2nd Interim report: Implementation plan of the IOTC VMS Pilot Project

AN INDIAN OCEAN TUNA COMMISSION PILOT PROJECT ON VESSEL MONITORING SYSTEM

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I. Executive Summary

The **IOTC VMS Pilot Project** aims to enhance fisheries monitoring, compliance, and data-sharing efficiency across the Indian Ocean region. This **2nd Interim Report** outlines the implementation plan, budget estimation, and key technical and operational requirements necessary to establish a functional **Vessel Monitoring System (VMS)** under the **framework of IOTC VMS Pilot Project.**

The project explores **two reporting models—Shared Decentralized and Partially Centralized**, to evaluate the most effective approach for real-time data collection and secure data management. A strong emphasis is placed on **regional cooperation**, **data security**, and **system interoperability** to align with international best practices.

The implementation plan follows a **structured three-phase approach**:

- **Pre-bidding Phase (6 to 12 months):** Establishing regulatory compliance, governance, technical specifications, and bidding documentation.
- **Bidding Phase (3 months):** Tender publication, bid evaluation, and vendor selection.
- **Implementation & Commissioning (6 to 9 months):** System setup, integration, testing, and training and commissioning of the Pilot Platform.

The **budget proposal** considers essential cost components such as:

- **Cloud-based infrastructure** to optimize costs and ensure reliability.
- **System customization & third systems interconnections**.
- **Dedicated staffing**, including a **VMS System Operator (1 FTE)** and partial time allocation for a **Compliance Manager**.
- **Communication costs**, based on estimated **VMS position reporting rates** and vessel participation scenarios (50 to 100 vessels).

The pilot project is designed to be **operational for two years**, following an implementation timeline of **1.5 years**. The outcomes of this pilot will provide a critical foundation for the full deployment of the **IOTC Regional VMS**, ensuring improved fisheries monitoring, enhanced compliance enforcement, and efficient data exchange among participating **CPCs, MCSPs, and the IOTC Secretariat**. This phased approach will facilitate a structured transition toward a fully operational regional VMS.

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II. Study outcomes to date

1. Introduction

The 1st Interim Report on the IOTC VMS Pilot Project outlines a comprehensive strategy for establishing a regional VMS Pilot System to enhance fisheries governance and address illegal, unreported, and unregulated (IUU) fishing. It highlights the vital role of improved monitoring, compliance, and regional collaboration in ensuring the sustainable management of tuna and tuna-like species in the Indian Ocean.

The pilot project aims to evaluate two reporting approaches—shared decentralized and partially centralized systems—while prioritizing real-time data collection, secure data management, and seamless system interoperability. The report emphasizes the importance of adhering to international standards, fostering regional collaboration, and implementing strong data security measures through scalable, cloud-based infrastructure.

This initiative seeks to bolster enforcement capabilities, facilitate efficient data sharing, and harmonize practices for sustainable fisheries management. It stresses the significance of stakeholder participation, with clearly defined roles and responsibilities. Additionally, the report advocates for structured operational frameworks, specialized training programs, and continuous improvement mechanisms to ensure the project's success. The results of this initiative will establish critical benchmarks and serve as a foundation for developing an advanced Regional VMS System in the Indian Ocean.

Before presenting the implementation plan milestones, it is important to emphasize bullet points below as a key success factor to launch this VMS Pilot Project.

2. VMS panorama in Indian Ocean region and Regional Cooperation framework

2.1   CPCs National VMS Overview

The IOTC area of expertise encompasses diverse Contracting Parties and Cooperating Non-Contracting Parties (CPCs) with varying levels of VMS adoption and implementation. While most CPCs maintain operational Fisheries Monitoring Centers (FMCs) and VMS infrastructure, significant variability exists in data sharing practices and technical capabilities.

Key highlights of CPCs' national VMS:

- **Operational FMCs**: All surveyed CPCs (**analysis of the VMS_Adoption&Report_SP_CoC22cq_en_-CoC228-82025Assessment for each CPC**) report having established and functional FMCs, indicating a baseline capacity for vessel monitoring and compliance.

- **Diverse VMS Technologies**: Satellite communication systems such as Inmarsat, Iridium, Orbcomm, and Global Star are widely utilized, underscoring the need for a flexible regional VMS that supports interoperability.

- **Reporting Intervals**: While most CPCs transmit data at a higher interval rate than the one required by IOTC Resolution 15/03, there is room for improvement to achieve near real-time reporting in accordance with the proposed amendments of Resolution 15/03.

- **High Compliance Rates**: Over 70% of vessels ≥24m LOA and 75% of vessels <24m LOA operating beyond EEZs are already equipped with satellite VMS, offering a solid foundation for regional implementation.

- **Manual Reporting Procedure**: Almost all CPCs (90% of CPCs) have established a manual procedure to report VMS information if MTU technical failure occurs. This ensures the reliability of the VMS data transmission to IOTC and demonstrates a solid regional cooperation framework. However, with a level of compliance of 55% among CPCs in relation to the manual reporting rate, the level of compliance show there is a quite significant area for improvement in order to bolster the IOTC regional cooperation framework.

2.2 The Baseline offered by the IOTC Resolution 15/03

As seen above, IOTC Resolution 15/03 establishes a baseline framework for VMS data collection and exchange to strengthen regional cooperation and ensure effective monitoring of fishing activities. Regional cooperation frameworks play a pivotal role in harmonizing VMS practices across the Indian Ocean. However, challenges persist, such as inconsistent standards, limited data sharing agreements, and varying enforcement capabilities among CPCs. The IOTC VMS Pilot Project seeks to address these gaps by promoting standardized protocols, fostering mutual trust, and encouraging joint monitoring efforts among CPCs.

3. Reporting models and Technical Framework

As presented in the 1st Interim report (**refer to B.II.3.3.3 RFMOs Regional VMS benchmark & C.I.2.2.1 System design**), three reporting models were evaluated to determine the feasibility and operational efficiency for a regional VMS system.

3.1 Reporting methods

- **Shared Decentralized**: In this model, VMS data is collected and managed by CPCs and shared with the IOTC Secretariat under defined protocols. This approach leverages existing CPC systems but requires rigorous data-sharing agreements and interoperability mechanisms.
- **Partially Centralized**: In this model, VMS data is transmitted directly from Mobile Communication Service Providers (MCSPs) to the IOTC Secretariat. This allows for real-time data transmission and centralized oversight but demands higher initial investment in infrastructure and data security measures.
- **Hybrid Reporting model**: This optimized approach combines elements of both shared decentralized and partially centralized models. It allows CPCs to manage and transmit data where existing FMC systems are robust while simultaneously enabling direct transmission from MCSPs in cases where CPC systems are less developed. Key benefits of the hybrid model include:
    - **Flexibility**: Adapts to the varying capabilities of CPCs, ensuring broader participation.
    - **Efficiency**: Balances real-time monitoring with the use of existing national systems, reducing implementation costs.
    - **Scalability**: Provides a framework that can evolve as CPC capabilities improve and more vessels are included.

All three models emphasize key technical components.

3.2 Technical framework

Below are crucial technical highlights that define the technical scope of the Pilot project and the design of the system.

