
Data	**Use for SMART4SEA**
Discard quantities	Sustainability indicators
Species discarded	Selectivity metrics
Discard history	Environmental impact KPIs
Inspection and Compliance Data	
Data	**Use for SMART4SEA**
Inspection reports	Compliance tracking
Electronic inspection records	Risk assessment indicators
Origin Certification Data	
Data	**Use for SMART4SEA**
Catch origin certificates	Supply chain transparency
Export compliance	Market traceability
Certification history	Product provenance validation
Supports EU Type A and Type B origin certificates.	

Data Export Capability	
Format	**Use for SMART4SEA**
Excel export	Direct integration into analytics pipelines
Historical datasets	Indicator calculation
Filtered time ranges	Period-based monitoring

Table 4 - Fishing Operation Data Available from DEA Armador

Additional Documentation per Fishing Trip and possible attachments are shown in Table 5**.**

Possible Attachments	
Data	**Use for SMART4SEA**
Environmental interaction reports	Marine biodiversity monitoring
Photos	Evidence support
Operational notes	Contextual trip metadata

Table 5 - Possible Attachments and use for SMART4SEA

DEA Armador is important for SMART4SEA as it provides **authoritative regulatory fishing-operation datasets**, especially:

- catches
- landings
- discards
- trip timelines
- inspection records
- origin certification

These datasets are:

- ✓ validated
- ✓ standardized
- ✓ exportable
- ✓ compliant with EU fisheries regulation
- ✓ directly usable for traceability indicators

All vessels assigned to the project have an e-logbook solution being able to provide the catch report/landing report.

3.3. ENERGY/MGO CONSUMPTION MONITORING

Energy consumption monitoring represents a key component of the **SMART4SEA** traceability framework, as it supports the estimation of operational efficiency indicators and contributes to the assessment of environmental performance across the pilot vessels.

As part of the initial vessel assessment phase, the availability of onboard fuel consumption monitoring systems was evaluated for each of the three vessels selected by ARVI. Two of the vessels are equipped with digital fuel consumption monitoring systems capable of generating exportable operational datasets. These datasets are expected to support the automated calculation of indicators related to fuel usage, voyage activity, and energy performance.

Monitoring Platforms Installed Onboard Pilot Vessels

Two different onboard digital monitoring platforms were identified across the selected pilot vessels: **ARGOS** and **SILECGEST**. Both systems provide modular, scalable monitoring capabilities supporting vessel performance analysis, energy consumption monitoring, and operational traceability data acquisition relevant for the SMART4SEA framework.

These platforms enable automated collection of key operational variables and support structured export of historical datasets for integration into external analytics environments such as the SMART4SEA platform.

3.3.1. ARGOS MONITORING PLATFORM

ARGOS is an integrated real-time vessel monitoring platform composed of configurable and scalable modules adapted to each vessel installation. It supports continuous monitoring across propulsion systems, electrical generation, navigation parameters, fishing operations, environmental indicators, and auxiliary equipment. *Table* 6 summarizes the variables collected.

Main Monitoring Capabilities – ARGOS	
Monitoring Area	**Variables Collected**
Main Engine	Power (kW), RPM, engine load, fuel consumption (instantaneous and cumulative), specific fuel consumption (g/kWh), litres per nautical mile
Engine Performance	Injection rack position, cylinder temperatures, bearing temperatures, exhaust gas temperatures
Turbocharger	Turbo RPM, air pressure and temperature
Fluid Systems	Fuel pressure, oil pressure, cooling water pressure (HT/LT), starting air pressure
Shaftline Monitoring	Torque, effective shaft power, propeller pitch and RPM
Auxiliary Engines & Generators	Power output (kW), accumulated energy (kWh), load %, working hours, fuel consumption
Electrical Parameters	Voltage, frequency, phase currents
Navigation	GPS position, vessel speed, trim, heel angle, seawater temperature
Cold Chain	Tunnel and storage chamber temperatures
Fishing Operations	Winches, trawl doors, fishing activity indicators
Environmental Indicators	CII, MRV/SNV (EU), SEEMP I/II (IMO)
Bunkering Module	Fuel mass flow, density, temperature, bunkered volume
Stability Monitoring	Draft and vessel stability indicators

Table 6 - Main Monitoring Capabilities – ARGOS and variables collected

The **ARGOS Analysis cloud platform** enables structured historical data export in multiple formats, as seen in Table 7.

