



## UNIDADE DE GESTÃO DE PROJECTOS ESPECIAIS

### IMPROVING CONNECTIVITY AND URBAN INFRASTRUCTURE IN CABO VERDE PROJECT

Avenida Amílcar Cabral, Ex. Edifício do BCV, 4º Andar  
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Ministry of Finance and Business Development

#### Terms of Reference (ToR)

Technical Assistance (TA) to develop an Aeronautical and Maritime Occurrence Notification multi-platform system

#### 1. Background

The Government of the Republic of Cabo Verde has received a US\$ 40 million loan from the International Development Association (IDA)\World Bank, to finance the Improving Connectivity and Urban Infrastructure in Cabo Verde Project (ICUIP). The main objectives are to improve access to climate-resilient transport and urban infrastructure for selected project areas in the recipient's territory (selected communities in Cabo Verde). The project is divided in 4 (four) main components:

**Component 1: Enhancing Resilient Urban and Community Infrastructure** - to rehabilitate public spaces and upgrade key public assets to maximize climate change adaptation and low-carbon economic development.

**Component 2: Enhancing Transport Connectivity and Resilience** - to finance climate informed rehabilitation and upgrading of inter-city and rural roads, with the objective of ensuring reliable all-season connectivity and access to transport services and reduce transport costs in project areas in Cabo Verde.

**Component 3: Technical Assistance** - to provide support for capacity building and technical assistance activities for improved, climate-resilient low-carbon integrated urban and transport planning, intermodal connectivity, and transport asset management.

**Component 4: Project Management** - provide support for the management and implementation of the proposed project.

The Component 3 includes among others, the generation and implementation of knowledge, such as the development of related surveys, studies, and systems that can better inform relevant institutions on transport, mobility, and urban needs in the face of climate change. It will take a broader connectivity approach that investigates both intra- and inter-island connectivity, leveraging an ongoing analytical work on how connectivity can be enhanced to better support tourism, funded by a Spain grant and in collaboration with World Bank.



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It is in the sense, the ICUIP will support under Component 3, the Technical Assistance (TA) to develop an Aeronautical and Maritime Occurrence Notification multi-platform system for Cabo Verde's civil aviation and maritime authorities, namely for:

- IPIAAM<sup>1</sup> – Institute for the Prevention and Investigation of Aeronautical and Maritime Accidents.
- AAC<sup>2</sup> – Civil Aviation Authority.
- IMP<sup>3</sup> – Port Maritime Institute.

Accidents are often preceded by incidents and safety deficiencies that reveal the existence of hazards to security. The ability to report these safety gaps provides an important resource for detecting real or potential safety hazards. The accurate and timely notification of relevant information related to hazards, incidents, or accidents is a fundamental activity in safety management. Information used to support safety analyses can be obtained from various sources.

The state of Cabo Verde, through its civil aviation and maritime authorities, bears the responsibility of ensuring transportation safety, each within its designated scope of authority and attribution. The intervention of these authorities in preventing incidents and accidents relies on access to information on occurrences in the sector, making the development of a notification tool crucial to its operation in line with its responsibilities.

## 2. Objective(s) of the assignment

The main objective of the assignment is to develop a secure and scalable aeronautical and maritime occurrence notification multi-platform system for Cabo Verde's civil aviation and maritime authorities. This system will enable the reporting and follow-up of occurrences while ensuring the adequate management of information. By centralizing occurrence data, it aims to empower Cabo Verde with a platform for collecting, analyzing, and acting upon occurrence data, thus driving proactive safety improvements and informed decision-making.

The system will provide a streamlined tool for reporting and tracking aviation and maritime occurrences, facilitating the identification of potential hazards, mitigation of

<sup>1</sup> For more information, please consult IPIAAM's website through this link: <https://www.ipiaam.cv/>.

<sup>2</sup> For more information, please consult AAC's website through this link: <https://www.aac.cv/>.

<sup>3</sup> For more information, please consult IMP's website through this link: <https://www.imp.cv/>



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risks, and optimization of resource allocation for enhanced safety. It will also foster a unified safety culture by offering a shared platform for occurrence reporting and follow-up, promoting collaboration, transparency, and continuous improvement across Cabo Verde's aviation and maritime sectors.

Moreover, the platform will enhance Cabo Verde's safety management system by aligning with international standards. This alignment not only promotes compliance but also builds trust and strengthens the country's reputation in the global aviation and maritime communities.

