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TERMS OF REFERENCE FOR THE

SUPPLY, DELIVERY, INSTALLATION AND CONFIGURATION

OF BLOCKCHAIN ENABLED AUTOMATED CERTIFICATION SYSTEM

I. BACKGROUND

A. About the Organization

The Maritime Industry Authority (MARINA) was created on 01 June 1974 as an attached Agency to the Office of the President (OP) with the issuance of Presidential Decree No. 474, otherwise known as the Maritime Industry Decree of 1974, to integrate the development, promotion and regulation of the maritime industry in the country and the creation of the Ministry (now Department) of Transportation (DOTr) by virtue of Executive Order No. 546, the MARINA was attached to the DOTr for policy and program coordination on 23 July 1979.By virtue of Republic Act No. 10635, the Maritime Industry Authority (MARINA) is established as the "Single Maritime Administration" responsible for the implementation and enforcement of the 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, as amended, and International Agreements or Covenants related thereto.

B. Establish a unified information system for MARINA.

In line with the Ten Point Agenda of the Administrator on the maximization on the use of digitalization or automation in our systems and processes to speed up services for our stakeholders through:

a. the enhanced online services paving for contactless transactions from application to release of statutory certificates and documents;
b. the establishment of protocols for the automation of assessment and inspection; and
c. to ensure that safety nets and data security system are in place for all MARINA online services;

The Blockchain Enabled Automated Certification System which aims to create an information system that will integrate the existing information systems being used by different MARINA service units/offices and is envisioned to institutionalize a highly efficient information system for MARINA and its Stakeholders.

II. APPROVED BUDGET FOR THE CONTRACT

The Approved Budget for the Contract (ABC) for the project is Thirty-Two Million Five Hundred Thousand Pesos (32,500,000.00) General Appropriations Act of 2020 inclusive of all applicable government taxes and charges.

III. LEGAL FRAMEWORK REQUIREMENTS

1. **Republic Act No. 11032** - An Act Promoting Ease of Doing Business And Efficient Delivery of Government Services, Amending for the Purpose Republic Act No. 9485, Otherwise Known As The Anti-red Tape Act Of 2007, And For Other Purposes

2. **Republic Act 10173** – An Act Protecting Individual Personal Information in Information and Communications Systems in the Government and The Private Sector, Creating for this Purpose a National Privacy Commission, and for other Purposes;

3. **Executive Order No Republic Act No. 8792 of the Philippines Electronic Commerce Act of 2000** – An act providing for the recognition and use of electronic commercial and non-commercial transactions and documents, penalties for unlawful use thereof and for other purposes;

4. **Joint Department Administrative Order No. 2, Series of 2006** – Guidelines Implementing R.A. 8792 on Electronic Payment and Collection System (EPCS) in Government;

5. **Joint Department Order No. 10-01, Series of 2010** – Guidelines on the Use of Access Devices for Payment of Fees, Charges, Assessments, and other Revenues due to the Government through the use of Electronic Payment and Collection System;

IV. OBJECTIVES

A. General Objective

Stakeholders

- Online application
- Real Time status of application through web portal and mobile application
- Ability to make online payment
- Provide instant update and tracking of applications through web portal and mobile application
- Real Time Verification of issued certificates
- Ability to submit complain through web portal or mobile app.

The Administration

- Web based documentation process
- One stop service delivery
- Effective and efficient database with access to all relevant stakeholders
- Single Interface for all Modules Processing
- Ability to generate all necessary report thru web portal
- Web based complaint management system
- Web based monitoring and tracking of user activities within the system
- Provide better services to all stakeholders.
- Provide faster and transparent service
- Better efficiency in documentation and related activities

- Increase work efficiency and reduce work load
- Reduce physical movement thru automation
- Reduce mistake thru digitalization

B. Specific Objectives

1. Provide a Blockchain enabled Automated Certification Management System to support the application, processing and issuance of: (Annex A)
   a. Domestic Shipping Service
   b. Enforcement Service
   c. Franchising Service
   d. Overseas Shipping Service
   e. Shipyards Regulation Service
   f. Maritime Safety Service
   g. Manpower Development Service
   h. Legal Service
   i. Certification Division
   j. Examination and Assessment Division (Application for Assessment-Theoretical and Practical)
   k. Accreditation Division
   l. Accounting and Finance Module
2. Provide a Blockchain enabled Automated Certification Management System that efficiently authenticates MARINA issued certificates.
3. To provide web-enabled information system that withstand 24/7 application and database availability and integrity in order to provide greater visibility of employees' business critical applications, other important data information and as well as information data processing;
4. To improve internal productivity and process efficiency through a unified access of information across the MARINA Enterprise System including relevant exchange of information coming from stakeholders;
5. To allow secured access of information by the Employees, Executive Management Team and its respective Stakeholders to improve overall collaborative effort and timely decision making within MARINA;
6. To provide MARINA with Mobile App to support the processing and issuance of MARINA Issued Certificates and Application.
7. To provide the MARINA with necessary and relevant information which can be used by the Administration to formulate policies, rules and regulations;
8. To generate comprehensive statistics needed by policy formulators and decision makers in conducting a thorough systematic analysis of the problems and agency needs;
9. To provide timely feedback to appropriate authorities on problems in the program implementation so that corrective actions are instituted on time;
10. To streamline the processing of application;

V. SCOPE OF WORK

A. Software Application System

1. The bidder shall provide an application system to MARINA with the following characteristics:

a. The software application system shall be a web application system that can be securely accessed by MARINA Service Units and MARINA Regional Offices.

b. The software application system shall be a blockchain enabled certificate management system that efficiently authenticates MARINA issued certificates.

c. The software application system must be capable of accepting online application.

d. The software application system and mobile application system shall have the capability to attach documentary requirements into the system.

e. The software application system and mobile application system must be capable of online viewing of records.

f. The software application system must be capable of online evaluation of documents.

g. The software application system and mobile application system must be capable of uploading all required documents listed and shown in the system.

h. The software application system and mobile application system shall be capable of Real Time monitoring of application through web portal and mobile version.

i. The software application system and mobile application system shall allow verification of records by checking hash values in the blockchain.