ARGOS Data Export Capabilities	
Export Format	**Description**
Excel (.xlsx)	Hierarchical datasets structured by equipment, variable, and signal name with timestamped records (~1-minute sampling frequency)
CSV (.csv)	Compatible with Python, R, Power BI, Tableau, ERP/MES systems and analytics platforms
Automatic Reports	Mechanical efficiency, propulsion performance, electrical generation, fuel consumption per route/period, regulatory indicators (CII, MRV, SEEMP)
Typical monitoring output	
Parameter	**Typical volume**
Sampling frequency	~1 minute
Signals monitored	~120 variables
Daily dataset size	~1,400 rows per vessel

Table 7 - ARGOS Data Export Capabilities and monitoring output and volume

3.3.2.SILECGEST MONITORING PLATFORM

SILECGEST, developed by SILECMAR, is a modular onboard digitalization platform installed on *Pescaberbes Tres*. It operates through independent functional modules integrated via the **SILECGEST BRAIN** core system and managed remotely through the **SILECLOUD** platform. Table 8 displays its main monitoring capabilities.

Main Monitoring Capabilities – SILECGEST	
Monitoring Area	**Variables Collected**
Main Engine	Instantaneous and cumulative fuel consumption (Coriolis flowmeters), RPM
Engine Sensors	Up to 12 temperature readings and 8 pressure signals
Navigation & Stability	Trim, heel angle, draft differences
Electrical Consumption	Power consumption of onboard electrical users
Cold Chain Monitoring	Integration with onboard temperature recorders
Fishing Operations	Net symmetry and towing speed sensors
Fishing Winches (optional)	Cable length, RPM, tension load cells
External Systems Integration	GPS, echo sounder, Marport sensors, bridge equipment
Automatic Fishing Control (optional)	Hydraulic-assisted manoeuvre automation system

Table 8 - Main Monitoring Capabilities – SILECGEST and variables collected

The **SILECLOUD platform** supports structured export of monitored variables, detailed in Table 9.

SILECGEST Data Export Capabilities	
Export Format	**Description**
CSV (.csv)	Timestamped time-series datasets compatible with analytics platforms
Excel (.xlsx)	Structured spreadsheet exports by variable
PDF Reports	Automated reports covering consumption, efficiency, and electrical performance indicators

Table 9 - SILECGEST Data Export Capabilities

Sampling resolution and exportable variables depend on installed onboard modules.

3.3.3. RELEVANCE FOR SMART4SEA DATA INTEGRATION

Both ARGOS and SILECGEST platforms provide valuable automated datasets supporting SMART4SEA indicators related to:

Relevance for SMART4SEA Data Integration	
Indicator Category	**Supported Variables**
Energy consumption	Fuel flow, specific consumption, generator load
Navigation activity	Speed, GPS position, routes
Mechanical efficiency	Shaft power, engine load
Fishing operations	Trawl activity indicators
Environmental performance	MRV / CII / SEEMP metrics
Cold chain monitoring	Storage temperature control

Table 10 - ARGOS and SILECGEST's Relevance for SMART4SEA Data Integration

These monitoring platforms significantly reduce the need for additional onboard instrumentation and enable reliable integration of operational datasets into the SMART4SEA traceability and analytics framework.

Future project activities may explore API-level integration options or automated synchronization mechanisms with onboard monitoring systems, subject to vendor interoperability specifications.

For the vessel where such monitoring systems are not currently available, alternative data acquisition approaches will be implemented. These include the use of fuel supply records, operational logs, and voyage-related information to estimate consumption patterns and support the calculation of relevant indicators.

Whenever possible, automated data integration mechanisms will be prioritized using system exports and structured data import procedures. In parallel, external data sources such as **AIS-based navigation data** may be used to complement consumption estimates by providing information on routes, distances travelled, and vessel activity profiles.

This combined approach ensures that energy consumption indicators can be progressively incorporated into the **SMART4SEA platform dashboard**, while minimizing the need for additional onboard instrumentation and avoiding disruption to normal fishing operations.

Both **Costa do Cabo** and **Pescaberbes Tres** have this technology respectively, so they can provide automatic integration (via API) about engines consumption. **O Oriente** information will be estimated based on the bunkering invoices uploaded into the SMART4SE platform.