#### 2.1. Specific objectives

- 1) The platform will feature a dedicated website serving as a centralized information hub for occurrence reporting and safety management. It will also provide easy-to-find links to the official websites of the relevant authorities (IPIAAM, AAC, IMP).
- 2) Development of an easy and user-friendly interface, allowing any citizen to report to the authorities a hazard, accident, or incident. The platform should support the attachment of files such as photos, videos and documents, with the capability to store these in a database.
  - a) Provide customizable reporting forms that cater to the specific requirements of different types of occurrences, allowing users to input relevant details and information accurately.
    - i) Smart dynamic forms: Design forms that adapt based on initial selections. For example, if a user selects "Accident" as the occurrence type, additional fields appear for severity, injuries, etc.
    - ii) Drop-down menus: Utilize drop-down menus for predefined lists (e.g., aircraft type, location, weather conditions).
    - iii) Checkbox options: Allow for multiple selections where applicable (e.g., contributing factors, equipment involved).
    - iv) Visual aids: Include images or diagrams where possible to help users identify specific components or circumstances involved in an occurrence.
  - b) The platform should have a responsive design to be accessible from the web on any device, working across all devices and operating systems, benefiting from



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- the mobile device properties. Enabling stakeholders to report occurrences through multiple channels.
- i) Make it easy to report anywhere, anytime, encouraging personnel to submit even minor incidents or near misses that could reveal patterns.
  - ii) Geolocation Functionality: Capture precise location data automatically using the device's GPS, simplifying incident mapping and analysis.
- 3) The platform's database and associated infrastructure shall be hosted and managed by the Núcleo Operacional da Sociedade de Informação (NOSI), Cabo Verde's national data center. NOSI will be responsible for providing all necessary support in terms of data management, including, but not limited to, storage, backup, security, and maintenance.
- a) Ensure the chosen technology stack (programming languages, frameworks, databases) is compatible with NOSI's infrastructure and any existing systems they may have in place.
  - b) Design the system to integrate seamlessly with NOSI's data management and security protocols.
    - i) Implement robust security measures to protect sensitive incident and investigation data in accordance with Cabo Verdean regulations and international standards.
    - ii) Consider data encryption, access controls, and regular vulnerability assessments to mitigate risks.
    - iii) Collaborate with NOSI's security team to ensure the system adheres to their specific requirements.
    - iv) Design the system to handle the expected volume of data and user traffic efficiently.
    - v) Consider NOSI's infrastructure capabilities and any potential limitations.
    - vi) Optimize database queries and system architecture for optimal performance.
  - c) Establish clear procedures for ongoing maintenance, updates, and bug fixes within NOSI's environment.
    - i) Maintain open communication channels with NOSI's technical team throughout the development process.



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- ii) Establish regular meetings to discuss progress, address issues, and coordinate activities.
  - iii) Provide comprehensive training to NOSI's staff on the system's operation and maintenance.
  - iv) Ensure ongoing technical support is available to address any questions or issues that may arise.
- d) Define clear roles and responsibilities regarding data ownership, access controls, and data sharing policies with NOSI.
- e) Establish procedures for data backup, archiving, and disaster recovery in coordination with NOSI.
- i) Develop a contingency plan in collaboration with NOSI to address potential system outages or disruptions, ensuring minimal impact on the reporting and investigation processes.
- 4) Implement real-time notification mechanisms to alert relevant authorities and stakeholders immediately upon the submission of occurrence reports, enabling swift responses and follow-up actions.
- 5) Inclusive notification database - Enables notifications to cover all aspects of operations and allows for the collection and storage of this information, facilitating the identification of different perspectives. This supports a comprehensive analysis and understanding of events, hazards, and their effects enabling statistical analysis.
- 6) Incorporate data analytics and visualization tools to analyze trends, patterns, and correlations within occurrence data, empowering authorities to derive actionable insights and make informed decisions.
- a) The processed and evaluated statistical data should be made available to the public through dashboards, resembling similar international platform like ECCAIRS 2<sup>4</sup>, SIPAER Platform<sup>5</sup> (Brazil Aviation Accident Investigation and Prevention System Platform).

<sup>4</sup> For more information, please consult ECCAIRS 2 website through this link: <https://aviationreporting.eu/>

<sup>5</sup> For more information, please consult SIPAER Platform through this link: <https://painelsipaer.cenipa.fab.mil.br/>



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- 7) The design of the system must adhere to, include the required information according the international recommendations from the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), and have the taxonomy compatible with other platforms like ECCAIRS 2, for example.
- 8) The platform should allow notification based on specific types:
  - a) Mandatory notification - Occurrences that endanger or, if not corrected or addressed, could endanger an aircraft or ship, its occupants, other individuals, and equipment or facilities affecting operational safety, reported by stakeholders in the sector.
  - b) Voluntary notification - Reports made by any citizen identifying a hazardous situation or any occurrence that could compromise operational safety, and the communication of other pertinent information related to safety.
- 9) The platform should provide end-to-end support for the investigation process, from initial occurrence reporting to the publication of final reports. Improving efficiency, data analysis, and collaboration across agencies.
  - a) Ensure a robust connection between initial occurrence reports and associated investigations. Use unique identifiers and easily accessible cross-referencing.
  - b) Create dedicated areas within the platform for specific investigations, with granular access controls to maintain confidentiality.
  - c) Allow secure uploading/downloading, storage, and annotation of various evidence types (photos, videos, documents, audio recordings, maintenance logs, etc.).
  - d) Implement features like real-time commenting, discussion threads, secure file sharing, and task assignment to facilitate seamless teamwork.
  - e) Develop customizable workflow templates for different investigation types and severities. Include progress tracking, status updates, and automated notifications at key milestones.
  - f) Provide tools for generating interim reports, statistical summaries on open/closed investigations, and the final investigation report with version control.
- 10) Workflow management:



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- a) Automated routing of reports to appropriate authorities (IPIAAM, AAC, IMP).
  - b) Tracking of investigation status, actions taken, and closure of cases.
- 11) Implement hierarchy:
- a) Confidentiality and jurisdiction: Certain occurrences may contain sensitive information relevant only to a specific authority.
  - b) Data integrity: Limiting access preventing accidental modification or unauthorized sharing of information pertaining to ongoing investigations, preserving the integrity of the data for analysis and legal purposes.
  - c) Clear role-based access ensures reports go directly to the relevant experts for review and action, reducing delays and miscommunications.
- 12) User roles and permissions:
- a) Define distinct user roles (e.g., reporter, investigator, administrator, etc.) with associated access levels for each authority (IPIAAM, AAC, IMP). Permissions should control who can consult, view, edit, and share specific parts of an occurrence report.
  - b) The system should default to the minimum necessary access, only granting additional permissions when clearly justified based on the nature of the occurrence and an individual's responsibilities.
  - c) While access controls are necessary, build mechanisms for secure sharing when inter-agency collaboration is needed for particular investigations.
  - d) Implement robust logging of user actions within the system to maintain records of who accessed what information and when, ensuring accountability.
- 13) Occurrence classification:
- a) Standardized categories for incidents, accidents, near misses, safety hazards, etc.
  - b) Ability to tag occurrences with relevant metadata (location, date/time, assets involved, etc.).
- 14) Facilitates analysis and follow-up measures regarding reported occurrences and other safety-related information.



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- 15) Ensures the confidentiality of personnel and professionals in the sectors, emphasizing a non-punitive nature of the platform, with users protected against legal, administrative, or disciplinary sanctions.
- 16) Allows feedback on actions taken in response to a notification.
- 17) Facilitates the registration, processing, analysis, and dissemination of investigation results.
- 18) Integration/Interoperability capabilities:
  - a) Ability to connect with other safety data sources (maintenance logs, weather, etc.)
  - b) APIs to allow for future expansion of functionality.
- 19) Knowledge management:
  - a) Repository for lessons learned, safety bulletins, and regulatory updates.
  - b) Search function to easily retrieve past cases or related information.
- 20) Ensures appropriate use and disclosure of collected safety information.
- 21) The platform should be available in two languages, Portuguese and English.
- 22) Provides guidance to users on the correct utilization of the platform.
- 23) Secure data storage:
  - a) Ensure robust data security measures, including encryption, access controls, and regular backups, to protect sensitive information stored within the platform and comply with data protection regulations.
  - b) Enable seamless integration with external systems and databases, such as aviation and maritime regulatory databases, weather monitoring systems, and emergency response platforms, to enhance data interoperability and information exchange.
- 24) Design the system with frontline personnel in mind – it needs to be intuitive and accessible during busy operations.
- 25) Provide thorough training, user manuals, and technical support for staff at all the relevant authorities.
- 26) Design with growth in mind. The system should handle increasing volume and complexity of data over time.





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### 3. Scope of services, Tasks (Components) and Expected Deliverables

#### 3.1. Scope of services

The Aeronautical and Maritime Occurrence Notification multi-platform system should overall provide a centralized and streamlined solution for reporting, tracking, and investigating safety incidents and hazards within Cabo Verde's aviation and maritime sectors. This robust platform should establish a secure website, empowering frontline personnel to report occurrences from anywhere, even with limited connectivity. A system that permits collaboration and transparency by seamlessly linking reports to relevant authorities and supporting the entire investigation workflow, from initial notification to the publication of final reports. Designed to enhance data-driven decision-making, a platform with essential built-in analysis and reporting tools, allowing authorities to identify trends, optimize resource allocation, and proactively improve safety standards, unifying safety culture aligned with international best practices, strengthening Cabo Verde's reputation in the global aviation and maritime communities.

The development of the platform should be user-friendly, resembling reporting adopted by other countries that are part of ICAO, for example, *Centro de Investigação e Prevenção de Acidentes Aeronáuticos - CENIPA*<sup>6</sup> (Brazil), Transportation Safety Board of Canada - TSB<sup>7</sup> (Canada), *Gabinete de Prevenção e Investigação de Acidentes com Aeronaves e de Acidentes Ferroviários - GPIAAF*<sup>8</sup> (Portugal) facilitating the exchange of safety-related information, *Gabinete de Investigação de Acidentes Marítimos e da Autoridade para a Meteorologia Aeronáutica - GAMA*<sup>9</sup> (Portugal) as well as the identification and solutions to common problems faced in these sectors.