- **Data Collection and Transmission**: Real-time and near-real-time data reporting mechanisms, with mandatory fields such as vessel ID, positional data, speed, course, and event codes.
- **Interoperability**: Ensuring compatibility with diverse CPC systems and legacy MTUs (e.g., Inmarsat, Iridium), allowing seamless integration across various technologies.
- **Data Security**: Implementing role-based access controls, encryption protocols for data routing (TLS 1.2 as a minimum standard), and ensuring that the **cloud hosting environment** complies with ISO-certified governance standards. This guarantees data confidentiality and integrity within the cloud-based infrastructure.
- **Data Distribution**: Providing secure mechanisms for sharing VMS data between CPCs, the IOTC Secretariat, and other authorized stakeholders. Role-based filtering ensures tailored access, and APIs facilitate real-time or near real-time data sharing.
- **User Interface**: A user-centric design ensures intuitive dashboards, interactive mapping tools, and customizable views, enabling stakeholders to effectively monitor vessel activities.
- **Data Processing**: Robust analytics and event processing tools support geofencing, anomaly detection, and alert generation for improved decision-making.
- **Data Storage**: Scalable and secure storage infrastructure ensures redundancy, data integrity, and compliance with data retention policies for at least two years.

4. Stakeholders Engagement

The success of the IOTC VMS Pilot Project relies heavily on the active participation and collaboration of various stakeholders, including Volunteer CPCs, the IOTC Secretariat, the VMS Working Group, MCSP operators, vessels operator and technical partners. Engagement efforts to date have yielded several insights and key contributions:

- **Volunteer CPC Participation**: **Australia**, **Seychelles**, and the **Philippines** have confirmed their commitment to the pilot project. These CPCs represent diverse fisheries management capacities, providing a good start for testing VMS Pilot system in operational contexts.

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- **Stakeholder Roles and Responsibilities**: Clear roles have been defined to ensure effective implementation:
    - o **The IOTC Secretariat** oversees project coordination, data governance, and compliance monitoring.
    - o **The VMS Working Group** provides expert recommendations on technical and operational matters, ensuring alignment with the project's objectives.
    - o **Volunteer CPCs** ensure vessels comply with reporting requirements, address technical issues, and provide feedback on the system's performance. Volunteer CPCs that will opt for the Shared Decentralized reporting method option will also route VMS data to IOTC VMS Pilot Platform according Data distribution rules and information-sharing agreements.
    - o **Mobile Communication Service Providers (MCSPs)** are responsible for data transmission to Volunteer CPCs or depending on reporting method, directly to IOTC VMS Pilot Platform. MCSPs will also be responsible for troubleshooting technical challenges for its communication segment.
    - o **Technical partners** will play a pivotal role in the project's success by providing expertise in system design, integration, implementation, and capacity building. Their contributions ensure technological robustness and scalability throughout the project lifecycle. Additionally, during the pilot testing period, they are responsible for operational maintenance, addressing technical challenges, and guaranteeing interoperability with third-party systems, including APIs, communication protocols, and data formats, to facilitate seamless data exchange and collaboration.
    - o **Vessel operators** maintain VMS devices, submit manual reports during technical failures, and follow compliance protocols. Vessels targeted for the pilot project shall be the ones pointed out in the IOTC resolution 15/03.

5. Recommendations to ensure IOTC VMS Pilot Project success

To achieve the desired outcomes and maximize the impact of the IOTC VMS Pilot Project, a series of strategic recommendations have been identified. These recommendations aim to address operational, technical, and cooperative challenges while setting a foundation for long-term success and scalability.

- **Establish Robust Data-Sharing Agreements**

    o Develop comprehensive Information Sharing Agreements (ISAs) and Standard Operating Procedures (SOPs) to ensure clear, legally binding frameworks for regional cooperation.

    o Enhance the IOTC Resolution 15/03 to strengthen its provisions on data security, confidentiality, and sharing protocols to align with the pilot's objectives.

- **Expand Participation with Additional Volunteer CPCs**

    o Engage with more Contracting Parties (CPCs) to volunteer for the pilot project.

    o An increased sample size will provide a greater diversity of feedback and allow for a more comprehensive assessment of system performance and scalability.

- **Prioritize Scalable Cloud-Based Solutions**

    o Adopt scalable cloud-based architectures to ensure system reliability, high availability, and performance.

    o Leveraging cloud solutions will enhance the feasibility of the project while optimizing costs and enabling future expansion.

- **Define Core Functionalities for the Pilot Phase**

    o Focus on implementing essential functionalities to maintain an off-the-shelf system approach and optimize the budget.

    o Evaluate the scalability of the system and the technical capacity of the selected partner to ensure the project can transition seamlessly from the pilot phase to full production.

- **Harmonization of Data Formats and Exchange Protocols**
    - Standardize data formats such as NAF, XML, JSON, and FLUX P1007 to ensure interoperability between systems.
    - Align data-sharing protocols with international standards like HTTPS, RESTful APIs, and SOAP for secure and seamless communication.
    - Establish a uniform framework for data exchange to enhance consistency and reduce technical integration challenges among stakeholders.

- **Emphasize Training and Technical Support**
    - Provide tailored training programs and continuous technical support to all stakeholders, including the IOTC Secretariat, Volunteer CPCs, and VMS operators.

- **Implement Operational Feedback Mechanisms and KPIs**
    - Regularly consult with stakeholders to validate the alignment of the pilot's scope and objectives.
    - Define and monitor Key Performance Indicators (KPIs), such as data accuracy, system uptime, and reporting consistency, to track progress and identify areas for improvement.

III. Detailed Implementation Plan

1. Operation, Maintenance, and Support Requirements

1.1   Operational Framework

The operational tasks for the VMS Pilot system will be managed by the IOTC Secretariat, guided by a comprehensive set of Standard Operating Procedures (**SOPs**) as recommended in the 1st Interim Report (**referenced in Section D: Recommendations of Standard Operating Procedures**). These SOPs are essential tools that must be evaluated, assessed, and applied by the IOTC to align with the enhanced IOTC Resolution 15/03 and Resolution 12/02. Particular emphasis must be placed on strengthening the administrative and legal frameworks to establish clear rules for data sharing through the development of an Information Sharing Agreement (ISA). Furthermore, to ensure data security and confidentiality, the IOTC Secretariat should finalize and implement Memorandums of Understanding (**MOUs**) and Non-Disclosure Agreements (**NDAs**) as legal safeguards with the Volunteer CPCs and any other stakeholder that may have access to the VMS data in the frame of this Pilot Project.

Given the early stage of the project, the SOPs need to remain flexible to accommodate updates and amendments to existing documentation and agreements, such as Resolution 15/03. This flexibility ensures adaptability as the framework evolves.

The operational tasks for the VMS Pilot system will be managed by the IOTC Secretariat following a set of comprehensive Standard Operating Procedures (SOPs). These SOPs, which are tailored to ensure seamless operation and compliance with IOTC Resolutions and CMMs, will be shared as part of the training process.

Key operational principles shall include:

- **Accountability and Reporting**: Every task undertaken by the Secretariat will be documented, traceable, and reported in regular compliance updates to the relevant oversight body. (could be the compliance officer or/and the VMS Working Group)
- **Process Standardization**: Streamline data collection, reporting, and management for consistent and reliable operations between Volunteer CPCs and the IOTC Secretariat.

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- **System Administration**: The Secretariat will oversee system updates and upgrades operated by the technical partner (**The Contractor**). The IOTC Secretariat or its designated VMS operators will manage the System daily operations such as the monitoring routine and operational criteria, the records modification once authorized by the system and the System Database population.