4. SMART4SEA FISHING FLEET OVERVIEW

4.1. COSTA DO CABO - TRAWLER

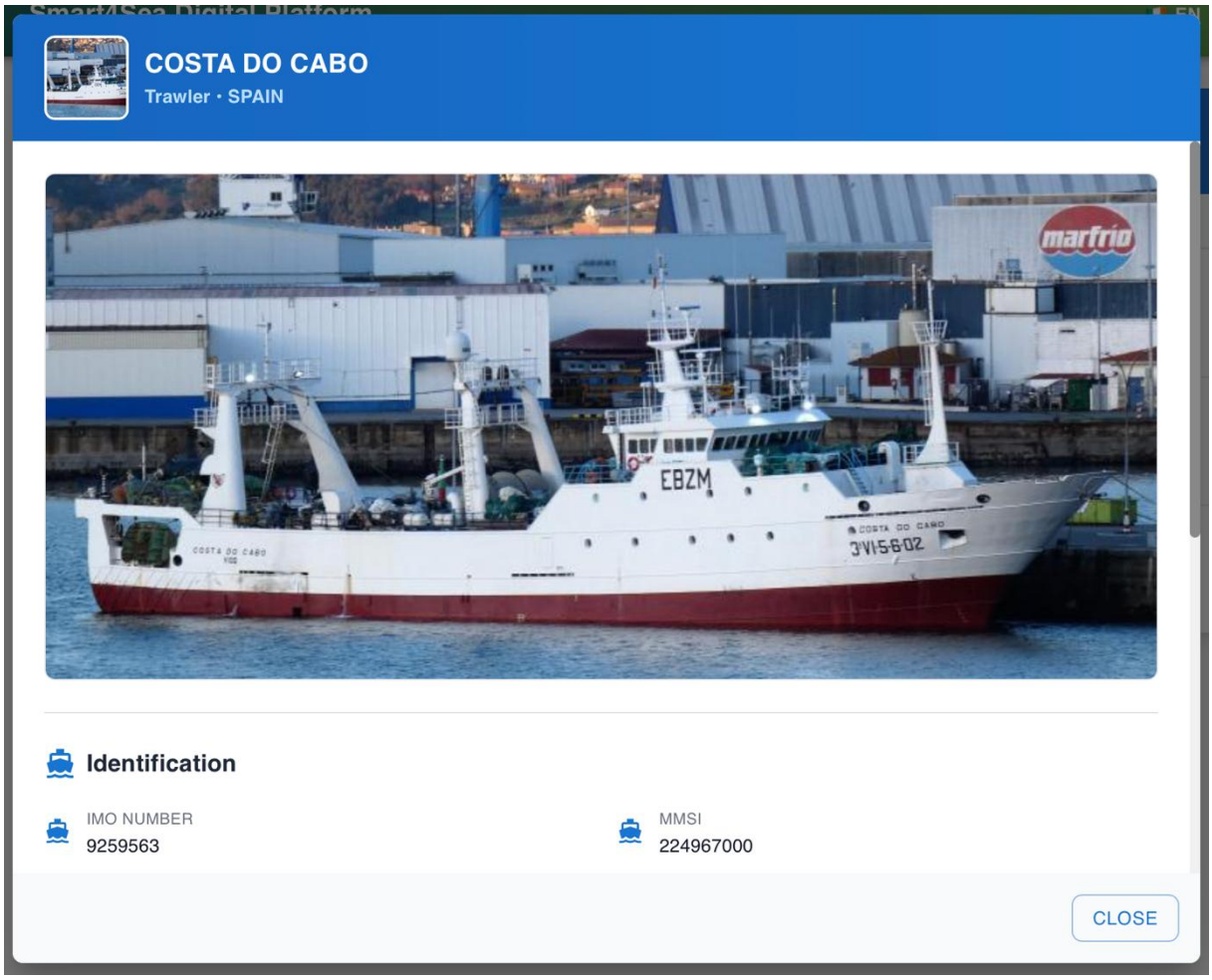


Figure 4 - COSTA DO CABO

Main Equipment Installed Onboard the Vessel "COSTA DO CABO"	
1. Vessel Identification	
Vessel Name	COSTA DO CABO
Vessel Type	Stern Trawler / Freezer
Hull Material	Steel (fully welded)
Construction	Astilleros M. Cíes (C-57)
Naval Architect / Technical Spec.	F. Carceller – Ingenieros Navales – Consultores
Owner	NUGAGO PESCA S.A.
Owner Contact (General)	Avda. de Marín, Bueu, Spain / Telf: 986 322173
Owner President	José Núñez Francisco
Classification Society	Bureau Veritas (BV) – SEVIMAR
2. Main Technical Characterictics	
Length Overall (LOA)	≈ 60.00 m
Length Between Perpendiculars (LPP)	50.50 m
Length Convention T (L. CEE)	51.40 m
Moulded Beam	11.5 m
Depth to Main Deck	4.6 m
Depth to Upper Deck	7.00 m
Depth to Castle Deck	9.4 m

Depth to Bridge Deck	11.70 m
Design Draft	4.5 m
Gross Tonnage (GT, 1969)	1,276 GT / 722.82 GRT
Crew Capacity	30 persons
Service Speed	≈ 11 knots
3. Vessel Capacities	
Fuel Oil Capacity	≈ 543 m^3
Fresh Water Capacity	≈ 17.5 m^3
Ballast Water Capacity	≈ 74.5 m^3
Lubricating Oil Capacity	≈ 10.5 m^3
Sludge Capacity	≈ 0.5 m^3
Frozen Fish Hold Capacity (-25°C)	≈ 800 m^3
Frozen Fish 'Tween Deck Capacity (-25°C)	≈ 437 m^3
Freezing Capacity	≈ 46 tonnes/day
4. Main Propulsion Engine	
Manufacturer	Wärtsilä
Model	6R32 low NOx D (homologation: 6R32A1B)
Rated Power (MCR)	1,434 kW (1,950 BHP) @ 750 rpm
Engine Cycle	4-stroke, single-acting diesel