j. The software application system and mobile application system should be customized according to the integration of workflow procedure/process flow submitted by MARINA service unit/offices for the processing of certificates/permits/licenses/inspection/accreditation/exam application.

k. The software application system and mobile application system shall allow recording of certificates, assessment results and other information into a blockchain.

l. The software application system and mobile application system must facilitate the recording and monitoring of stakeholder's applications and record.

m. The software application system must be capable of online verification of all MARINA released certificates/clearance.

n. The Certificates created must contain a QR code for quick verification on the MARINA system

o. The software application system and mobile application system shall have a capability of online payment

p. The software application system and mobile application system shall have a capability of online appointment/scheduling.

q. The software application system and mobile application system shall have capability for an online chat for help desk.

r. The software application system and mobile application system shall be developed using software development framework with the latest versions for systems and mobile application and database.

s. The software application system shall facilitate the recording and monitoring of records and credentials.

t. The software application system shall replicate all the functionalities, data bases and reports of the systems being used by MARINA.

u. The software application system must have an account for Maritime Training Institutions, Assessment Centers, Maritime Higher Education Institutions, DOH Accredited Clinics, Manning Agencies for the updating of seafarer's records.

v. The software application system shall be capable of generation of user defined statistics query for top management use.

w. The software application system shall generate the profile of the client.

x. The software application system shall generate the master list or alpha list of all stakeholders.

y. The software application system shall generate list who transacted at MARINA on a yearly, monthly, weekly and daily bases.

z. The software application system must have a checklist for all the requirements.

aa. The software application system should allow dynamic configuration of user defined form using graphical form builder without programming so that creation and changes in the forms can be done without a developer.

bb. The software application system should support common shortcut keys such as, Ctrl + C=copy, Ctrl + V=paste, Ctrl + S=save,etc.

cc. The software application system should allow configuration to define mandatory fields and will not allow deals to be saved if mandatory fields are not filled-up.

dd. The software application system should provide and/or allow creation of additional user-defined fields.

ee. The software application must replicate all the functionalities of the Surveillance Accreditation and Monitoring Information System (SAM-IS).

ff. The software application system should automatically generate transaction reference numbers with option for user-defined numbering convention.

gg. The software application system should provide facility to download information and convert file to a standard and/or common format.

hh. The software application system should provide facility for calendar and holidays maintenance.

ii. The software application system should allow users to add or lengthen tables or fields without need for customization.

jj. The software application system should provide validation rules for data entries.

kk. The software application system should generate descriptive error messages for error handling.

ll. The software application system should incorporate defined controls that will be applied uniformly across all or selected transactions.

mm. The software application system and mobile application must have an access rights.

nn. The software application system and mobile application system shall have a query function that will be able to generate, display and print reports based on parameters defined by the end-user.

oo. The software application system and mobile application system shall have a capacity of monitoring and management of seafarer's education, training, sea service, medical records and other related information as may be defined by the Administration.

pp. The software application system and mobile application system shall record those who submitted questionable documents.

qq. The software application system and mobile application system shall have a monitoring of expired certificates.

rr. The software application system and mobile application system shall have the change password for seafarers with security questions.

ss. The software application system shall have a capability of defining level of security usage and management.

tt. The software application system and mobile application system shall have capability in prompting the end-user for duplicate or double entries.

uu. The software application system shall have capability of merging duplicate accounts.

vv. The software application system shall contain a database that will establish a complete platform that is capable of providing secure, scalable and effective data control and management. The database shall have the capability to handle automated processes and give relevant information on resource management, and other customized monitoring functions.

ww. The software application system must be compliant to performance and response time. Thus, the Bidder must follow the 8 second rule, which means that systems responsiveness must not exceed 8 seconds per transaction. It is also encouraged that bidder should maximize the use of SQL VIEWs, Triggers, Stored Procedures and/or other performance enhancement techniques like clustering, high availability in database efficiency. Moreover, slow queries must be avoided if not totally removed.

xx. The software application system should have user management to create new user accounts with specific roles

yy. Development of biometric API that will interface with biometric capture readers of MARINA.
- The API must be able to compliant to the following:
  - Perform fingerprint capture, minutiae extraction, and 1:1 Matching using simple, small libraries that can be integrated to existing application.
  - Must perform high quality imaging, extraction, and matching algorithm technologies, including Highly-Adaptive Filtering and Advanced Image Enhancement and Restoration.
  - Processes and stores fingerprint minutiae into 3 types of template formats (ANSI INCITS 378, ISO/IEC 19794-2, 400-byte encrypted)
  - Complies with Biometric Standards (ANSI INCITS 378, ISO/IEC 19794-2)
  - Includes NIST Certified algorithms for FIPS 201 / PIV Compliance (MINEX tested Template Generator v3.5, Template Matcher v3.5)

- The API shall be integrated with existing login examination system of MARINA.
- The API shall support capturing of fingerprint on exam centers and uploading of captured fingerprint record to the central server of MARINA.
- The API shall support downloading of examinee information with biometric information and allow offline verification of biometric with 1:1 matching on the facility within the exam centers.
- The API must be compliant to the existing biometric reader of MARINA (Secugen Hamster Pro 20)

zz. The database capabilities shall include the ability to:
- Store, retrieve and update data;
- Establish a complete platform that is capable of providing secure, scalable and effective data control and management;
- Handle automated processes and give relevant information on resource management, and other customized monitoring functions;
- Secure information;
- Handle application clustering (i.e., blending separate machines into a single virtual database based on the growth of the database and increase in the number of transactions); and
- Work with other RDBMS such as Oracle, DB2, SQL Server, MySQL, Postgres, etc.

2. The Bidder shall adopt the Agile Methodology approach on developing the MARINA Automated Certification System.

3. The Bidder shall respond to each issue logged, within the prescribed resolution time depending on problem classification, as shown in the table below:

Severity level	Description	Resolution time
BLOCKER	users cannot proceed in using the system or execution of the module due to this error	4 hrs.
HIGH	not an execution blocker but is a blocker for operations (ex. missing function; impairs data integrity, etc.)	8 hrs.
MEDIUM	not an execution blocker and not a blocker for operations (ex. column header is not descriptive, trash screen displayed, etc.)	16 hrs.
LOW	Standard infractions (ex. displayed fields are not aligned, etc.)	32 hrs.