- **Data Administration**: The IOTC Secretariat will be responsible of the VMS data consistency and security. Its designated VMS operators will take care of the Pilot System database population such as registering new vessels and migrating Non dynamic Data from the **RAV file** for vessels flying Volunteer CPCs flag. A proposed set of Non-Dynamic Data set has been presented in the 1st Interim Report (**referenced in section C. 2.2.2 Declarative Data).** In the frame of this Pilot Project and to avoid too much complexity, arbitration of data fields may be done in the early stage of project implementation considering only essential information and discarding the remaining ones to later stage.

- **Information Sharing and Data Security**: Implement an Information Sharing Agreement to govern VMS data access, ensuring data confidentiality, secure transmission, and controlled dissemination among Volunteer CPCs and the IOTC Secretariat. Establish clear governance to ensure data integrity and availability through robust access controls and security protocols.

- **Testing Technical Scenarios**: SOPs shall be designed to oversee the testing of the different scenarios mentioned in the 1st Interim report.

- **Enhancement Feedback**: The Pilot System users will contribute to ongoing system optimization by recording observations and offering constructive feedback based on day-to-day usage. This feedback will promote the continuous improvement of this Pilot Project and update SOPs to adapt to evolving needs and requirements.

- **Ease of Adoption**: The SOPs shall be designed to be intuitive and straightforward, requiring only basic technical literacy. Learning will primarily occur through the daily use of the Pilot System starting right after the training sessions.

- **Communication Channels**: Pro-active Interaction with the **Contractor's Maintenance and Support team** will occur through standardized platforms like email and ticketing systems, ensuring professional and effective communication in English.

1.2   Maintenance and Support Responsibilities

The selected Contractor will be fully responsible for ensuring the VMS platform remains operational and addressing any issues encountered by IOTC VMS operators and any additional user. The IOTC Secretariat will focus exclusively on operational use and shall commit to report any operational failure and downtime as soon as it is detected but will not be engaged in direct technical maintenance.

A Maintenance and Support contract will be signed between the IOTC secretariat and the Contractor to address these issues. This contract will cover the following items:
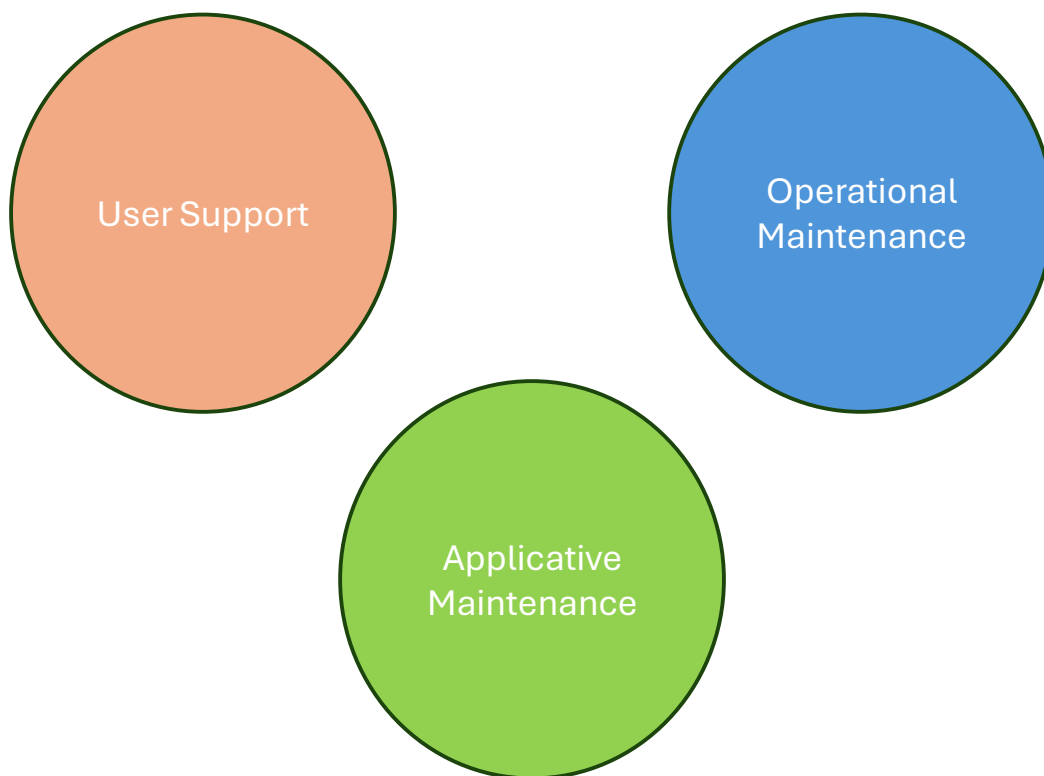

Figure 1: The Maintenance triptych.

1.2.1   User Support

- **First-Level Support:** The Contractor's customer service team will handle initial inquiries from operators, addressing routine issues such as missing or incorrect vessel data in reports, improper configuration or usage of system settings and features, or technical errors affecting system performance. A structured ticketing system will track requests, ensuring timely responses for urgent and non-urgent matters based on predefined service timelines.

- **Second-Level Support**: For advanced or unusual technical challenges, the Contractor's specialized technicians will intervene. Examples include troubleshooting system integration issues or resolving errors caused by external systems. In cases where the issue lies with external Member systems, the Contractor will provide detailed technical documentation to guide the resolution process. The Contractor shall even liaise directly with third parties such Volunteer CPC FMC system technical team or MCSP to resolve connection and data distribution issues.

- **Availability of Support**: Support hours will align with the IOTC Secretariat's operational schedule or be adapted to suit both parties, ensuring issues are addressed promptly and efficiently.

1.2.2   Operational Maintenance

- The Contractor is tasked with ensuring the platform operates seamlessly, with preventive monitoring and scheduled updates to minimize interruptions.

- Activities such as infrastructure upgrades, system performance checks, and routine supervision are handled entirely by the Contractor's technical team.

- **System Availability**: The VMS platform must maintain a high availability rate of 99.5% to ensure continuous operation and reliability. Any scheduled downtime for maintenance must be planned and communicated to the IOTC Secretariat to minimize disruptions. Emergency downtime must be resolved within the agreed service level timelines to maintain system accessibility and performance.

1.2.3 Applicative Maintenance

- **Issue Management**:
    - Minor issues that do not affect system functionality will primarily be resolved as part of regular updates to the platform. However, if a minor issue arises between scheduled updates and requires attention, it will be addressed within the non-critical SLA timeframe of 3 working days to ensure flexibility and responsiveness.
    - Critical problems requiring immediate attention will be escalated for urgent resolution, with interim solutions implemented to maintain system operations while permanent fixes are developed.
- **Service Level Agreement (SLA)**:
    - The SLA will define critical performance metrics, including response times for issue resolution, system uptime targets (99.5%), and acceptable timeframes for resolving critical and non-critical issues.
    - Non-critical issues will be resolved within 3 working days, while critical issues will be addressed within 1 working days.

1.2.4 Hardware Maintenance

- The Contractor will be fully responsible for overseeing and coordinating with the hosting company managing the VMS platform's infrastructure. This includes ensuring reliable operation, performing necessary maintenance, and addressing any hosting-related issues in alignment with the agreed service levels.
- While the Contractor supervises the hosting company, it will not directly manage the hardware located at the IOTC Secretariat.
- The only hardware present at the IOTC Secretariat consists of standard computers used for system access and internet network infrastructure. The Contractor will provide support and guidance for using the VMS platform on these devices; however, the maintenance and servicing of these computers will remain the responsibility of the Secretariat, managed through their local IT provider.