Cylinder Configuration	6 cylinders in-line
Bore × Stroke	320 mm × 350 mm
Total Displacement	102 litres (17 L / cylinder)
Air Supply	Turbocharged with charge-air cooling (ABB turbocharger)
Starting System	Pneumatic (compressed air)
Fuel Specific Consumption (85% MCR)	≈ 179 g/kWh ±5% (propeller curve, ISO 3046-1)
Lubricating Oil Consumption	0.8 g/kWh ±3% @ 100% MCR
Flexible Coupling	Holset MSC-31.5
Fuel Type	Marine Gas Oil (MGO) – max. viscosity 8 cSt/40°C
5. Gearbox/Reduction Gear	
Manufacturer	REINTJES
Model	LAF-3465
Reduction Ratio	5.077 : 1
Output Shaft Speed	≈ 147 rpm
Clutch Type	Hydraulic (input shaft)
PTOs (Power Take-Off)	2 × 900 kW @ 1,500 rpm (non-clutchable)
Bollard Pull (fixed point)	420 kN
Gearbox Efficiency	98.5%

6. Propeller, Shaft line & Nozzle	
Propeller Type	Variable Pitch Propeller (CPP)
Propeller Diameter	3,300 mm (in fixed nozzle)
Number of Blades	4
Blade Type	Moderate Skew
Blade & Hub Material	Nickel-Aluminium Bronze (Ni-Al Bronze)
Hub Model / Diameter	D/775 mm
Hub + Blades Weight (approx.)	3,766 kg
Tail Shaft Length (approx.)	5,500 mm
Tail Shaft Diameter (aft/fwd)	284 / 264 / 260 mm
Sterntube Lubrication	Oil-lubricated (CEDERVALL bearings)
Remote Control System	LIPSTRONIC/C
Fixed Nozzle	Yes

7. Auxiliary Engines & Alternators		
Equipment	**Brand/Model**	**Specification**
Auxiliary Engines (×2)	Mitsubishi S12R MPTA	870 kW @ 1,500 rpm – 6 cyl. in-line, 4-stroke
Main Alternators (×2)	Stanford HCM734E	1,035 KVA / 50 Hz / 380 V / III
Shaft Alternators (×2, PTOs)	Stanford HCM734E	1,035 KVA / 50 Hz / 380 V – coupled to gearbox PTOs
Emergency / Harbour Generator	Volvo Penta TAMD 74 + Stanford UCM 274	204 CV @ 1,500 rpm (turbocharged) / 170 KVA

8. Electropumps, separators & Fresh Water Generators	
General Service / Bilge / F.F. Pumps (×3)	AZCUE VM-EP-80/16-R – 15 CV, 65 m^3/h @ 30 m.w.c.
Fuel Transfer Pump	AZCUE BT-IL-70 D2 – 5.5 CV, 25 m^3/h
Fresh Water Pressure Unit	AZCUE MO-36/20 – 3 CV, 4 m^3/h
Salt Water Pressure Unit	AZCUE MO-36/20 – same spec, bronze body
Fish Park Drainage Pumps (×3)	AZCUE VRX 80/160 – 4 CV, 30 m^3/h (VORTEX impeller)
Fuel Oil Purifier	Alfa Laval MAB-104 – 2,000 l/h
Lubricating Oil Purifier	Alfa Laval MAB-103 – 550 l/h
Fresh Water Generator (evaporation)	PETSEA VAP 10,000 – 10,000 l/day
Fresh Water Generator (R.O.)	PETSEA RO 110/1208W – 10,000 l/day
UV Fresh Water Steriliser	UV-4400-F – 4,400 l/h, AISI 304 housing
Pipe Protection System (anti-fouling)	PETION A-685-TD – max. 750 m^3/h
Air Compressors (×2)	ABC VA-70-E-PC – 23 m^3/h @ 30 kg/cm^2, 5 CV each
9. Refrigeration & Freezing System	
Refrigerant	R-404A
Freezing Tunnels	5 (4 operating simultaneously + 1 standby)
Tunnel Capacity	≈ 30 tonnes/day in 4 tunnels (3 cycles × 7 h × 2,500 kg/cycle)
Plate Freezer Cabinets (×2)	Horizontal – 10 plates each, 8,100 kg/24 h each cabinet
Total Daily Freezing Capacity	≈ 46 tonnes/day