4. The Bidder must Migrate all databases of existing systems.
5. The bidder shall apply the software application system, and other components not specified, to the overall output of the project.
6. The Bidder shall give advance/prior notice in case of modification/change in the services or products provided as part of maintenance. Implementation of any modification or change shall be subject to the approval of MARINA.
7. The bidder must ensure the smooth transition from old to new system. The old system should still be used by MARINA so as not to interrupt the daily operations in processing of documents. Thus, the bidder must see to it that system releases should be compatible with the old database until such time that all database records shall be migrated to the new updated/upgraded database and then systems shall progressively transition to the new system.

B. Blockchain Requirements

The bidder shall ensure that the system should provide basic functions and features as stated below:

1. Certificate template construction in accordance with MARINA guidelines
2. Certificates shall have a unique certificate ID and underlying information's.
3. Certificates issued directly on the blockchain by MARINA authorized organizations
4. Certificates created contain a QR code for quick verification on the MARINA system
5. The E-Certificates should comply with the IMO FAL.5/Circ.39 dated 20th April 2016 "Guidelines for the use of Electronic Certificates"
6. Cryptographic tokenization of certificates and blockchain hash comparison for validations

C. Security and Privacy Requirements

The bidder shall ensure that the system should provide the Security and Privacy Requirements as stated below:

The authentication and authorization of the system need to be robust to ensure highest level of security. The system prevents all standard web vulnerabilities and provides industry standard security measurements. With a very strong Enterprise system's regular security audit and careful implementation of various measures least but not limited to the following must be taken to prevent any kind of security breach:

1. **Application Security**

   a. The system should be completely secure and foolproof with incorporation of industry standard proven data encryption techniques and methodologies. Those encryption techniques should be audited in timely manner to detect loopholes and updated with the latest patches, in order to ensure that the mechanisms are fitted with the latest security features.
   b. User sessions and cookies should be uniquely re-generated and stored securely each time they log in.
   c. URL restriction should be tight. The system should recognize a logged-in user with proper rights and only present the part of the system that falls within his/her authorization scope. Furthermore, trying to access a URL by guessing should also be prohibited
   d. The URLs for internal users should be relatively unique (only known to administrators and relevant personnel) and separate from the well-known portal URLs. The communication between the user's device and interfaces should be SSL encrypted to prevent data hijacking through network protocols
   e. Configuration and other sensitive system-level artifacts should be securely stored
   f. The access control security function shall provide a facility for the system administrator to suspend an existing user's access rights for a specified period of time or indefinitely.

2. **User Interface Security**

   a. No system level file/information should be accessible throughout the web browser. The system should never allow executing direct files
   b. Facility can be provided to lock a user and unlock as and when required
   c. No invalidated input should be accepted in any web forms – all incoming data should be validated, checked and purified before acting on that
   d. In case of any system failure or error condition, no sensitive information (e.g. database credential) should be displayed on the site. All kinds of errors should be suppressed, logged, gracefully handled and should only be accessible by the administrators with proper rights
   e. SQL/XML/Code injection, Session hijacking/fixation, Output Escaping, Cross-Site Request Forgery, Cross-Site Scripting, Enforced Same Origin Policy, Parameter Tampering, Directory Traversal, Denial of Service etc. should be prevented, logged, and reported
   f. Shall have a privilege and password system that is very flexible and secure, and that enables host-based verification.
   g. Shall have a password security by encryption of all password traffic when you connect to a server.

h. Shall have a two (2) factor authentications
   Client
   1. Username and password
   2. Time-based One-time Pin (TOTP) via email
   Admin
   1. Username and password
   2. Facial Recognition
i. The system must have a forgot password features for all users.
j. The system should have policy for brute force attacks.
   - Accounts with 3 failed login attempts should block.
   - Recover of password should be done by the assigned administrator using administration panel.
   - Idle time of 15 minutes should automatically log out. Or can be set by IT Admin
   - Only alpha and numeric keys are allowed in username and password field.
   - Accounts which are idle for seven days shall be temporarily disabled.
k. The system should have a password reset tool to be manage by the end user requester via email.
l. The system should notify the administrator thru email for new request for change password.

3. **Data Security**

a. The System shall comply with the R.A. 10173 otherwise known as the "Data Privacy Act of 2012", respecting and protecting the privacy of each individual/ applicant as prescribed in the abovementioned law, hence, shall come up with the "Data Privacy Statement" to be posted in the Front-End System and shall notify the users/ applicants every time they log in to the system;
b. The system shall comply to the Data Privacy Policy as approved by Data Privacy Officer of Marina and should comply to the Data Privacy Act of the Data Privacy Commission.
c. No personally identifiable information may be exposed within and outside the system without proper authorization as privacy of the user data must be dealt with utmost priority.
d. Any attempt to breach the security will be recorded with all the relevant data
e. If the system is accessed in the time not defined by the Administrator, e.g. in the case of production deployment, all options will be locked and the user will not be able to use the system.
f. Reports can be retrieved for all audit logs.
g. The bidder must submit a quarterly privacy impact assessment report

4. Network Security

    a. The system must communicate using Transport Layer Security
    b. Public-key encryption methods are used as part of SSL encryption and are expected to be part of the System.
    c. The system must be protected by a cloud based network protection system that support DDoS Protection, Web Application Firewall and Rate Limiting with subscription for three (3) years.
    d. The system must have a licensed Secure Socket Layer (SSL) with license valid for three (3) years.

D. Electronic Payment Requirements

The bidder shall ensure that the system should provide the Electronic Payment Requirements as stated below:

1. The system should be integrated with a payment gateway that can facilitate all types of electronic payment options and media available.
2. Stakeholders should have the ability to make electronic payment for fees using their existing bank accounts/debit card/mobile bank account and over the counter payment.
3. All stake holders (both national and international) should have the ability to make payment through web portal or mobile application.