2. Specifications of the functionalities for the IOTC VMS Pilot Project

In this section, the functionality and feature specifications required for the implementation of the IOTC VMS Pilot Project are detailed. This technical information is extracted from the 1st Interim Report for the Proposal, Design, and Requirements of the IOTC VMS Pilot Project. These specifications will support the IOTC Secretariat in launching the VMS Pilot Project tender and selecting the most suitable system provider.

For greater clarity, the following requirements are organized by thematic categories and assigned levels of requirement as follows:

- **Mandatory** (must-have).
- **Highly Desirable**.
- **Optional**.

The level of requirements presented afterwards can be modified by the IOTC Secretariat, keeping in mind that the proposal done here follows a cost optimization strategy for bringing value at cost tools and insights.

2.1   Data Collection and Transmission

No.	Requirement Description	Level of requirement
1	The VMS system shall support dual reporting methods: "**shared decentralized**" receiving data from National VMS systems and "**Partially centralized**" receiving data directly from the Mobile Communication Service Providers (**MCSPs**).	**Mandatory**

2	The VMS system shall receive in real-time and store in its Database the Dynamic Positioning Data transmitted either by Third Systems (National VMS connected to the Pilot VMS platform) or directly by Mobile Transmitter Unit (**MTU**) via the Mobile Communication Service Provider (MSCP) and containing at least following information:
	• **Message type** (Regular report, Manual report, event generated report, Response to poll report).
	• **Country Code / Flag State**.
	• MTU ID: ID of the VMS Transceiver.
	• **Vessel ID** (e.g. Radio Call Sign).
	• **Latitude and Longitude** coordinates in decimal
	• **Speed (in knots) and Course (in degrees)**.
	• **Date & Time in UTC of the position fix**.
	• **Event codes**: when the MTU enables it, the following event codes shall be received and treated by the VMS system:
	   o Power UP/DOWN.
	   o Antenna obstructed
	   o Intrusion/tampering detection
		Mandatory

	o Entry/exit zone	
3	In order to ensure high interoperability, the VMS system must support the following data formats (**NAF, XML, JSON, CSV**) using secure exchange protocols (**HTTPS, RESTful Apis, SOAP v1.2 with two-way SSL**).	**Mandatory**
4	The system shall enable the creation, management and importation of vessels, groups of vessels and geographic objects (zones and annotations) and store it directly into the system database.	**Mandatory**
5	The VMS system shall be capable of storing the Vessel Declarative data fields based on the IOTC Record Authorization Vessels in a relational database (**refer to appendix C.IOTC Record Authorization Vessels data fields**). The bidder must precise which data field is supported and which is not. [(1)]	**Highly Desirable**
6	The system shall support the automatic migration of vessel registry declarative data from the IOTC RAV file into the system database during the installation and configuration phase.	**Highly Desirable**
7	Additional Declarative data to be filled in the VMS system Database should be considered by the System Provider (**refer to appendix D. Additional Declarative dataset**).	**Optional**
8	The VMS system Database must associate the Dynamic Positioning Data retrieved automatically with the Declarative Dataset filled in the system database.	**Mandatory**
9	The VMS system must offer the possibility from its User Interface to insert manual position into the database in case of a failure of MTU communication.	**Mandatory**
10	Manual import of VMS dataset must be supported by the VMS system (in CSV format).	**Mandatory**
11	The VMS system shall enable data extract in CSV format for the Dynamic Positioning Data (VMS data)	**Mandatory**
12	According to the Partially centralized reporting method, The VMS system shall be able to poll and change the reporting frequency of MTUs by sending commands (when MTU device enables to do so) directly to the MCSP.	**Mandatory**

Table 1 : Data collection and transmission.

[(1)] *The list of IOTC RAV data fields shall be incorporated into the tender specifications with a Yes/No column for each field.*

2.2   Data Processing and Analytics

The IOTC VMS Pilot Project requires efficient and accurate data processing to ensure the reliability and usability of transmitted information. Below are the key functional requirements:

No.	Requirement Description	Level of requirement
13	Data consistency automatic check mechanisms are critical to ensure the reliability and integrity of Dynamic Positioning Data received and processed by the VMS system. Consequently, the system shall perform automated integrity checks including: • Positional data range validation for:	

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	o Latitude data value to be between – 90° and + 90° o Longitude data value -180° and + 180° o Speed value within 0-100 knots o Course value within 0° and 360°	**Highly Desirable**
14	The system shall detect anomalies such as duplicate records, unknown vessel data, and incomplete or inconsistent data points (**e.g. timestamp, vessel ID, geolocation coordinates...**) or incorrect formats.	**Mandatory**
15	The system must provide User/operator alerts such as: • MTU Technical alerts (**Power Up/down, GNSS Signal Lost, Antenna Blockage/obstructed, Tampering/intrusion detection**). • Geofencing Alerts (**Entering/exiting area, Speed in Zone).** • Position Report Overdue & Report too often.	**Mandatory**
16	The system must provide alarms such as: • Unknown reporting Vessel. • Data Consistency Alarm. • VMS data Distribution with third systems crashed down alarm (to monitor two-way data exchange with third systems.	**Mandatory**
17	**The system shall offer following Alert settings:** • Alerts can be shared with other user/operators • Alerts can be classified by level of severity (Emergency, only for guidance...). • Alerts can be configured according to seasonality period (active/inactive periods). • Alert triggered can be notified by email to recipients with possibility to add a message in the notification.	**Mandatory**
18	**The system shall offer Reporting and Visualization insights as follow:** • All Alerts raised shall be visualized in a Dashboard from where the operator will consult and treat these alerts with possibility to close it afterwards. • Alert Report exports shall be available (e.g. Excel) for operational reviews.	**Mandatory**

Table 2 : Data processing and analytics.

2.3   User Interface

The user interface of the IOTC VMS Pilot Project shall provide intuitive tools for real-time monitoring, vessel tracking, and geographic data management. Below are the key functional requirements:

No.	Requirement Description	Level of requirement
19	**Cross-Platform Web-based Interface:** • The system shall provide a fully responsive web-based Interface, designed to ensure seamless access and optimal performance across both desktop and mobile devices. • The web-based Interface shall be compatible with modern web browsers, including **Google Chrome**, **Mozilla Firefox**, and **Microsoft Edge**. • It must Support concurrent access by multiple users, ensuring real-time updates and operational consistency.	**Mandatory**
20	The system must provide, on an interactive GIS interface following VMS Data Visualization features: • Display of vessel trajectories for real-time monitoring and historical analysis. • Display last positional data as icons on navigational charts. • Display vessel labels together with the positional data. • Display trajectories with color-coding based on speed. • Arrow indicators to highlight direction of vessels. • Dynamic clustering of vessels icons feature for improved visualization at different zoom levels.	**Mandatory**
21	The system shall offer the following Basic tools: • Include options to zoom in/out and pan across charts. • Drawing tools directly available from the map for Geographical Objects (zone/ annotations) creation. • Measurement tool to calculate distances on the map. • Enable a Full screen option for the map display • Support simultaneous display of map windows to support comparative analysis.	**Mandatory**
22	The system shall allow filtering and display of data according to: • Date ranges (**e.g., last X days, between two dates**). • Vessel or group of vessels. • Vessel speed. • Zones.	**Mandatory**

23	The system will be able to provide the following advanced tools:
	
	• Estimated Time Arrival (ETA) Calculation:
	
	    o Estimate arrival times based on vessel positions, speed, and course directly drawn on the map.
	