Tunnel Compressors (×2)	Mycom 160 VLD – 132 kW (180 CV) each, 2,950 rpm
Hold Compressor (×1)	Mycom 160 VSD – 90 kW (125 CV), 2,950 rpm
Hold Storage Temperature	-25°C
Cooling Fluid	Sea water condensers
Refrigerant Pumps (tunnels)	2 × WITT GP-51 @ 1,450 rpm, 4 kW each
Gambuza (stores) Compressors (×2)	Bitzer Hi-series – 1.5 kW each, R-404A, -25°C evap.
Air Conditioning (climatisation)	1 × unit, 32,508 Kcal/h (37.8 kW), 4,200 m^3/h
10. Fishing Equipment & Deck Machinery	
Fishing System	Stern trawling (arrastre por popa)
Main Trawl Winches (×2)	Rapp Hydema – 30.7 t traction, 3,000 m cable × Ø28 mm
Trawl Door Lines (malletas) – Double (×1)	Rapp Hydema – 2 × 16.2 t @ 37 m/min
Trawl Door Lines (malletas) – Simple (×2)	Rapp Hydema – same spec as double unit
Net Drum (×1, double independent)	Rapp Hydema – 2 × 24.9 t (empty), capacity 16 m^3
Lantern Winches (×2)	Rapp Hydema – 19.7 t @ 30 m/min
Cod-end Winches (×2)	Rapp Hydema – 13.2 t @ 45 m/min
Cod-end Release Winch (×1)	Rapp Hydema – 7.5 t @ 25 m/min
Hydraulic Power Units	6 × Denison pumps – 4 × 130 kW + 2 × 150 kW – 230 bar
Stern Trawl Blocks (×2 + 1 future)	CARRAL Series 213 No.4 – hydraulically positioned on stern gantry
Deck Cranes (×2)	TOIMIL T15000/4 (stern) and TOIMIL T7000/3 (bow)

Anchor Windlass	Electric, 2 × capstans, 20 CV motor, 1,500 rpm
Mooring Winch (×1)	Electric, 1,500 kg pull, 2 capstans, 15 CV motor
Anchors (×2)	≈ 1,140 kg each
Anchor Chain	2 × 385 m, Ø30 mm, Type Q2 with KENTER shackles
11. Navigation & Communication Equipment (Owner Supplied)	
Radars (×2)	96-nautical-mile range – brand TBD by owner
Echo Sounders / Fish Finders (×2 colour)	Brand TBD by owner
GPS Units (×2)	Brand TBD by owner
Autopilot (×1)	Brand TBD by owner
Chart Plotter (×1)	Brand TBD by owner
MF/HF Radiotelephone (×1)	250 W transmitter – brand TBD by owner
VHF Radiotelephones (×2)	Brand TBD by owner
Emergency Position Indicating Radio Beacon (EPIRB)	Owner-supplied
Electromagnetic Speed Log (×1)	Brand TBD by owner
Mandatory Watch Receiver (2,182 kHz)	Brand TBD by owner
Gyrocompass Repeater	Local servo room unit – included in radio/navigation package
Internal PA / Intercom System	Bridge to trawl winch area, tween deck and trawl doors
Engine Room Telegraph	Electric – bridge to engine room, optical + acoustic signal

12. Safety & Life Saving Equipment	
Rescue Boat	1 × unsinkable rigid inflatable (ZODIAC-NARVAL or equivalent) + outboard motor
Life Rafts (×4)	RFD / DUARRY – 16 persons each, SOLAS Pack A, with stainless steel cradles
Life Rings with Auto-Light (×3)	Including 2 with smoke signal
Life Rings with Heaving Line (×3)	30 m line each
Life Jackets	1 per crew member + 20% reserve (in stainless steel deck locker)
Parachute Rocket Flares	12 units (red light)
Smoke Floats	2 units
SART Transponders (×2)	One per side
Immersion Suits	1 per rescue boat crew member (3 suits)
13. Onboard Monitoring System – SMART4SEA Integration	
Fuel Monitoring System	ARGOS – real-time vessel monitoring platform (Coriolis flow meters)

Table 11 - Main Equipment Installed Onboard the Vessel "COSTA DO CABO"