E. Web Application Requirement

The bidder shall ensure that the system should provide the Web Application Requirements as stated below:

1. The application which is a web-based solution, has to be hosted in a centralized Web-server.
2. The application should be developed following Service Oriented Architecture (SOA).
3. Application should support Model View Controller (MVC) framework.
4. Considering the operating/client environment at different level of this application, it should be developed in such a way so that it requires low bandwidth to run.
5. The web-based application should support cross browser platforms (popular web-browsers such Mozilla Firefox, Opera, Chrome, Internet Explorer, Safari etc.)
6. Should have ability to seamless integration with future module/components /applications
7. Application should be lightweight and rich client-side scripting
8. User Interface (UI) should be developed based on the analysis of User Experience (UX).
9. Any web interface of this application should be fully responsive

F. Mobile Application Requirements

The bidder shall ensure that the system should provide the Mobile Application Requirements as stated below:

1. The mobile application version of the system should be developed for Android and IOS.
2. The mobile app should have capability of displaying system notifications.
3. The mobile app should support registration of new users with verification of credentials and login of users.
4. The mobile app should support e-KYC for registration of users which supports recording of video, and online verification of user accounts.
5. The mobile app should provide QR code and links to verify issued certificates through a blockchain enabled verification system.
6. Functionality for registration options for service recipients
7. App should enable compact view of services for service recipients.
8. There should be an option to auto synchronization with the central database with apps local data based on the availability of the internet connectivity.
9. The bidder shall register the OIS and Android version of the mobile application.

G. Language Support

The bidder shall ensure that the system should provide the Language Support Requirements as stated below:

1. The system should support multilingual option i.e. English and Filipino version for customer facing applications. All the user interfaces will be able to display and input controls can take input both in English. System/App users can choose and set his/her preferred language in profile setting for the system interfaces.

H. Configurable Form and Business Workflow

The bidder shall ensure that the system should provide the Configurable Form and Business Workflow Requirements as stated below:

1. The system shall provide form builder that allows MARINA to dynamically change form fields so that revisions in form can be easily accommodated without need of additional programming.
2. The form builder should allow dynamic changes in the fields for all the forms and supports various types of input fields including textfield, date, dropdown, radio buttons, and more.
3. The form builder should allow setup of page layout into 1, 2 or 3 columns so that page layout can be flexible and designed to fit the user experience.
4. The business workflow should be configurable via a graphical workflow tool that allows changes in the business process. This is essential to ensure that the system can be used without reprogramming when policy of business process has been changed. The business workflow shall allow flexibility of changes in the business process workflow

I. Interoperability and Data Exchange

The bidder shall ensure that the system should provide the Interoperability and Data Exchange Requirements as stated below:

1. The bidder must develop the system following all the standards and protocols of interoperability, integration and data exchange with other systems. It is expected that the system will be based on open architecture and will be fully interoperable with the current and future systems.

   The following are the key expectations on interoperability requirements:

   a. The system should be designed for interoperability using industry standard protocols.
   b. System must expose data by Advanced Message Queuing Protocol and REST via TLS
   c. All imported data must undergo data validation to ensure full integrity.
   d. Data exchange within the system at different levels via the internet shall be encrypted.

   e. The system should have functionality to exchange data with other own systems or external institute systems.
   f. The system shall have functionality to export/import files based on the standard template defined through web services and/or API
   g. Full API documentation must be provided so that third party integrators can integrate their system with this system.

J. System Audit

The bidder shall ensure that the system should provide the System Audit Requirements as stated below:

1. This system shall maintain an audit trail of any changes or updates made in any information that are considered as vital and should maintain the audit log with information such as:

   a. Log the users who are accessing the system
   b. Log the parts of the application that are being accessed
   c. Log the fields that are being modified
   d. Log the results of these modifications
   e. Log attempted breaches of access
   f. Log attempted breaches of modification rights
   g. Timestamp

Ensure an audit trail is kept for all transactions and all audit transactions logged are kept on the trail file or trail database from where system can generate different audit reports as and when required.

K. Database Requirements for all Modules

The bidder shall ensure that the system shall contain the database for easy tracking and reference. At the minimum, the database shall have the following features

1. **Internals and Portability**

   a. Works on many different platforms.
   b. Uses multi-layered server design with independent modules.
   c. Designed to be fully multi-threaded using kernel threads, to easily use multiple CPUs if they are available.
   d. Provides transactional and non-transactional storage engines.
   e. Uses very fast B-tree disk tables (MyISAM) with index compression.
   f. Designed to make it relatively easy to add other storage engines. This is useful if you want to provide an SQL interface for an in-house database.
   g. Uses a very fast thread-based memory allocation system.
   h. Executes very fast joins using an optimized nested-loop join.
   i. Implements in-memory hash tables, which are used as temporary tables.
   j. Implements SQL functions using a highly optimized class library that should be as fast as possible. Usually there is no memory allocation at all after query initialization.
   k. Provides the server as a separate program for use in a client/server networked environment, and as a library that can be embedded (linked) into standalone applications. Such applications can be used in isolation or in environments where no network is available.

2. **Data Types**

   a. Many data types:
   signed/unsigned integers 1, 2, 3, 4, and 8 bytes long, <u>FLOAT</u>, <u>DOUBLE</u>, <u>CHAR</u>, <u>VARCHAR</u>, <u>BINARY</u>, <u>VARBINARY</u>,<u>TEXT</u>, <u>BLOB</u>, <u>DATE</u>, <u>TIME</u>, <u>DATETIME</u>,<u>TIMESTAMP</u>, <u>YEAR</u>, <u>SET</u>, <u>ENUM</u>, and Open GIS spatial types.
   b. Fixed-length and variable-length string types.

3. **Statements and Functions**

   a. Should have a full operator and function support in the SELECT list and WHERE clause of queries
   b. Should have a full support for SQL GROUP BY and ORDER BY clauses.   Support   for   group   functions (COUNT(), AVG(), STD(), SUM(), MAX(), MIN(), and GROUP_CONCAT()).
   c. Should have a support for LEFT OUTER JOIN and RIGHT OUTER JOIN with both standard SQL and ODBC syntax.

d. Should support for aliases on tables and columns as required by standard SQL.
e. Should support for DELETE, INSERT, REPLACE, and UPDATE to return the number of rows that were changed (affected), or to return the number of rows matched instead by setting a flag when connecting to the server.
f. Should support for MySQL-specific SHOW statements that retrieve information about databases, storage engines, tables, and indexes. Support for the INFORMATION_SCHEMA database, implemented according to standard SQL.
g. An EXPLAIN statement to show how the optimizer resolves a query.
h. Independence of function names from table or column names.
i. Can refer to tables from different databases in the same statement.