The platform should have an easily visible link on the main webpage of the Cabo Verde's civil aviation and maritime authorities, directing the user to the occurrence notification

<sup>6</sup> For more information, please consult CENIPA aeronautical occurrence report form through this link: <https://www2.fab.mil.br/cenipa/index.php/contatos-de-sobreaviso-para-comunicacao-de-ocorrencias-aeronauticas>

<sup>7</sup> For more information, please consult TSB aeronautical occurrence report form through this link: <https://www.tsb.gc.ca/eng/incidents-occurrence/aviation/index.html>

<sup>8</sup> For more information, please consult GPIAAF Platform through this link: <http://www.gpiaa.gov.pt/?cn=70657189AAAAAAAAAAAAAAAAAAAA&cpp=1>

<sup>9</sup> For more Information, please consult GAMA Platform through this link: <https://www.gama.mm.gov.pt/index.php/formulario-de-notificacao-notification-form>



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platform. Upon accessing the platform, the user should identify the type of notification to be made, whether voluntary or mandatory. In the case of a voluntary notification, the user will be directed to a simple interface allowing them to describe the identified hazard or occurrence, with the possibility to be anonymous if desired. In that same space, they can attach photographs or videos, the platform should allow user registration, enabling analysis of reporting patterns and trends from specific individuals, offering updates or requests for further information related to a user's previous voluntary reports, and commenting on public reports.

For mandatory notifications, the platform should provide the option for either aeronautical or maritime mandatory notifications. Once the sector of the occurrence is selected, the user should then fill in a series of crucial information for the initiation of the process, allowing the user to download reporting forms or upload internal reports. The types of required information should align with those demanded by the national and international laws and regulations.

The platform should allow the aviation and maritime institution and agencies to register on the platform facilitating their report, namely, but not limited to:

- 1) National and foreign operators which have operated/operating/new ones in Cabo Verde;
- 2) Airports, Aerodromes, and Ports;
- 3) Certified national and foreign training organizations;
- 4) Certified national and foreign maintenance organizations;
- 5) Other individuals or organizations certified or authorized according to current regulations;
- 6) All occurrences involving aircraft or ships registered in Cabo Verde or foreign ones used by national or foreign operators who have operated in Cabo Verde, including occurrences in national airspace or territory;
- 7) Occurrences taking place outside the national territory involving aircraft or ships registered in Cabo Verde;

Registration fosters dedicated workspaces within the platform, facilitating both internal agency operations and secure inter-agency coordination when required. Agencies should



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maintain ownership of their data and can access tailored analytics, extracting insights to improve safety outcomes within their specific sectors.

The platform should support the investigators or inspectors from the moment that an occurrence is notified, permitting them to receive an immediate alert with key details (location, type, severity, etc.), kick starting their assessment. Creating a secure workspace within the platform, allowing the investigator to centralize all case information, with the possibility to invite necessary collaborators, and manage evidence. Supporting customizable workflow templates and built-in data analysis tools, permitting the investigator to coordinate with their team, examining historical trends, and diving deeper into potential root causes.

The platform should provide standardized reporting structures aligned with international guidelines, streamlining both drafting and the approval process for the final report. Once complete, the platform enables secure publication of the report, and automatically disseminates key findings into the knowledge repository.

The platform must prioritize data integrity, security, and usability when publishing statistical information. Statistics should be presented in various formats (visualizations, reports, summaries) to cater to diverse audiences, and users must have the ability to filter and explore the data. Transparent labeling and contextual notes will prevent misinterpretation of the statistics and highlight their role in driving proactive safety improvements.

For more details, but not limited to, please consult expected functionalities on Annexes, namely, Annex 1: Information Management functionalities, Annex 2: Maritime occurrence notifications functionalities and Annex 3: Aeronautical occurrence notifications functionalities.

### 3.2. Tasks

The Consulting firm is expected to undertake the following tasks (i) business requirement analysis and review (ii) solution design, build and test, (iii) user acceptance testing, end user training and sign off, (iv) go-live activities, and (v) post go-live support and handover of the project. The specific scope of work for the consulting firm should include, but not limited to, the following specific tasks:

#### Task 1: Planning & requirements gathering

- 1) Stakeholder interviews: Consult with IPIAAM, AAC, IMP and users.



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- 2) Collaborate with NOSI to obtain detailed specifications of their infrastructure.
- 3) Detailed use cases: Document step-by-step workflows for reporting, investigation, data analysis, etc.
- 4) Security & compliance: Map out data protection regulations, access control needs, and audit requirements.
- 5) Technical specifications: Outline desired technologies, integration points, and performance targets.