4.2. O ORIENTE – PURSE SEINER

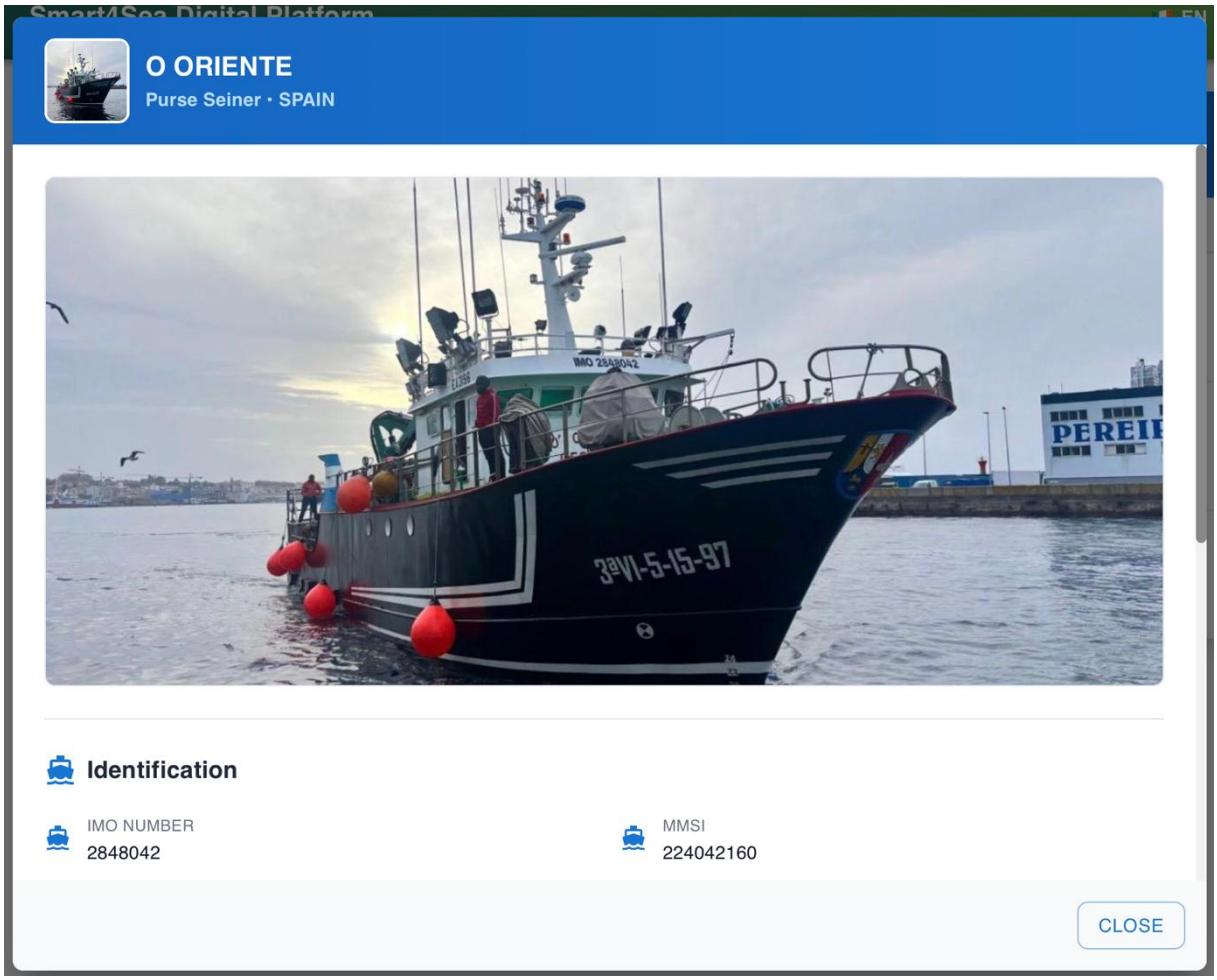


Figure 5 - O ORIENTE

Main Equipment Installed Onboard the Vessel "O ORIENTE"			
Equipment	**Brand**	**Model**	**Serial Number**
Main Engine	Mitsubishi	SGR-MPT-2A	13815
Gearbox	ZF	BW-191-2	AM142/2
Auxiliary Engine	Diter	TD 229/6	E229-6-02098
Alternator	Stanford	UCD-224 D311	C078030/02
Crane	Guerra	11090M3	C2373
Liferaft	RCD	Survival	2042500300008
Liferaft	RCD	Survival	2042500300012
Autopilot	Furuno	FR-8111	—
Radar	Furuno	FR-8111	3332-0738

Table 12 - Main Equipment Installed Onboard the Vessel "O ORIENTE"

4.3. PESCABERBES TRES – TRAWLER



Figure 6 - PESCABERBES TRES

Main Equipment Installed Onboard the Vessel "PESCABERBES TRES"				
Equipment	**Brand**	**Model**	**Serial Number**	**Notes**
Galley Cooker	Buraglia	CPE/80 c.1	—	Power: 10.5 kW
Washing Machine	Fagor	LC-E 7S	—	Power: 6.3 kW
Bilge & Fire Pumps (2 units)	Azcue	CA-50/7	—	7.5 HP each
Main Engine Lubrication Pump	Azcue	BT-IL-70D2	—	15 HP
Main Engine Crankcase Drain Pump	Azcue	BT-IL-70D2	—	15 HP
Diesel Transfer Pump	Azcue	BT-IL-45D2	—	3 HP
Fish Hold Grinder Pumps (2 units)	Azcue	VRX 50/17	—	2 HP each
Waste Oil Tank Pump	Azcue	1YE	—	1 HP
Main Engine Cooling Pump	Azcue	MN 40/125	—	5.5 HP
Sanitary Pumps (2 units)	Azcue	BO 31/20	—	3 HP each
Engine Room Ventilators (2 units)	Letag	AHT450.21	—	10,000 m^3/h – 4 HP
Galley Ventilator	Letag	AHT250.20	—	1,500 m^3/h – 0.5 HP
Toilet Ventilators (2 units)	Letag	AHT250.20	—	1,500 m^3/h – 0.5 HP
Auxiliary Engine Room Ventilator	Tecnisa	—	—	Engine room auxiliary ventilation
Fresh Water Generator	—	Reverse Osmosis System	—	Capacity: 3 t/day – 2.7 kW
Fuel Purifier	Alfa Laval	MAB-103 B-24	—	Capacity: 1150 l/h – 1 HP
Fishing Winch	T. Carral	—	—	Fishing deck machinery