4. Scalability and Limits

a. Shall support for large databases.
b. Shall support for up to 64 indexes per table.

5. Connectivity

a. Clients can connect to MySQL Server using several protocols:
b. Clients can connect using TCP/IP sockets on any platform.
c. On Windows systems, clients can connect using named pipes if the server is started with the enable-named-pipe option. Windows servers also support shared-memory connections if started with the shared-memory option. Clients can connect through shared memory by using the protocol=memory option.
d. On Unix systems, clients can connect using Unix domain socket files.

6. Localization

a. The server can provide error messages to clients in many languages.
b. Full support for several different character sets, including latin1 (cp1252), german, big5, ujis, several Unicode character sets, and more. For example, the Scandinavian characters "å", "ä" and "ö" are permitted in table and column names.
c. All data is saved in the chosen character set.
d. Sorting and comparisons are done according to the chosen character set and collation (using latin1 and Swedish collation by default).
e. The server time zone can be changed dynamically, and individual clients can specify their own time zone.

L. Database Replication

The bidder shall ensure that the system should provide the Database Replication Requirements as stated below:

1. Must be able to replicate the database of all modules to the MARINA Server Room.
2. Must have a Cross-platform support - Support for multiple operating systems such as Windows, Unix and Linux platforms ensures that the software will function in any heterogeneous network environment with the most commonly deployed operating systems.
3. Must have a Source server automated failover - Setting a target server so that it can automatically assume the functions of the source server can either minimize or eliminate downtime.
4. Must have a Multiple source server failover - Setting a target server so that it can automatically assume the functions of a number of source servers.
5. Real-time and queued replication - Real-time replication means that there is always a duplicate copy of critical data but sometimes if the server is otherwise involved, or bandwidth conservation needs to be practiced at specific times, then the replicated data should be able to be queued.

M. Dashboard Requirements

The bidder shall ensure that the applications for all the modules shall have a "dashboard" functionality that shall retrieve and display statistical requirement. The dashboard shall be displayed on the MARINA server which shall be compatible with most web browsers and available to work on any operating system.

The dashboard shall be designed with a catchy and simple template with clear representation of data and information, at the same time the graphics shall be simple to reduce the required time for processing.

1. Information and data shall be presented in form of charts and graphs that displays statistics with the ability to choose different time scales (today, yesterday, last week, last month, last year and date range).
2. The dashboard shall contain the administrator's access to all data that will be displayed in to the monitor with the ability to download all information and graphs in supported file format.
3. The following set of functions shall be optionally available in the results portion of the dashboard. The results of the report are either represented in a separate browser window (the default behavior), or from within the dashboard for result types of instruments.
   a. Print – this will send the report as displayed to the printer.
   b. Save – this will save the report in its presentation format to the file system.
   c. Save As – this will allow the user to save the file to a fixed set of alternate formats. One example would be PDF.
   d. Email – this will email the report to another user.
   e. View info – this will launch a default browser page form for the selected item
   f. View file – this will launch the selected file (by query) from the database for viewing.

4. Refresh Rate – this property shall determine how often the dashboard shall automatically refresh the data for the active dashboard panel. A selection from manual refresh, 5 second, 2 minutes, 5 minutes, 15 minutes and 30 minutes refresh rate is required.

5. The following enumerates the list of dashboard panels:
   a. List of Reminders.
   b. Bar Graph of transactions received for the last 7 days.
   c. Pie Chart of Breakdown of transactions

N. Non-Functional Requirements

1. User Interface Design/User Experience Design (UI/UX)

The bidder must propose a UI/ UX plan containing UI designing method and tools, prototype or Mockup design (if applicable). UI review method, process for study and analyze UX , collaboration of basic web and mobile UX issues and expected result and outcome of UX, finalizing the UI/UX design. Apart from this, The Bidder should consider the following issues as requirement at the time of UI/UX plan.

   a. The software application system interfaces should be highly user friendly, easy to navigate and ensure fast loading.
   b. The UI shall design by using well-established, supported and lightweight UI framework so that it follows widely used industry flow patterns
   c. UI shall be easily configurable if any changes are needed
   d. Menu, content and navigation shall be based on the user entitlements, roles and permissions.

2. Sizing, Performance and Scalability Requirements

The bidder shall ensure that the system should provide the Sizing, Performance and Scalability Requirements as stated below:

   a. The software application system shall be capable of handling online functionalities for a database of at least 2,000,000/year service recipients and 500 operators System Users.
   b. The software application system shall be scalable to support the volume estimates for a period of 10 years at a 20% annual growth rate.
   c. The software application system shall be designed to handle estimated large scale 5,000 simultaneous connection (online users) when it is ultimately rolled out.
   d. The bidder must conduct an extensive load testing task taking above factors into consideration and submit a load testing results.
   e. The database architecture should be such that the system is available to user 24 x 7 x 365 days a year without any unapproved down-time.
   f. Page load time, login response-time, on-click" load time for the web application should be less than 3 seconds while this is accessed over the intranet.

g. Average transaction response time, on-submit response-time, or any other database access/ search time should be less than 5 seconds when the system solution is accessed over the intranet.

h. Considering the network infrastructure challenges in Philippines, the system must support low bandwidth conditions for the services defined in the functional requirements.

i. In case of mobile application also, this should support very low bandwidth even in 2G network provided internet bandwidth.

j. The proposed solution should be highly scalable to accommodate current and future requirements within the scope of the scope mentioned in the TOR

k. Analyze the requirements whether both horizontal scaling (scale out) and vertical scaling (scale up) will be required for this software application system?

l. The software application system should be provided with appropriate caching mechanism to handle very high-traffic scalability

m. The bidder may propose here other relevant measures for the scalability.