#### Task 2: Design & Prototyping

- 1) User Interface (UI) design: Create wireframes and mockups for the platform.
- 2) Database schema: Design the data structure to support reporting, investigations, and analytics.
- 3) Workflows & logic: Model processes using flowcharts or other visual tools.
- 4) Interactive prototypes: Develop clickable prototypes for user testing and feedback.

#### Task 3: Development

- 1) Modular coding: Break down development into sprints with focus on core functionalities, then iterative refinements.
- 2) Front-end development: Implement the UI using responsive design principles.
- 3) Back-end development: Build database interactions, workflow automation, security features.
- 4) API development: Create secure APIs if integrations with other systems are needed.

#### Task 4: Testing & quality assurance

- 1) Unit testing: Developers test individual code components.
- 2) Integration testing: Ensure modules of the system work together seamlessly.
- 3) User acceptance testing (UAT): Involve stakeholders in testing with real-world scenarios.



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- 4) Security testing: Conduct vulnerability scans and penetration testing.

#### Task 5: Deployment & launch

- 1) Infrastructure setup: Provision servers (cloud or on premise) and configure environments.
- 2) Data migration (If applicable): Securely transfer data from legacy systems.
- 3) Rollout strategy: Phased approach or full launch, with user communication and support plan.

#### Task 6: Maintenance & support

- 1) Ongoing bug fixes: Responsive issue tracking and resolution.
- 2) Feature enhancements: Incorporate user feedback and address new requirements.
- 3) Security updates: Proactively patch vulnerabilities and monitor for threats.

### 3.3. Expected deliverables

The following outputs/deliverables are expected from the various tasks during the engagement. All the deliverables must be in Portuguese.

Deliverable 1: Inception report – Overview of the job to be done within the scope of work.

Deliverable 2: Planning & requirements gathering

- 1) Stakeholder analysis report: Detailed profiles of user types, needs, and pain points.
- 2) Use case documentation: Comprehensive scenarios outlining how users interact with the system.
- 3) Security & compliance assessment: Analysis of relevant regulations and recommendations for data protection measures.
- 4) Technical requirements document: Outlines hardware/software needs, desired integrations, and non-functional requirements (performance, scalability).

Deliverable 3: Design & prototyping

- 1) UI design artifacts: Wireframes, mockups, and style guides demonstrating the look and feel of the platform.
- 2) Database schema: Entity-relationship diagrams and detailed data dictionary.



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- 3) Workflow diagrams: Visualizations of investigation processes, reporting flows, and decision points.
- 4) Interactive prototype: Clickable demo allowing stakeholders to experience basic navigation and user journeys.

#### Deliverable 4: Development

- 1) Source code: Well-commented codebase, modularized for maintainability.
- 2) Test cases & documentation: Unit tests, integration test plans, and technical specifications.
- 3) Deployment scripts: Automation scripts to streamline deployment.
- 4) Progress reports: Regular updates on milestones reached, challenges, and adjusted timelines.

#### Deliverable 5: Testing & quality assurance

- 1) Test reports: Detailed results of unit, integration, security, and user acceptance testing.
- 2) Bug tracking log: Documented list of issues discovered, their severity, and resolution status.
- 3) Sign-off documents: Formal sign-off by stakeholders upon UAT completion.

#### Deliverable 6: Deployment & launch

- 1) Deployed system: Fully operational platform on production servers.
- 2) Data migration records (If applicable): Logs and reports ensuring complete data transfer from legacy systems.
- 3) User manuals: Clear guides for different user roles within the platform.
- 4) Launch communication plan: Outlines how the rollout will be announced to stakeholders.

#### Deliverable 7: Maintenance & support

- 1) Knowledge base: Technical documentation, troubleshooting guides, and FAQs.



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- 2) Service level agreement (SLA): Contractual agreement outlining response times, support channels, and availability guarantees.
- 3) Issue tracking system: Mechanism for reporting bugs and requesting enhancements.
- 4) Periodic review reports: Summaries of usage metrics, system health, and security audits.

Deliverable 8: Training and handover:

- 1) Training sessions for each component of the notification platform system.
- 2) Handover of the notification platform.

Deliverable 9: Final Report

#### 4. Qualification requirements & Team composition

##### 4.1. Qualifications requirements

The assignment will require a consulting firm or consortium with:

- 1) At least ten (10) years of experience in the areas of technology, smartphone, and web application development, including integration/interoperability services:
  - i. Demonstrated expertise in building similar safety reporting or data management systems within the aviation and/or maritime sectors.
  - ii. Familiarity with regulations relevant to incident reporting, investigations, and data privacy in Cabo Verde (and ideally, international standards from ICAO and IMO).
  - iii. A track record of developing systems with robust security measures, data encryption, and access control mechanisms.
  - iv. Proficiency in the technologies suitable for the project (e.g., web frameworks, database systems, cloud platforms).
  - v. Experience with agile methodologies (Scrum, Kanban) or similar structured approaches for iterative development.
- 2) At least three (3) successful projects, present in portfolio, that highlight similar works performed;



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- 3) Experience working and deploying projects in Cabo Verde or similar context is highly desirable.