Anchor Windlass	T. Carral	—	—	Power: 12.5 HP
Net Drum Winch	T. Carral	Hydraulic	—	Power: 30 HP
Deck Winch	Electric	—	—	Power: 10 HP
Main Engine	A.B.C.	6DZC-500	—	Propulsion engine
Auxiliary Generator Sets (2 units)	Volvo-Penta	—	—	247 kW each
Alternators (2 units)	—	—	—	210 kVA each
Ward Leonard System	—	—	—	DC motor 275 HP + 220 kW generator
Cold Storage Compressors (2 units)	—	—	—	3 HP each (gambuzas)
Freezing Tunnel Compressor	—	—	—	30 HP
Ice Generator / Hold Compressor	—	—	—	40 HP
Electric Water Heaters (2 units)	—	—	—	50 L and 100 L
UV Sterilizer	—	—	—	Water sterilization system
Air Compressors (2 units)	A.B.C.	VA-30	—	4 HP each
MF/HF Radiotelephone	Skanti	TRP-1251SD1	—	250 W transmitter
MF Antenna	Comrod	AT-82	—	External antenna
DSC Antenna	Comrod	AR42	—	DSC receiver antenna
VHF Radiotelephone	Skanti	1000	—	25 W
NAVTEX Receiver	ICS	NAV.5	—	Navigation message reception
Radar Transponder	McMurdo	RT.9	—	Bridge installation

Satellite Radio Beacon	McMurdo	E3	—	Emergency beacon
Portable VHF Radio	Navico	AXIS.30GMDSS	—	Emergency lithium battery
Portable VHF Radio	Navico	AXIS.250GMDSS	—	Rechargeable battery + charger
Installation Materials Set	—	—	—	Installation accessories

Table 13 - Main Equipment Installed Onboard the Vessel "PESCABERBES TRES"

Additional data concerning fishing gear usage and maintenance activities will also be considered and recorded within the Smart4Sea platform.

ARVI shared several reference documents related to the three vessels, including vessel technical specifications, onboard equipment inventories, fishing gear maintenance and repair plans, and detailed information on the digital fuel monitoring systems installed on the two larger vessels.

Based on this framework, BITCLIQ plans to develop a vessel registry system that will support the creation of an integrated database populated through external APIs (including AIS data sources) and existing vessel monitoring systems, as well as automated data import and validation mechanisms whenever feasible. These datasets will be made available to project partners and will support the automated calculation of key project indicators to be displayed in the SMART4SEA platform dashboard.