3. Business Continuity

Business Continuity plan will play a vital role by creating the systems of prevention and recovery to deal with potential threats and risk of the systems operation. The bidder must propose a Business Continuity Plan for the software application system.

a. The Bidder shall develop backup and recovery procedures and policies in maintaining the application system. All standard backup facilities should be supported by the system which can be started with disk based backup facility, gradually moving to Storage Area Network (SAN) based backup system.

b. Data and the Operating system core component will be separated. A ghost image of the Operating system will always be available in case of rebuilding the server. All data can be restored in the data drive once the Operating System is restored.

c. System can also have an automated Backup mechanism by which users can schedule the backups and the system will take the backups without manual intervention.

d. System must check for the media and generate a report on backup with date time and details of backup.

e. If a restoration fails for any reason, the system should prompt with proper error messages and suggest what has to be done to rectify the situation via on-screen, logs, email and text messages.

f. System should maintain an automated recovery system and all versions of backup will be maintained. At any given point in time, the versions and incremental backup details can be retrieved from the system.

g. The system may be hosted in virtual servers or containers. A restore of a virtual server/container is much easier and faster compared to a single host server.

4. Disaster Recovery

a. The bidder shall provide a Disaster Recovery Program/Plan which shall describe how the MARINA shall deal with potential disasters. As disaster strikes when least expected, precautions shall be undertaken so that the effects of a disaster shall be minimized or almost negligible or occur unnoticed. The Disaster Recovery Plan shall be detailed enough for all possible disasters such as power outage, computer failure, natural calamities or human error, among others. It shall contain the comprehensive procedures necessary to resume business to its normal operation in the least possible time. Moreover, the responsibilities of the people involved in the operation shall be thoroughly defined.

5. User Acceptance Test (UAT)

All types of users must test the developed system application and have to provide a details feedback/ test report. Based on the UAT report, the bidder must update the application accordingly to ensure user satisfaction by making it more user friendly. The bidder must propose a comprehensive UAT plan in their technical proposal which may cover the followings:

a. UAT activities to be perform (planning, designing test cases, selection of testing team, Executing test cases and documenting, Bug fixing, sign-off etc),
b. Types of user wise roles and test items distribution
c. Resource requirement,
d. Activity wise time requirement
e. Activity wise test case, test results/ deliverables
f. Detail user feedback / test reports
g. System update plan

6. Copyright

a. All kinds of source code including code documentation and other approved documents (i.e. complete source code, database schema, SDD, DFD, administrative manual, user manual etc.) and all kinds of deliverables developed under the scope of this TOR are the property of Maritime Industry Authority and the bidder have to handover these to MARINA.
b. The bidder must provide Copyright Certificate of the Systems and Deposit to National Library of the Philippines.

7. Reports, Forms and Correspondences

The bidder shall ensure that the Reports, Forms and Correspondence Requirements as stated below:

a. System should be able to generate specific reports, forms and correspondences.
b. System should include standard reports for management.
c. System should allow users to create additional ad-hoc reports, forms and correspondences.
d. Reports, forms and correspondences can be viewed on-line, printed on demand, or scheduled as part of end-of-day batch processing.
e. Reports, forms and correspondences can be exported to various file types i.e. MS Word, Excel, Text, PDF,HTML
f. Reports, forms and correspondences can be transmitted via email.
g. System should be able to generate reports providing statistical data on transactions entered in the system.

8. Interfaces

The bidder shall ensure that the system should provide the Interface Requirements as stated below:

a. System should be capable of generating flat files for handoff to external systems.
b. Electronic files transferred between systems should be encrypted on transmission and decrypted on receipt.

9. Inquiry/Search Function

The bidder shall ensure that the system should provide the Inquiry/Search Function as stated below:

a. System should allow users to inquire/search for details using user-defined parameters

N. Design, Development & Implementation Requirements

1. System Requirement Analysis

Requirements finalization will be a very important milestone of the bidder proposed development methodology. It is expected that, the selected bidder will carry out detailed requirement study and analysis on the each and every scope of e-Service that mentioned in the TOR. Under this scope of work, the bidder has to analyze the detail functions, processes, documents, actors, sites and infrastructure of the relevant prevailing system precisely of the concerned organization. The bidder should submit a system requirement analysis plan which should cover the scope of work, relevant activities to be performed, timeline, deliverables to be produced, dependencies and resources to be used.

2. System Design

The detailed functional scope defining and designing as per the standard of software engineering approach for the proposed system tasks are being performed. This is very vital and important phase of any Software Development Life Cycle (SDLC). Considering the ultimate development and implementation scope, the proposed system design should be robust, scalable, user friendly and interoperable enough.

At this system designing phase vendor may perform different following designing related task and will produce various standard System designing Documents (SDD).

a.   Identifying module, components, tasks, I/O and functional features.
b.   Specifying technical and functional requirements.
c.   User Interface design.
d.   Description of UI and requirements.
e.   Preparing the use cases.
f.   Defining Integration and interoperability scope.
g.   Designing system architecture.
h.   Determine process and data flow.
i.   Database design.
j.   API Design.
k.   Finalizing tools, technologies and frameworks to be used etc.

The bidder must cover details system designing plan in their technical proposal which may include relevant activities, approaches, methods, documentations and deliverables.

3. Solution Architecture

The Bidder shall propose comprehensive solution architecture on Blockchain Enabled Certification System which may cover the following items in their descriptive and diagrammatic presentation.

a.   Goals/Results
b.   Service Recipients
c.   e-Service Operators/User (Stakeholders)
d.   e-Service Observers (Service administration and performance monitor)
e.   Database application components
f.   Entity application component
g.   Systems to be integrated
h.   Process application component
i.   Interaction application component
j.   Application
k.   Accessible Points
l.   Networks
m.   Types or Layers of Service Delivery Points
n.   Hosting Site

4. Development & Implementation Methodology

The bidder must provide the complete system development and implement methodology including complete project implementation methodology. The proposed methodology should be justified for this project.

5. Testing

The Bidder must propose a testing plan for the Automated Certification System starting from development to deployment. This testing plan should cover all the standard suitable testing approaches for this system application which may include phase wise testing activities like test scripting, test cases, testing tools, testing process, test log, result and report formats i.e. expected test deliverables based on the application development requirements.