	• Tracking Replay:
	
	    o Replay vessel trajectories for historical analysis and compliance reviews.
	
	    o Density Maps (heatmaps): Visualize vessel presence density on the map over a specified timeframe.
		Highly desirable

24	The system allow users to customize vessels and vessel group icons and style, as well as vessel trajectories.	**Mandatory**
25	**Map and Layer Management.** These specifications below are the minimum requirements needed for monitoring Vessel activities within the IOTC area of competence: • Display data marine charts (e.g. **C-map**) covering waters under IOTC governance. (**FAO statistical areas 51 and 57**) • Base maps with global and regional overviews. • Comply with **WGS84** geodetic standards for positional accuracy. • Incorporate additional layers like **Open Street map** and **Google maps**. • Include layers for day/night limits, date and time and graticule grids.	**Mandatory**

26	**Geographical Objects (GO) Management:**
	• Create and manage geographical objects interactively:
	
	    o By drawing directly on the map using Line, Circle and polygons tools.
	
	    o Entering positions and parameters directly in a management interface.
	
	    o Importing predefined geographic areas in formats such as **Shapefiles**
	
	• Integrate **GO** with Alerts to monitor vessel movements and compliance.
	
	• Enable operators to share the **GO** creation with other Users.
		Mandatory

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27	**EEZ and boundaries:** • The VMS system provider shall import and define in the map interface all IOTC CPCs EEZ.	**Mandatory**
28	**Remote Access to Web-based Interface:** • **The Remote Web Interface** shall support real-time and secure access to the VMS Pilot system • **The web interface** will use HTTPS for secure access to the VMS system. • **Authentication mechanism** (Login/password as a minimum) to be provided by the VMS Pilot Platform to authenticate users and preserve Data confidentiality. • **Automatic logout and Password change** requirements after a certain period of time to enhance Data security access.	**Mandatory**

29	**Role-based Accounts.**
	
	 • The VMS system shall support the creation of role-based accounts with predefined roles, including Administrator, Operator and Viewer.
	 • Data access right restrictions shall be available according to the following criteria:
	  ○ By vessel, fleet, CPC Flag
	  ○ By area (EEZ, specific zone)
	  ○ By time range
		Mandatory

Table 3 : User interface.

2.4   VMS Data exchange and audit

No.	Requirement Description	Level of requirement
30	The system shall provide APIs (RESTful APIs and SOAP v1.2 with Two-Way SSL) to enable real-time data exchange with external systems, supporting NAF, JSON and XML formats for interoperability.	**Mandatory**
31	The system shall use secure communication protocols, including HTTPS (POST/GET), for real-time or near real-time data exchange.	**Mandatory**
32	The system shall handle standardized data formats, including NAF, XML, FLUX P1007, JSON, and CSV, for seamless integration and compatibility.	**Mandatory**

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33	The system shall provide role-based filtering, allowing tailored data access for stakeholders (e.g., flag states, CPCs, RFMOs) based on vessels, fleets, zones (e.g., EEZs), and timeframes.	**Mandatory**
34	The system shall implement strong encryption (TLS 1.3) for all transmissions, with TLS 1.2 fallback for legacy systems.	**Mandatory**
35	The system shall maintain audit trails by logging all data exchanges and deliveries for accountability and monitoring purposes.	**Mandatory**
36	The system shall include a login/logout audit tool to trace user account usage for enhanced security and accountability.	**Mandatory**
37	The system shall maintain audit trails for all modifications to vessels declarative data inputs in the database.	**Mandatory**

Table 4 : VMS Data exchange and audit.

2.5   Technical Specifications and System performance

No.	Requirement Description	Level of requirement
38	The system shall adopt a cloud-based architecture leveraging leading providers (e.g., AWS, Azure, GCP) to ensure scalability, resilience, and operational efficiency.	**Mandatory**
39	The cloud environment shall include automated backups with disaster recovery plan	**Mandatory**
40	The system shall handle a minimum of 100,000 transactions per day, support at least 100 concurrent users, and maintain data transmission latency under 5 minutes.	**Mandatory**
41	The database shall support storage for at least 1,000 vessels during the pilot phase, with scalability to handle 10 times more vessels post-pilot.	**Mandatory**
42	The system hosting architecture shall include a high-availability database cluster with multi-zone deployment and failover mechanisms to ensure data redundancy.	**Mandatory**
43	Data retention and archiving shall be supported for all the duration of the pilot i.e. minimum of 2 years.	**Mandatory**
44	All data transmissions and storage shall comply with international standards (e.g., ISO 27001, GDPR) to ensure data security and privacy.	**Highly desirable**

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No.	Requirement Description	Level of requirement
45	The system shall maintain an availability rate of 99.5% to ensure continuous and reliable operation during the pilot phase.	**Mandatory**

Table 5 : Technical specifications and system performance.

2.6   Training and documentation

No.	Requirement Description	Level of requirement
46	The VMS system implementation shall include tailored training programs for IOTC Secretariat (Administrator), VMS operators, and Volunteer CPCs (those who will participate to the pilot project) [1] based on their roles.	**Mandatory**
47	Training components shall include: • A general system overview session for all user profile (Admin/operator/Viewer) and for guidance for any other stakeholder which doesn't have direct action on the system: o General Overview of the System Components. o DataFlow. o Data sharing Protocol. [2] • A technical / administrator training session: o Technical support. o Initial set-up and Configuration. o Data Distribution connection and settings. o Role-based account Creation and management. o User role-based permissions. o Troubleshooting. • User Training session: o VMS Software usage for day-to-day operation. o User Interface features. o Software features and functionalities.	**Mandatory**
48	Training materials shall include as a minimum user manual, quick start guide and training presentation available in both English and French.	**Mandatory**
49	Training delivery methods shall include online webinars (for Volunteer CPCs) [3] and in-person workshops (for Administrator and Operators) including hands-on sessions.	**Mandatory**

50	Post-training evaluations shall assess participant readiness and identify gaps, with feedback collected to refine future training programs.	**Highly desirable**
51	Refresher training sessions shall be provided periodically to reinforce key concepts and address emerging challenges.	**Highly desirable**

Table 6 : Training and documentation.

[1] *When final list of Volunteer CPCs is edited, adjustments of this requirement should be realized.*
[2] *Data sharing Protocol shall be clearly presented and explained in bidding documents for VMS provider*
[3] *The IOTC Secretariat once the final list of Volunteer CPCs confirmed shall precise the number of Volunteer CPCs as well as the number of people to attend this online training session, this to let the VMS contractor determine how many online sessions should be proposed for ensuring good training conditions and efficient system knowledge transfer.*

3. Volunteer CPCs: VMS data, MTU devices and communication channels.

For the implementation of the IOTC VMS pilot Project, we have 3 volunteer CPCs accepting to participate in this project:

- **AUSTRALIA**
- **THE PHILIPPINES**
- **SEYCHELLES**

Therefore, the strategy is first to determine within which reporting methods those volunteers want to participate;

Option 2 "Share Decentralized", Option 3 "Partially Centralized" or both (hybrid reporting strategy).