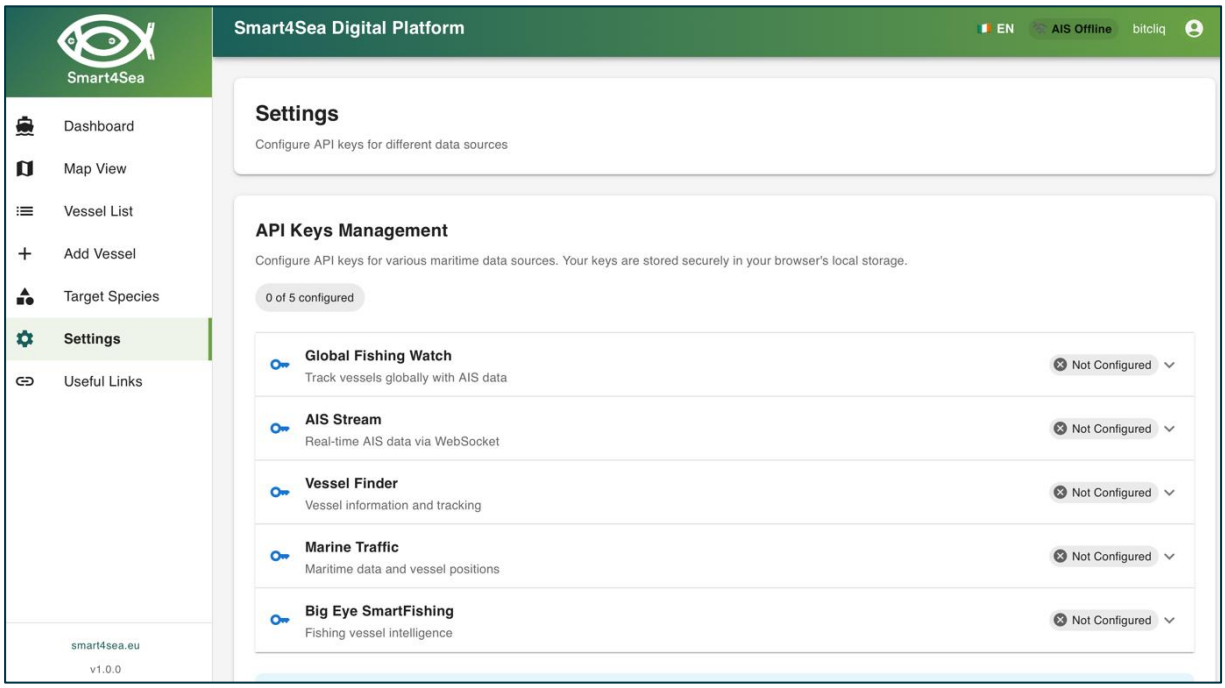


Figure 7 - SMART4SEA Digital Platform External Data Sources And APIs

5. NEXT STEPS

In future project iterations and upcoming activities, additional data sources may be incorporated to ensure full coverage of project indicators that are not yet fully supported by the currently identified data streams.

Further work will focus on refining the vessel data acquisition framework through the integration of complementary onboard and external data sources, including operational records, monitoring systems, and third-party datasets where available. This process will contribute to improving data completeness, reliability, and interoperability within the **SMART4SEA platform**.

In parallel, the feasibility of introducing additional automated data collection mechanisms will be evaluated, taking into account vessel-specific technological constraints and operational conditions. Where appropriate, lightweight ICT enhancements may be considered to support the progressive implementation of traceability indicators across the pilot vessels.

These steps will support the continuous improvement of the vessel digital readiness framework and ensure alignment with the traceability objectives defined by the SMART4SEA project.

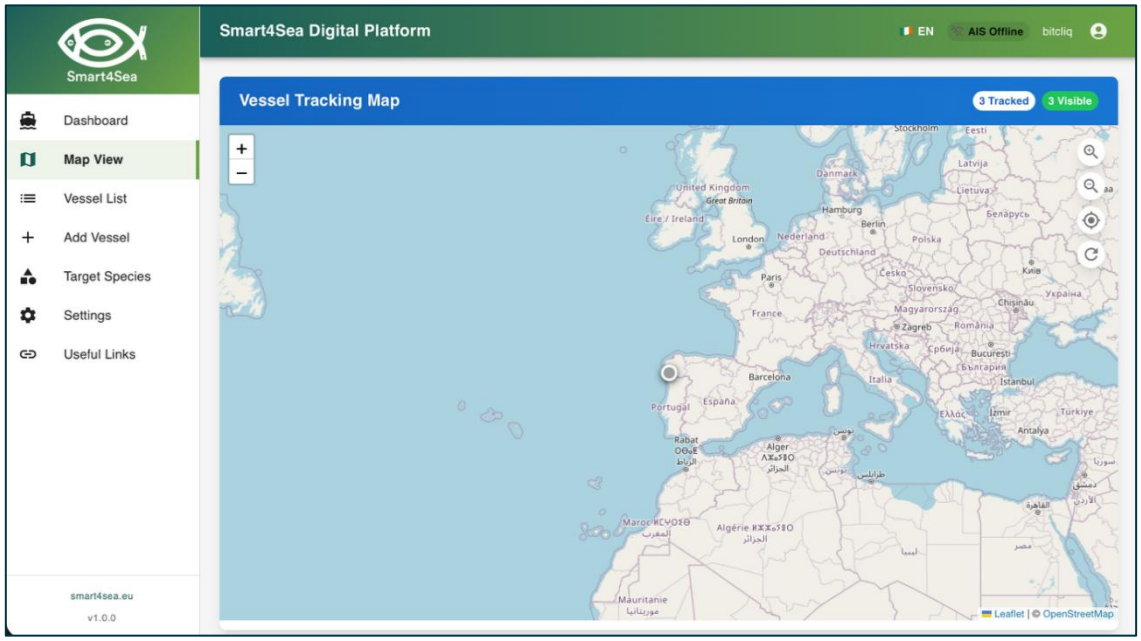


Figure 8 - SMART4SEA Digital Platform Vessel Tracking Maps

To validate the concept and the data that the platform is expected to address, during the last meeting held in February in Vigo, BITCLIQ presented an initial version of the data collection platform. This version enables the creation and characterization of each vessel profile, the configuration of external data sources via API, the characterization of captured species and their association with the project vessels, as well as the visualization of vessel positions and routes through AIS. It also includes a dashboard with several KPIs, through which the system will be able to provide relevant information to all project partners, according to the available sources and data collected. Additional indicators and algorithms may be defined by the partners for calculation and subsequent presentation within the platform.

6. DETAILS OF THE PARTNERS INVOLVED IN THE ACTIVITY

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