#### 4.2. Team composition

The team should be comprised of the following key experts:

- 1) Team Leader – must have at least ten (10) years of proven practical experience in managing a software development team driving full (and correct) adoption of modern software engineering and delivery practices and, at a minimum, a Master's degree in IT Engineer and Computer Science; should have experience at least in two (2) similar projects; should have experience in leading complex software projects, managing timelines, budgets, and client communication; should have excellent understanding of aviation and maritime sectors; should have experience in quality assurance.
- 2) Technical Expert – must have at least six (6) years of experience in developing digital platforms and, at a minimum, a bachelor's degree in IT Engineer, Information Management, with specialization in knowledge management and business intelligent, applications interface and related fields: should have both technical and management background with excellent understanding of aviation and maritime sectors.
- 3) IT Expert – With a minimum bachelor's degree in IT Engineer and with four (4) years of experience in HTML, CSS, JavaScript, and responsive design frameworks (React, Angular, Vue.js, etc.), database technology, server-side programming languages (Node.js, Python, Java, etc.), and API development.
- 4) Aviation/Maritime Expert – must have at least 3 (three) years of experience in maritime, aviation sectors; a bachelor's degree in finance, economics, business administration, aviation and maritime.
- 5) Business Analyst: must have at least 4 (four) years of experience in business analyst in software development projects related to aviation or maritime industries, familiarity with data modeling, process mapping tools, and requirements documentation software; with a minimum bachelor's degree in





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business administration; should have skills in translating user needs into system requirements, creating use cases, and modelling workflows.

- 6) UI/UX Designer: must have at least 4 (four) years of experience in user-centered design for web interfaces; with a minimum bachelor's degree in graphic design, multimedia, IT Engineer.

### 5. Reporting requirements and time schedule for deliverables

The following outputs/deliverables are expected from the various tasks during the engagement.

Deliverables	Type	Deadlines	% payment upon acceptance and approval by the client
Deliverable 1, 2	Planning & requirements	1 month after contract	10%
Deliverable 3	Design & prototyping	3 months after the last deliverable	25%
Deliverable 4	Development:	5 months after the last deliverable	30%
Deliverable 5	Testing & quality assurance	2 months after the last deliverable	15%
Deliverable 6	Deployment & launch	1 months after the last deliverable	10%
Deliverable 7, 8, 9	Maintenance & support	12 months of support after launch	10%

### 6. Client's input and counterpart personnel

#### 6.1. Client's input



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In the development process of the platform, there should be flexibility in handling changes to the project scope or requirements, and potential cost adjustments. In addition, periodic code reviews to ensure the software is developed according to industry best practices.

#### 6.2. Counterpart personnel

The notification platform evaluation team will be appointed by the Board of Directors of Cabo Verde's civil aviation and maritime authorities, that will be responsible for assessing whether all requirements have been met, as well as the functionality and flexibility of the multi-platform system.

#### 6.3. Duration of the assignment

The assignment will be carried out over a maximum period of twelve (12) months from the date of signature of the contract.

#### 6.4. Organization of the assignment

The consultant firm shall undertake the assignments in close consultation with Cabo Verde's civil aviation and maritime authorities, who will follow and support the assignment. The Consultant will report to *Unidade de Gestão de Projetos Especiais* (UGPE) for contract management aspects.

The Consultant's proposals are expected to be detailed with the activities, time allocation of each expert, and costs, clearly outlined by stages.

#### 6.5. Copyrights

The consultant is obliged to provide all source code related to the solution developed notification multi-platform system, within this project as well as all documents related to the project. If licensed tools are used in the development, the licenses must be transferred to the Contracting Authority.

#### 6.6. Contract type

A Lump-Sum form of Contract shall be signed, payments to the consulting firm are linked to approval of deliverables, and the payment of reimbursable expenses are made upon presentation of the receipt of the expenses occurred at the real cost.



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### ANNEXES

Annex 1: Information Management functionalities

Annex 2: Maritime occurrence notifications functionalities

Annex 3: Aeronautical occurrence notifications functionalities

Annex 4: IPIAAM aeronautical occurrence report form

Annex 5: AAC aeronautical occurrence report form



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#### Annex 1: INFORMATION MANAGEMENT

1. Integration with received notifications
2. Classification as accident or incident
3. Automatic numbering (refer to the investigation numbering format)
4. Appointment of investigator/investigation team by the Management Board
5. Investigation phases
  - a. Data and evidence collection
  - b. Analysis of data and evidence
  - c. Preliminary report
    - i. Ready
    - ii. Approved
  - d. Consultation
  - e. Final Report
    - i. Ready
    - ii. Approved
    - iii. Published
6. Database (folder for occurrence)
  - a. Videos
  - b. Photographs
  - c. Interviews
  - d. Preliminary report
  - e. Final report
  - f. Others
7. Statistical data
  - a. Tables/charts (by year, total over the years, comparison between years, etc.)
    - i. Number of notifications (voluntary and mandatory)
    - ii. Number of opened investigation processes
      1. Accidents
      2. Incidents
    - iii. Number of completed investigation processes
    - iv. Type of occurrences
      1. Fire
      2. Collision
      3. Propulsion failure
      4. Grounding



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- 5. Other
    - v. Occurrences by island/port
    - vi. Others
  - 8. “Search” menu
    - a. Entry field: process number
    - b. Query data: all process data
- Videos, photographs, reports, interviews, etc.