3.1   Reporting methods

To date, we 've got feedback and inputs from AUSTRALIA. The remaining volunteers will have to give their input to consolidate the methodological approach for organizing this pilot regarding the reporting and the retrieve of the data.

- Volunteer CPCs choosing Option 2 "Shared decentralized": **To be confirmed**
- Volunteer CPCs choosing Option 3 "Partially Centralized": AUSTRALIA
- Volunteer CPCs choosing Hybrid reporting method: None*

* Due to the low number of volunteers, having CPC that is likely to participate according to the two reporting methods will compensate giving more feedback and insights.

The second step would be to define for each Volunteer CPCs the vessel sample that will be considered in the frame of this project.

3.2   Vessel sample

We will answer this question starting with the following postulates:

- Vessels targeted shall be the ones according to **IOTC Resolution 15/03**:
  - **Fishing Vessels ≥24m LOA**: All vessels flagged under Volunteer CPCs operating within and beyond their Exclusive Economic Zones (**EEZs**).
  - **Fishing Vessels <24m LOA operating beyond Exclusive Economic Zones (EEZs):** Smaller vessels operating on the high seas

- Vessels database to be considered tis the IOTC Record Authorization Vessel (RAV)
  - AUSTRALIA: up to **49 fishing vessels**
  - SEYCHELLES: up to **82 fishing vessels**
  - THE PHILIPPINES: no vessels declared in the RAV.

If the IOTC Secretariat and the VMS Working group decide to enlarge the vessels sample and approve the resolution 15/03 amendments, therefore the sample will be bigger.

After the vessels sample is finalized, the next step is to analyze the VMS technical details for each Volunteer CPCs.

3.3   VMS technical details

Based on presented methodology and to clarify coming technical challenges, a technical questionnaire has been created and administrated to Volunteer CPCs. This questionnaire has been presented and inserted in the 1st interim report.

Up to date, only AUSTRALIA answered to that questionnaire, and this generated following outputs:

3.3.1 Technical characteristics of the Australian VMS

MTUs approved in AUSTRALIA and used for the segment fleet under the scope of the VMS Pilot project:

MTUs	Communication Technologies
Skywave IDP-690	Orbcomm IsatDataPro
Skywave IDP ST 6100	Orbcomm IsatDataPro
Skywave IDP ST 9100	Orbcomm IsatDataPro
CLS TRITON ADVANCED	IRIDIUM SBD

Table 7 : Approved MTU list in AUSTRALIA.

As the decision to report VMS data under option 3 has been expressed, the IOTC VMS system will have to connect directly to MCSPs to retrieve the VMS data. Details of information regarding VMS data format and communication protocols were also gathered in the frame of the questionnaire administration.

- VMS Data Format supported by MCSPs operating in AUSTRALIA:
    - Data formats supported: Excel -csv / NAF / FLUX
    - Communication protocols supported: ftp /Https POST
    - Polling response capacity = YES

We can see that the VMS formats and the communication / messaging protocols are in line with the Specifications requirements mentioned in this implementation report.

- VMS Event codes data support by Australian MTUs:
    - **Power UP/DOWN - ANTENNA OBSTRUCTED**: all the MTU units mentioned above
    - **Intrusion - Zone ENTRY/EXIT**: Only Triton Advanced unit

- Polling feature: all the MTU units.

The same investigative work should be conducted with the other Volunteer CPCs. Additionally, it is essential to gather technical contacts from the Volunteer CPCs' FMCs and/or MCSPs in advance to ensure the necessary information is available before the tender is launched.

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4. Timeframe for implementation

The implementation of the IOTC VMS Pilot Project is structured into three key phases to ensure a systematic and efficient rollout. Each phase below is designed to address critical preparatory, procedural, and operational elements necessary for the project's success.

Main Phases :

- **Pre-bidding preparation phase:** This phase focuses on establishing the necessary foundations for the project, including defining requirements, ensuring regulatory compliance, and preparing essential documents to support a fair, clear and competitive bidding process.
- **Bidding phase:** During this phase, the tender process is executed, involving the publication of bidding documents, bidder clarifications, proposal evaluation, and the selection of the most qualified vendor based on predefined criteria.
- **Implementation and commissioning phase:** This final phase encompasses the setup, integration, and testing of the VMS system, ensuring all technical and operational aspects are fully functional before the system goes live, followed by ongoing monitoring and performance assessments.

4.1 Pre-bidding phase (6 to 12 months)

- **Define Project Requirements**: Finalize and validate project requirements and specifications.
- **Regulatory Compliance**: Approve and implement amendments to the IOTC Resolution 15/03.
- **Standard Operating Procedures**: Validate, draft and finalize the IOTC VMS Pilot project SOPs
- **Legal Framework**: Ensure the acceptance, drafting, and finalization of the ISA, NDA, and MoU framework, which must be formally established and signed between the IOTC Secretariat and Volunteer CPCs prior to the tender launch.
- **Governance Structure**: Establish a governance framework to define roles, responsibilities, and structured decision-making processes among stakeholders.
- **Tender Documentation**: Develop the bidding documents and evaluation criteria.
- **Bidder Identification**: Identify potential bidders.

4.2   Bidding Phase (approximately 3 months)

- **Tender Publication**: Publish the IOTC VMS Pilot project tender.
- **Clarification and Transparency**: Allow a 2-3 week period for clarification questions and set a firm deadline for the IOTC Secretariat to release clarification responses. (record and share all clarification responses transparently to ensure fairness).
- **Bid Evaluation**: Collect and evaluate proposals from bidders using a structured scoring system based on technical and financial criteria.
- **Shortlisting**: Complete evaluations and create a shortlist of eligible bidders, ensuring compliance with mandatory requirements.
- **Vendor Presentation**: Organize an online presentation of the VMS system by the shortlisted bidders.
- **Contract Award**: Finalize and award the contract to the selected bidder.

4.3   Implementation and Commissioning Phase (6 to 9 months)

- **Project Kick-off:** Conduct a formal kick-off meeting.
- **Technical Coordination:** Gather and confirm contact details for Volunteer CPCs and MCSPs to facilitate technical support and coordination.
- **System Deployment:** Set up, configure, and test the VMS system.
- **Acceptance Testing:** Perform on-site acceptance testing (SAT) and initiate system go-live.
- **System Integration**: Integrate third-party systems (Volunteer CPCs FMC and MCSPs) with the VMS Pilot Platform to enable seamless data exchange.
- **Stakeholder Training:** Conduct training sessions for stakeholders to ensure efficient system usage.
- **Final Validation:** Carry out final acceptance testing to validate system performance.
- **System Launch & Monitoring (duration of the Pilot Project = 2 years):** Launch the pilot project and establish continuous monitoring of system performance.
    - o **Performance Evaluation:** Implement a structured post-implementation monitoring framework, including scheduled performance reviews and necessary system optimizations.
    - o **Continuous Improvement:** Develop a stakeholder feedback mechanism to ensure ongoing improvements and adaptability of the VMS system.

4.4   Project timeframe alternatives

The planning breakdown for the implementation of the IOTC VMS Pilot Project follows the timeframe guidelines of two years, as referenced in the inception report provided by the IOTC Secretariat.