- a. Unit Test
- b. Functional Test
- c. Installation testing
- d. Compatibility testing
- e. Smoke and sanity testing
- f. Regression testing
- g. Stress Testing
- h. Acceptance testing
- i. Alpha testing
- j. Beta testing
- k. Functional vs non-functional testing
- l. Continuous testing
- m. Destructive testing
- n. Software performance testing
- o. Usability testing
- p. Accessibility testing
- q. Security testing

6. Deployment and Implementation

After the completion of development, integration, testing and hosting. MARINA will issue the consent to "GO LIVE". The Bidder shall ensure that the system is ready for exposure to access towards all level of users. The bidder must also submit a Deployment and Implementation plan covering the major activities to be performed, the deliverables to be provided.

7. Additional System Specification for all Modules

The Bidder shall ensure that all the software licenses needed for successful deployment and implementation of the System will be provided.

8. Training and Knowledge Transfer

Training and knowledge transfer must be provided that:

a. The Bidder must propose a detail training plan for the users of the e-service application.

b. The Bidder have to develop and provide so training to the Trainer (TOT), that TOT can provide training to Users of MARINAs nationwide implementation.

c. The Bidder should include necessary training methodology, documentation and training materials support in their training plan

d. The training materials may include user manual, administration manual, quick start tutorial, online help, and frequently asked questions

e. The training plan must describe the sequencing, time, duration and resources involved in implementation of each of the proposed training activities.

f. The training plan should contain full course descriptions for all courses that to be carried out for respective users.

g. The Bidder should develop multimedia training materials for all users. These materials shall be available for viewing and reviewing for all users through a web portal.

h. The training activities should cover the training feedback and evaluation report.

i. The type of training will depend on the function of the participants such as but not limited to System Administration, Database Management, Network Administration, Security Administration, Content Management and others that are deemed necessary in the proper implementation of the modules.

k. The numbers of participants to be trained are as follows:
   - Six (6) personnel for System Maintenance and Development
   - Six (6) personnel for Systems Administration
   - Six (6) personnel for Database Management
   - Six (6) personnel for Security Administration
   - Six (6) personnel for Content Managers
   - Four Hundred (400) personnel for End-User

l. Appropriate training manuals shall be provided for each participant. Training manuals must be easy to understand and comprehend.

m. The bidder shall include in the Bid a preliminary training plan for the training courses to be carried out including but not limited to the following:
   - Course Title and Description
   - Learning Objectives
   - Class Size and Composition
   - Course Duration
   - Training Sequence

n. Training and Technology Transfer shall be conducted before final project acceptance. All expenses incurred during the training shall be borne by the bidder.

9. Documentation

a. The bidder shall provide complete documentation for every deliverable and at every end of each development stage and milestone that will be submitted to MARINA for approval. The documentation shall include all the source codes of the application systems. All documents shall be owned by the MARINA and shall reserve the right to reproduce at no additional cost. All documentations shall be written in English and must be available in both soft and hard formats.

b. The bidder shall provide user and system manuals and technical materials of all IT equipment including all of its components. Complete documentation of hardware, software, utility and CDs shall be provided including the inventory of components and serial numbers.

c. The bidder shall provide (2) two video material explaining the usage and features of the system for both seafarer, shipping companies and other Marina stakeholders.

d. Provision of all documentations (user, administrative and technical) to MARINA personnel including necessary handover and training. Documentation shall include, but not limited to the following:

1. User Documentation
   - Requirements Specification
   - User's Manual / FAQ
     - Operations manual (booklet) on how to use the system, which should cover all types of users and all types of system interactions.
     - e-Learning module (web-based and CD-based instructional training) complete with screenshots and voice- over.
   - Administration Manual
2. Technical Documentation
3. Technical Architecture
   - Architecture Framework
   - Class Diagram, Sequence Diagram
   - Entity-Relationship Diagram
   - Database Schema
   - Database Dictionary
4. System Installation Manual

10. Maintenance and Support Service

The selected Bidder has to provide a period of three (3) years maintenance and support service. The Bidder must provide detail maintenance and support service plan in the technical proposal, which may include the followings-

a. Support service types and mode of services
b. Helpdesk functionalities
c. Configuration management
d. Release management
e. Incident management
f. Problem management
g. SLA (Service Level Agreement)
h. Maintenance and support service related reporting
i. Service Log Management

At the end of 3 years MARINA may evaluate the scope of support requirement and request a new contract for Support and Maintenance from the Bidder.

11. Service Level Agreement

MARINA shall maintain a Service Level Agreement (SLA) with the bidder, with provisions for liquidated damages for their non-compliance. The terms and conditions of the SLA are enumerated below:

Criteria	Description	Liquidated Damages
System Maintenance and Support	Provide 8 X 5 technical support on the problems reported by MARINA based on the prescribed time frames	In accordance with RA 9184 – IRR on Liquidated Damages
Software updates, maintenance releases and patches	Provide software updates, maintenance releases and patches within thirty (30) calendar days after product distribution in the market for the duration of the contract at no additional cost to the MARINA.	In accordance with RA 9184 – IRR on Liquidated Damages

MARINA shall have the right to blacklist the bidder after twelve (12) instances of non-compliance to this terms of reference at any given time during the contract period.

12. Warranties

    a. The bidder warrants that it shall conform strictly to the terms and conditions of this Terms of Reference.

    b. A warranty period of thirty-six months (36) months shall commence upon issuance of the Certificate of Acceptance.

    c. The bidder shall neither assign, transfer, pledge, nor subcontract any part or interest therein.

P. Back up and Recovery

- The Bidder Must provide a two (2) year off-site backup and recovery of the entire system.

VI. BIDDER'S DELIVERABLE

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1. The bidder should provide a running application in Web Application Interface.
2. The bidder should provide a mobile application for both Android and IOS Devices that connects to the MARINA Automated Certification System, with specific features enabled to be provided by MARINA.
3. The bidder should provide a system that runs on latest PHP or Java programming language using Service Oriented Architecture design.
4. The bidder should provide a database running on latest MySQL.
5. The bidder should provide a bootstrap framework and materialize CSS for front end of web application.
6. The bidder should provide a dedicated repository of codes that is securely stored through a private repository. All codes provided by the bidder from day 1 should be place in the repository.
7. The bidder should provide an extensible automation build process that can automatically assemble, build and deploy the application on different servers.
8. The bidder should provide a platform for continuous inspection of code quality to perform automatic reviews with static analysis of code to detect bugs, code smells and security vulnerabilities.
9. The bidder should provide a project management tool for issuance of tickets for both change and incident request.
10. The bidder should provide end user training for all users of the system and in-depth training for the assigned IT personnel to maintain the system.
11. The bidder should provide a dedicated support engineer upon project sign off that can cater support request 8x5 phone, email, remote and on-site request with 2-years warranty for both incident and change request.
12. The bidder should cater a support request with unlimited man-hours for incident request and 500 man-hours for change request for a period of three years upon completion of the project.