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#### A. Annex 2: MARITIME OCCURRENCE NOTIFICATIONS

##### 1. Maritime Incident Notification:

- Automatically generate a number: xxx/year/M/Total Number
  - i. xxx: three digits referring to the number of notifications received in that year
  - ii. year: four digits referring to the current year
  - iii. M: indicates the occurrence as maritime (in the case of an aeronautical occurrence, it should be "A")
  - iv. Total Number: total notifications received (cumulative, regardless of the year)
- Classification of the occurrence as Incident or Accident will be determined by the Maritime Safety Department

##### 2. Mandatory Notification:

- Who? ENAPOR (if within the port area), Company, Shipowner, Ship Captain

##### 3. Mandatory Notification

- Ship/Vessel
  - i. Name
  - ii. Registration number
  - iii. Shipowner/Company
  - iv. Type of ship/vessel
    - 1. Recreational
    - 2. Fishing
    - 3. General Cargo
    - 4. Passengers
    - 5. Hazardous Cargo
    - 6. Others
- Type of Occurrence
  - i. Grounding
  - ii. Collision
  - iii. Fire
  - iv. Flooding
  - v. Propulsion failure
  - vi. Other (specify)



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- Personnel
  - i. Number of serious injuries
  - ii. Number of minor injuries
  - iii. Number of fatalities
- Environmental pollution
  - i. No
  - ii. Yes
    - 1. Fuel oil spill
    - 2. Diesel spillage
    - 3. Petrol spillage
    - 4. Other (specify)
- Material damages
  - i. No
  - ii. Yes (general description)
- Operational status after the occurrence
  - i. Operational
  - ii. Reduced operability
  - iii. Inoperable
    - 1. Need for tug assistance
      - a. Yes
      - b. No
- Navigation Plan
  - i. Port of origin
    - 1. Name
    - 2. ATD
  - ii. Port of destination
    - 1. Name
    - 2. ETA or ATA
  - iii. GPS position of the occurrence
    - 1. Latitude
    - 2. Longitude
  - iv. Type of cargo on board
  - v. Number of crew members
  - vi. Number of passengers



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#### B. Annex 3: AERONAUTICAL OCCURRENCE NOTIFICATIONS

##### 1. Aeronautical Occurrence Notification:

- Automatically generate a number: xxx/year/A/Total Number
  - i. xxx: three digits indicating the number of notifications received in the current year
  - ii. year: four digits indicating the current year
  - iii. A: signifies the occurrence as maritime (in the case of an aeronautical occurrence, it should be "M")
  - iv. Total Number: total number of notifications received (cumulative nature, regardless of the year)
- Classification of the occurrence as Incident or Accident will be determined by the Aeronautical Safety Directorate

##### 2. Mandatory Notification:

- Who? ASA (if within the airport), Company, Pilots

##### 3. Mandatory Notification:

- Aircraft
  - i. Name
  - ii. Registration number
  - iii. Company
  - iv. Aircraft type
- Type of occurrence
- Personnel
  - i. Number of serious injuries
  - ii. Number of minor injuries
  - iii. Number of fatalities
- Material damages
  - i. No
  - ii. Yes (general description)
- Operational status after the occurrence
  - i. Operational
  - ii. Reduced operational capability
  - iii. Inoperable
    - 1. Need for assistance
      - a. Yes
      - b. No





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- Flight plan
  - i. Departure airport
    - 1. Name
  - ii. Destination airport
    - 1. Name
  - iii. GPS position of the occurrence
    - 1. Latitude
    - 2. Longitude
  - iv. Type of cargo on board
  - v. Number of crew members
  - vi. Number of passengers



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### C. Annex 4: IPIAAM AERONAUTICAL OCCURRENCE REPORT FORM