However, depending on the efforts and commitment of all stakeholders, there is potential for an accelerated implementation. Specifically, the pre-bidding phase could be completed within six months, which would allow for the entire project to be fully implemented within a maximum of 1.5 years. Additionally, due to the small number of Volunteer CPCs, the implementation phase could be executed in a shorter period, potentially within six months, ensuring that the IOTC VMS system is commissioned and fully operational within 15 months. This adjustment relies on efficient coordination, proactive engagement from all parties, and streamlined decision-making processes to ensure timely execution while maintaining the highest standards of quality and compliance.

IV. Budget Proposal

This section provides a detailed breakdown of the costs associated with the implementation of the **IOTC VMS Pilot Project**. It summarizes the key cost components that must be considered in the tender process to ensure an accurate financial evaluation of bidders.

The cost breakdown has been developed based on the following key assumptions:

- **Cloud-Based Environment Recommendation:** It is strongly recommended opting for a cloud-based environment rather than hosting the system within the IOTC Secretariat. This approach is more cost-effective for a pilot project, as it optimizes infrastructure expenses and eliminates the need for significant IT hardware investments. Additionally, it removes the requirement for reinforcing IT staff for system maintenance, as the hosting company, in collaboration with the VMS provider, will handle operational support. Furthermore, choosing a **state-of-the-art hosting provider** ensures enhanced **reliability, availability, and cybersecurity**. The hosting service can be located in the **IOTC Secretariat headquarters' country** or in any **CPC country** based on feasibility and strategic considerations.

- **Budget Allocation for Customization, Interconnection, and Bidirectional Data Exchange:** A dedicated budget must be allocated for the customization and interconnection of the system with third-party platforms to enable seamless data retrieval and data exchange. Customization efforts include the implementation of official zones, Exclusive Economic Zones (EEZ), user account creation, and the migration of the Regional

Authorized Vessel (RAV) database into the new system. Additionally, significant efforts are required to integrate the pilot system with third-party systems, such as CPC FMCs and MCSPs, to support bidirectional data exchange. This includes both retrieving VMS data from external systems and routing VMS data to authorized third parties as part of the data distribution framework. The budget estimation for this component has been prepared to accommodate up to five interconnections, ensuring the system's ability to interface with multiple external platforms effectively.

- **Pilot Project Duration and Budget Alignment:** The IOTC Secretariat has set a **two-year duration** for the pilot project, and the budget proposal has been developed accordingly. This timeframe refers to the period during which the system is expected to be fully operational and does not include the implementation phase. The budget proposal has been structured accordingly to ensure that resources are allocated for system maintenance, operational continuity, and performance monitoring over this two-year period. This approach allows for a thorough evaluation of the system's effectiveness while ensuring financial sustainability.

- **Budget Estimation and Currency:** The budget presented in this proposal is an estimation range with a margin of **±20%** and is calculated in **euros**. Given the current level of available information, contingency expenses have not been included in the budget. Future adjustments may be required as more details become available during the pre-bidding phase.

1. VMS Pilot Platform Budget

Items	Implementation Costs	Recurrent costs (monthly fee)	Total recurrent cost for 1 years	Total recurrent cost for 2 years
Cloud environment set-up and configuration	10,000-15,000 €			
VMS Application Installation, setup and commissioning	17,000-22,000 €			
System customization and interface settings	8,000-12,000 €			
Interconnection and interfacing with third systems (up to 5 distribution channels)	10,000-15,000 €			
Training (1)	20,000-25,000 €			
Hosting service		1,500-2,500 €	18,000-30,000 €	36,000-60,000 €
Saas service fee		2,000-3,000 €	24,000-36,000 €	48,000-72,000 €
User support service fee		1,000-1,500 €	12,000-18,000 €	24,000-36,000 €
Maintenance service fee (operational and applicative maintenance)		2,500-3,500€	30,000-42,000 €	60,000-84,000 €

Table 8 : VMS Pilot Platform Budget.

(1) Training budget include one on-site training for 3 days for IOTC Secretariat, two on-line sessions for Volunteer CPCs and the creation of specific training materials for the project.

1.1   Staffing

To ensure the effective operation and management of the IOTC VMS system, a dedicated staffing structure is required. The proposed human resource allocation is as follows:

- **VMS System Operator (1 Full-Time Employee - FTE):** The VMS system will require one dedicated full-time employee to ensure its effective operation and administration. This includes liaising with Volunteer CPCs, MCSPs, and the IOTC VMS Provider, ensuring data quality, supporting compliance evaluations, and performing essential data processing tasks. This position will report directly to the Compliance

Manager, who will allocate approximatively 10 to 15% of his time to VMS management. This role will focus on monitoring data distribution, ensuring the integrity and functionality of communication channels, adjusting data exchange settings, and managing user accounts. Additionally, the operator will oversee compliance reports, track VMS distribution channel errors and interruptions, and evaluate system performance using Key Performance Indicators (KPIs). **Estimated annual budget: 60,000 USD /year**

- **Compliance Oversight (10-15% Compliance Manager's Time):** The Compliance Manager will allocate approximately 10 to 15% of their time to supervising VMS-related operations. His responsibilities will include overseeing compliance evaluations, ensuring data distribution integrity, monitoring system performance, addressing any VMS-related discrepancies, and ensuring that reporting processes align with IOTC regulatory legal requirements and SOPs. He will also provide guidance to the VMS System Operator and facilitate communication with relevant stakeholders to maintain operational efficiency. **Estimated annual budget: 10,000 USD/year**

- **IT Support (Mutualized Resource):** The VMS pilot project could benefit from the existing IT team at the IOTC Secretariat, which already manages other IOTC-related missions. Leveraging this resource would provide essential IT support for troubleshooting, system maintenance, and contractor coordination without requiring additional dedicated staff. While not a mandatory prerequisite, integrating VMS-related tasks into the existing IT framework would improve system reliability, streamline operations, and optimize costs. **Estimated annual budget: 10,000 USD/year**

As the pilot project progresses toward full implementation, the IOTC Secretariat may need to reinforce staffing capacity to accommodate the expected increase in monitored vessels and associated operational activities. A comprehensive assessment of future staffing needs should be conducted as the IOTC Regional VMS moves toward full-scale deployment.

2. Communication cost

For the Volunteer CPCs that will opt for the reporting method "Partially Centralized" option 3, the Airtime cost will have to be considered for this pilot project. Before presenting budget estimation, the following key assumptions have to be taken into account:

- **VMS Position Cost Estimation:** Based on the **IOTC-2019-WPICMM02-VMS** Study, the price per VMS position was initially estimated at **0.03 USD**. However, considering the study's date, inflation rates, and insights from VMS experts, a more realistic estimate places the cost at **0.07 USD per position**. This revised figure serves as a more accurate baseline for calculating airtime expenses and overall communication costs within the pilot project. Alternatively, as this concerns the redistribution of VMS data to additional recipients, negotiations could be engaged to secure discounted pricing. The feasibility of such reductions will depend on each MCSP's pricing policy. If successful, these negotiations could lead to a **cost decrease of approximately 20% to 30%**, significantly reducing overall communication expenses.

- **Budget Estimation and Currency:** The budget presented in this proposal is an estimation with a margin of **±15%** and is calculated in **euros**.

- **Number of vessels:** For this budget estimation, we will assume two hypotheses, considering **50 and 100 vessels** respectively, as the precise number of CPCs opting for Option 3 "Partially Centralized" has yet to be confirmed. These figure serve as a reference point for estimation purposes, allowing for flexibility in budget adjustments once more accurate participation data becomes available.