VII. CONFIDENTIALITY OF DATA

1. The bidder shall document detailed procedures/techniques in identifying systems security risks and breach(es) and how such shall be handled.
2. All project staff of bidder shall be required to sign a non-disclosure agreement.
3. The Blockchain Enabled Automated Certification System, its components, parts and all products, product samples and specifications, data, ideas, technology, and technical and non-technical materials, all or any of which may be derived from any of the foregoing (all of which, individually and collectively, referred to as "Proprietary Information") are confidential and proprietary to the Maritime Industry Authority.
4. The bidder agrees to hold the Proprietary Information in strict confidence. The bidder furthermore agrees not to reproduce, transcribe, or disclose the Proprietary Information to third parties without prior written approval of the Maritime Industry Authority.

VIII. PRE-TERMINATION OF THE CONTRACT

1. The bidder for the Blockchain Enabled Automated Certification System may be pre-terminated by MARINA for any violation of the terms of the contract. In case of pre-termination, the bidder shall be informed by MARINA, thirty (30) days prior to such pre-termination in conformance with Procurement Law Republic Act 9184 and its Implementing Rules and Regulations.
2. In case of pre-termination, the bidder shall be liable to an additional liquidated damages equivalent to one percent (1%) of the total contract price as provided by the Government Accounting and Auditing Manual (GAAM) and forfeiture of the Performance Security.
3. MARINA shall have the right to blacklist the bidder in case of pre- termination.

IX. PROJECT TIMEFRAME

The project shall be completed within a period of Seven (7) months broken down as follows:

        Six (6) months for:
           a. Data Gathering, system investigation and system design
           b. Software Development
           c. Data Migration and parallel testing
        One (1) month for:
           d. Training

X. TECHNICAL SUPPORT

1. The bidder shall provide technical support via telephone/fax, on-site assistance to resolve technical and other related problems. Resolution shall be delivered in the form of telephone, electronic and/or on-site resolution. It shall refer to a condition wherein the reported problem is resolved by the bidder to the satisfaction of MARINA.
2. The bidder shall resolve a problem within twenty-four (24) hours after it was reported by MARINA thru fax, telephone or email.
3. The bidder shall provide portal intended for monitoring/discussion and reporting on the process of development and implementation.

XI. BIDDER'S QUALIFICATIONS

1. The bidder must have at least three deployed projects in government agency for the past 5 years.
2. The bidder should provide certification from at least FOUR (4) government agencies of successful implementation
3. The bidder must have at least two (2) programmer trained with certification to develop system using Blockchain Technology with least 1-year tenure in the company
4. The bidder shall assign a certified Project Management Professional with at least 15 years' experience as project manager.
5. The bidder shall have at least ten (10) years of experience in the design, development, delivery, installation, testing, and commissioning of information systems
6. The bidder should have been operating in the Philippines for at least ten (10) years and is registered with SEC or DTI and meets PHILGEPS requirements.
7. The bidder must have experience in at least three (3) similar projects in the design, development, delivery, installation, testing, and commissioning of information systems would be preferred
8. The bidder must have completed similar project in software development with data form entry and business process workflow.
9. The NFCC computation must at least be equal to the total ABC of the project.
10. The bidder must submit, in addition to the bidding documents and in a separate envelope: A CERTIFICATION, UNDER OATH, THAT THEY ARE NOT BLACKLISTED BY ANY GOVERNMENT AGENCY.
11. The bidder are NOT allowed to "subcontract" the project to another company.
12. The bidder will be required to demonstrate a functional prototype for the automated issuance of certificates via a blockchain. Prototype must be presented and acceptable to MARINA's "Selection Committee".
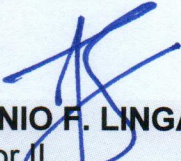
XII. BIDDER'S RESPONSIBILITIES

1. To protect sensitive data, the developer/vendor shall sign a Non-Disclosure Agreement (NDA) to protect the data in the system. Likewise, all personnel of The Bidder who are involved in the project shall sign an NDA.
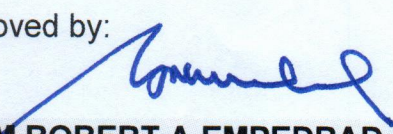
2. Present a Proof of Concept similar to Certificate Issuance and Verification that uses blockchain technology one week after the bidding.
3. Submits weekly status report detailing the accomplishments, project risks and issues, and next tasks.
4. Shall assign the following personnel for the development and implementation of the project
   a. One (1) full time Project Manager
   b. One (1) Systems Analyst (with experience in Systems Analysis and Design)
   c. At least Two (2) full time Developers (experience in web development and Java)
   d. At least Two (2) full-time Mobile Developer
   e. At least Two (2) full-time Blockchain Developer
   f. Database Administrator
   g. End-User Trainer
5. Performs capacity planning and provide hardware and network recommendations to ensure sufficient infrastructure is in place prior to full rollout.
6. Performs Quarterly web vulnerability assessment / penetration testing to verify the security configuration of the application.
7. Ensures all deliverables are submitted on time.
8. Ensures that application will be ready for deployment to the cloud.

9. Training of MARINA personnel on all regions for nationwide roll-out.
10. Ensures that key project risks that impact the project are monitored and visible to all project stakeholders.
11. Submit User's Acceptance and Testing Plan
12. Provides warranty and 8:00 A.M. to 5:00 P.M. technical support for 3 years after the system has been deployed for production use.
13. The Bidder shall provide all the software licenses needed to ensure successful deployment and implementation of the system.
14. The Bidder must update all documentations on a semi-annually basis and must submit the final documentations before the expiration of warranty period.

Prepared by:

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Administrator

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