#### Apêndice F

Formulário de Notificação

#### Acidentes / Incidentes Graves

(Anexo 13 da ICAO paragrafo 4.2)

a.	Para acidentes, a abreviação de identificação <b>ACCID</b> e para incidentes graves <b>INCID</b>			
b.	Fabricante / Modelo	Nacionalidade	Matricula	Nº de serie
c.	Nome do proprietário			
	Nome do operador			
	Nome do contratante			
d.	Nome do piloto em comando	Nome/ Nacionalidade da tripulação		
		1.		
		2.		
		3.		
e.	Data do Acidente ou Incidente Grave		Hora do Acidente ou Incidente Grave (Hora Local ou UTC)	
f.	Último ponto de partida da aeronave		Ponto de destino pretendido da aeronave	
g.	Posição da aeronave com referência a algum ponto geográfico facilmente definido e latitude e longitude			
h.	Numero de tripulantes e passageiros a bordo.	Pessoas a bordo- Tripulação / Pax.	Outros	
	Outros: Mortos e com lesões graves	Fatal - Tripulação / Pax.	Outros	
		Lesões graves - Tripulação / Pax.	Outros	
		Lesões menores - Tripulação / Pax.	Outros	
i.	Descrição do acidente ou do incidente grave e a extensão dos danos à aeronave, o quanto for possível			
j.	Uma indicação em que medida a investigação será conduzida ou se propõe a ser delegada pelo estado de ocorrência			
k.	Características físicas da área do acidente ou de incidente grave, bem como indicação de dificuldades de acesso ou requisitos especiais para se chegar ao local			
l.	Identificação da autoridade de origem e meios para entrar em contato com o investigador responsável pela investigação e a autoridade de investigação de acidentes do estado da ocorrência a qualquer momento.			
m.	Presença e descrição de material perigoso transportado a bordo da aeronave			



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<b>n.</b>	Nome, organização que submete a notificação e o contato da pessoa/organização	Nome: Função: Endereço: _____ _____ Telefone: Email :
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Obrigado por ter preenchido este formulário, que será enviado ao Núcleo de Segurança Aeronáutica, para fins de segurança operacional.

Assinatura do Presidente do IPIAAM,

\_\_\_\_\_  
Data \_\_\_\_/\_\_\_\_/\_\_\_\_




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### D. Annex 5: AAC AERONAUTICAL OCCURRENCE REPORT FORM

 AGÊNCIA DE AVIAÇÃO CIVIL	<b>REPORTE DE AERODROMOS E SERVIÇOS EM TERRA/ AERODROME AND GROUND HANDLING SERVICE REPORT</b>	Reference:	FS/AER/28
		Revision:	Revision 1
		Date:	
The completed form should be emailed to:			
<b>1. INFORMAÇÃO DO OPERADOR/ OPERATOR INFORMATION</b>			
Operador/Operator	Email	Telefone/Phone	Endereço/Address
<b>2. INFORMAÇÃO DA OCORRÊNCIA/ OCCURENCE INFORMATION</b>			
Data/Date / /	Hora/Time	H	M Local/Location
<b>3. DESCRIÇÃO DA OCORRÊNCIA/ OCCURENCE DESCRIPTION</b>			
<b>4. INFORMAÇÃO DE AERODROMO/ AIRODROMO INFORMATION</b>			
Airport	RWY-		
<b>5. INFORMAÇÃO DA AERONAVE/ AIRCRAFT INFORMATION</b>			
Registro da Aeronave/ Aircraft Registration	Fabricante/Manufacturer -		
Modelo/ Type -	Classe/Peso Max à decolagem/ MTOW -		
<b>5.1. FASE DE VOO / DETECTION PHASE</b>		<b>5.2. DETALHES DO VOO / FLIGHT INFORMATION</b>	
<b>Detection Phase Operations</b>		Indicativo/ Flight number	
<input type="checkbox"/> Taxi	<input type="checkbox"/> Ground Handling	VFR <input type="checkbox"/> IFR <input type="checkbox"/>	
<input type="checkbox"/> Take-Off	<input type="checkbox"/> Unknown	Altitude/Altitude	
<input type="checkbox"/> Climb	<input type="checkbox"/> Other, specify:	Velocidade/Speed	
<input type="checkbox"/> En-Route			
<b>6. INFORMAÇÃO DE EQUIPAMENTOS / EQUIPMENT INFORMATION</b>			
<b>7. METEOROLOGIA / METEOROLOGY</b>			
<input type="checkbox"/> Foi fator/ it was a factor	Especifica a condição/ Specify the condition		
<input type="checkbox"/> Não foi/ it wasn't			
<b>8. RESULTADOS DE INVESTIGAÇÃO / INVESTIGATION RESULTS</b>			
<b>9. MEDIDAS TOMADAS / ACTION TAKEN</b>			
<b>10. SUBMITTER'S DETAILS / DETALHE DO NOTIFICADOR</b>			
Name	Organization	Date / /	Internal reference
Email	Telephone	Address	
<b>11. ANEXOS/ATTACHMENTS</b>			
<input type="checkbox"/> Sketch(es)	<input type="checkbox"/> Report(s)	<input type="checkbox"/> Photo(s)	<input type="checkbox"/> Others (specify)
<b>12. DEFECT REPORT TYPE</b>			
<input type="checkbox"/> Initial defect notification only (follow-up report required)			
<input type="checkbox"/> Notification of defect with complete investigation results			
<input type="checkbox"/> Follow-up report from earlier defect notification			