- **VMS frequency reporting option**: We will consider the mandatory VMS reporting frequency as stated in IOTC Resolution 15/03. Additionally, we will include an enhanced reporting frequency option, as proposed in the Resolution 15/03 amendments.

2.1   Communication cost budget estimation

Number of Vessels	4 hourly Reporting (price per year)	2 hourly Reporting (price per year)
50	7 560 €	15 120€
100	15120 €	30 240 €

Table 9 : Communication cost budget estimation.

B. Appendix a -List of figures and tables

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C. Appendix b-List of acronyms

Acronym	Meaning
AOI	Area of Interest
API	Application Programming Interface
AWS	Amazon Web Services
CMM	Conservation and Management Measures
CPC	Contracting Parties and Cooperating Non-Contracting Parties
EEZ	Exclusive Economic Zone
FLUX	Fisheries Language for Universal Exchange
FMC	Fisheries Monitoring Center
FTE	Full Time Employee
GCP	Google Cloud Platform
GO	Geographical Object
HTTPS	Hypertext Transfer Protocol Secure
ID	Identifier
IOTC	Indian Ocean Tuna Commission
ISA	Information Sharing Agreement
IS	Information System
ISMS	Information Security Management System
IUU	Illegal, Unreported, and Unregulated (Fishing)
JSON	JavaScript Object Notation
KPIs	Key Performance Indicators
LES	Land Earth Station
LOA	Length Overall
MCSP	Mobile Communication Service Provider
MCS	Monitoring, Control, and Surveillance
MoU	Memorandum of Understanding
MtoM	Machine-to-Machine
MTU	Mobile Transmitter Unit
NAF	North Atlantic Format
NDA	Non-Disclosure Agreement
RAV	Record of Authorized Vessels
RESTful API	Representational State Transfer Application Programming Interface
RFMO	Regional Fisheries Management Organization
SOAP	Simple Object Access Protocol
SCS	Satellite Communication Systems
SOP	Standard Operating Procedure

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SFTP	Secure File Transfer Protocol
SSL	Secure Sockets Layer
TLS 1.2	Transport Layer Security version 1.2
UTC	Coordinated Universal Time
VMS	Vessel Monitoring System
XML	eXtensible Markup Language
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business

D. Appendix c- IOTC Record Authorization Vessels (RAV) data fields.

Data Field	Explanation
IOTC Number	Unique identifier assigned to the vessel in the IOTC Record of Authorized Vessels (RAV).
Type	Type or classification of the vessel (e.g., fishing vessel, support vessel).
Name	The registered name of the vessel.
Flag State	The country under whose jurisdiction the vessel is registered.
Range	The operational range of the vessel (maximum distance it can travel without refueling).
REGNO	Registration number assigned by the flag state authority.
IMO	International Maritime Organization number for vessel identification (if applicable).
IRCS	International Radio Call Sign used for communication purposes.
Port	Port where the vessel is registered or based.
Vessel Kind	The category or type of vessel, such as purse seiner, longliner, or trawler.
Gears	Type of fishing gear used by the vessel (e.g., longline, gillnet, purse seine).
LOA (m)	Length Overall of the vessel in meters, measuring the total length from bow to stern.
GT (Gross Tonnage)	A standardized measure of the vessel's internal volume, used for regulatory purposes.
GRT (Gross Registered Tonnage)	Older volume measurement system based on registered spaces within the vessel.

Total Volume (m³)	Physical total cubic volume of the vessel's enclosed spaces.
CC (MT)	Carrying Capacity in metric tons (MT), indicating the vessel's maximum payload.
Owner	Name of the vessel's owner.
Owner Address	Address of the vessel owner.
Operator	Name of the person or entity operating the vessel.
Operator Address	Address of the vessel operator.
Operating Company	Company responsible for the vessel's operations (if applicable).
Operating Company Address	Address of the operating company.
Operating Company Reg Num	Registration number of the operating company.
Beneficial Owner	The ultimate individual or entity that benefits from the ownership of the vessel.
Beneficial Owner Address	Address of the beneficial owner.
From	Start date of the authorization period.
To	End date of the authorization period.
Starboard Photo	Photo of the vessel's **starboard side** (right side).
Portside Photo	Photo of the vessel's **port side** (left side).
Bow Photo	Photo of the **front (bow)** section of the vessel.
Last Updated	The date when the vessel information was last updated in the RAV.

E. Appendix d-Additional Declarative dataset

Proposed Data Field	Explanation
Fishing License Details	Information on the vessel's fishing license, including license number, validity period, and authorized fishing areas.
Mobile Transmitting Unit (MTU) Details	Information on VMS equipment, including manufacturer, model, serial number, and communication provider.
Status of Authorization	Indicates whether the vessel's authorization is Active, Suspended, or Expired.
Home Port	The vessel's base port where it typically returns for docking, refueling, or resupplying.
Contact Email	Email address for the vessel owner/operator.
Contact Telephone	Telephone number for the vessel owner/operator.
VMS Reporting Frequency	Specifies the required interval for VMS data transmissions (e.g., every 2 hours).
Date of Entry into RAV	The date the vessel was added to the Record of Authorized Vessels.
Deactivation Date	The date when the vessel was deactivated or removed from the RAV.

Geographical Objects (GO)	Information on geographical objects, including GO Type (Official/User Zones, marks, Ports), GO Ref, and Active Period (if seasonal).
System User Account Information	User account details, including User ID, Full Name, Organization, Role and Permissions, Contact Information, Login Credentials, and Language Preferences.
Operational Notes	Free-text field for comments on vessel activity, inspections, or irregularities.

F. Appendix e- Bibliography and information sources

Reports and studies:

- **IOTC-2019-WPICMM02 VMS Study**
- **TOR VMSWG – IOTC-2019 CoC 16-R(E) Appendix 8**
- **IOTC-CoC16-R-(E)**
- **IOTC-2019-CoC16-05a [E]**
- **IOTC–2020–S24–R[E]**
- **IOTC–2021–VMSWG01–R[E]**
- **IOTC–2021–VMSWG02–R[E]**
- **IOTC–2021–VMSWG02–02**
- **IOTC–2021–VMSWG03–R[E]**
- **IOTC–2022–VMSWG04–02**
- **IOTC–2022–VMSWG04–R[E]**
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- **IOTC-2022-VMSWG05-03**
- **ISSF-2022-06-RFMO-VMS-Comparative analysis to identify best practices**

- **IOTC–2022–VMSWG05–R[E]**
- **IOTC–2022–VMSWG05–02**
- **IOTC-2022-VMSWG05-04**
- **IOTC-2023-VMSWG06-04-Rev1**
- **IOTC–2022–VMSWGSS01–R[E]**
- **IOTC–2023–WPICMM06–08**
- **IOTC–2023–VMSWG06–R[E]_Rev1**
- **IOTC–2023–VMSWG06–03**
- **IOTC–2023–VMSWG06–03_Rev1**
- **IOTC–2023–VMSWG07–03**
- **IOTC-2023-VMSWG07-02**
- **IOTC–2023–VMSWG07–R[E]**
- **GFCM-Centralized VMS**
- **Gfcm-De-Centralized**

RFMO Resolutions and official documentation

- **IOTC Resolutions 15/03 and 12/02**
- **WCPFC List of approved Mobile Transceiver Units (MTU)/ Automatic Location Communication (ALC) as of 06 February 2024**

Other documentation

- **Information Security Management System (ISMS) international standards**
- **ISO 27001 and ISO 27002**