TERMS OF REFERENCE (TOR)

For

Electronic Document Management System (EDMS)

And

Digital Archiving Service

Prepared By

Ministry of Foreign Affairs

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1. Background

The Ministry of Foreign Affairs formulates and executes the foreign policy of the Government of Bangladesh. The core guidance of policy formulation comes from the relevant section of the Constitution of Bangladesh in developing the external policy of the Republic, the Ministry draws from the laws of the land, acts of the Parliament, international treaties that Bangladesh is a State party to, and other customary sources. In discharging its functions, the Ministry follows the provisions of the Rules of Business of the Government of Bangladesh. The Foreign Ministry represents the State to foreign governments and international organizations through its 72 missions across the globe. The Ministry's goals is to develop and maintain friendly relations with other States and foster cooperation with developed, developing and least developed countries, and various regional, sub-regional, political and economic groups. The Ministry pursues Bangladesh's external economic and trade interests, promotes its culture abroad, and disseminates information to foreign countries. It safeguards the legal rights and promotes interests of its citizens and other legal entities in foreign countries. The Ministry discharges its diverse duties through its headquarters in Dhaka and through its network of Missions aboard. The work of the Ministry is conducted by a number of wings. These divisions gather, analyze and process information, set priorities and draws up options according to the allocation of their individual areas and responsibilities.

Digital archiving is a warehouse of digital material that a company or person desires to keep for a longer period of time. It stores collections of digital information such as documents, videos, images, etc. in a digital format with the intention of providing long-term access to the information. A digital archive is similar in purpose to a physical archive, but the historical documents and objects that provide evidence of the past have been digitized (often by scanning or photography, unless a document was created digitally in the first place) and made available online. The purpose of Digital Archive is to preserve as well as provide long-term easy access of documents of the Ministry from anywhere at any time to the authorized officials of the Ministry.

The objective of the Digital Archiving System is:

1. To ensure efficiency in work process through curtailing the document handling timeline.
2. To provide a secure digital storage solution for documents, preventing improper handling, theft, breach of security and physical damage due to any natural disaster.
3. To ensure compliance and regulatory requirements for Record Management.
4. To digitally manage and archive legacy/historical documents without unnecessarily occupying office space.

2. Review of Existing Services

2.1. e-Service Scope

The vendor will be required to complete the development and deployment of Digital Archiving System for this division as an application following the SDLC methodology and perform the relevant activities accordingly within a proposed stipulated time.

This system's implementation project can be divided into 4 major phases which are described hereunder.

2.1.1. Phase-I: Requirement Analysis & Design

This is the starting phase, in this phase project plan, requirement fixation & high-level design will be completed for the entire project. The entire functional scope that will be finalized in the "System Requirement Analysis & Design" phase may be divided into separate independent multiple packages. Each package may contain a number of components, modules and features based on the implementation priority, dependency, and integration complexity. This entire system must be designed and developed following micro service architecture so that inter dependencies and integration functions among the modules and features of different components of multiple packages will be smooth but very organized.

2.1.2. Phase-II: Development & Release:

Each package's components/modules and features will be developed and released in an iterative methodology with predefined steps passed LLD, development, Integration and Testing. After successful completion of this package development as per predefined expected standard and result only this iteration cycle will be completed and will release the developed and tested application as Beta version of this package.

2.1.3. Phase-III: UAT and Deployment:

After releasing the packages developed and tested application as Beta Version, this will enter in the phase i.e. UAT and Deployment. In this phase, the actual user feedback and review will be taken and finally the application will be accepted by the User Authority after passing certain tests. Then the required training as per predefined training plan will be provided and also after taking necessary measures the deployment will be done successfully to make this application LIVE as per the plan that will be prepared in the Project Management plan at the inception phase.

2.1.4. Phase-IV: Pilot & Maintenance

After final deployment and going live with the acceptance of implementing organization, the piloting implementation and maintenance support service will be started at this phase pilot implementation will be conducted for a certain period with close intervention, caring &

support of the vendor. After the expiration of piloting period, this maintenance support service will be continued as per agreement.

The ultimate scope of this eGovernment solution of this ministry is to design, develop, and implement Digital Archiving System for this division and its organizations will be digitized with proper simplification and integration. As a holistic digital service delivery approach, all the existing digital service applications i.e. software/systems will be required to be integrated which is described in the **"Integration Requirement"** section. For detailed clarification and understanding the required high level functional scope of major services are described in the "**Functional Requirement**" part below. It may be **noted** that, the other remaining manual service delivery processes may require to be digitalized under the scope of this service delivery platform based on the requirement that will be stated at the **"Requirement Analysis"** phase by the implementing authority regarding G2C & G2B services delivery of this ministry and its organization. Covering all the possible scopes, vendor may propose their best architecture and service delivery solution for this system in their technical proposal.

3. e-Service Functional Requirements

3.1. e-Service Functions and Features

The major modules functional features are described hereunder which are required to be considered in scope finalization of this eService development at the requirement study and analysis phase.

3.1.1. Digital Archiving System
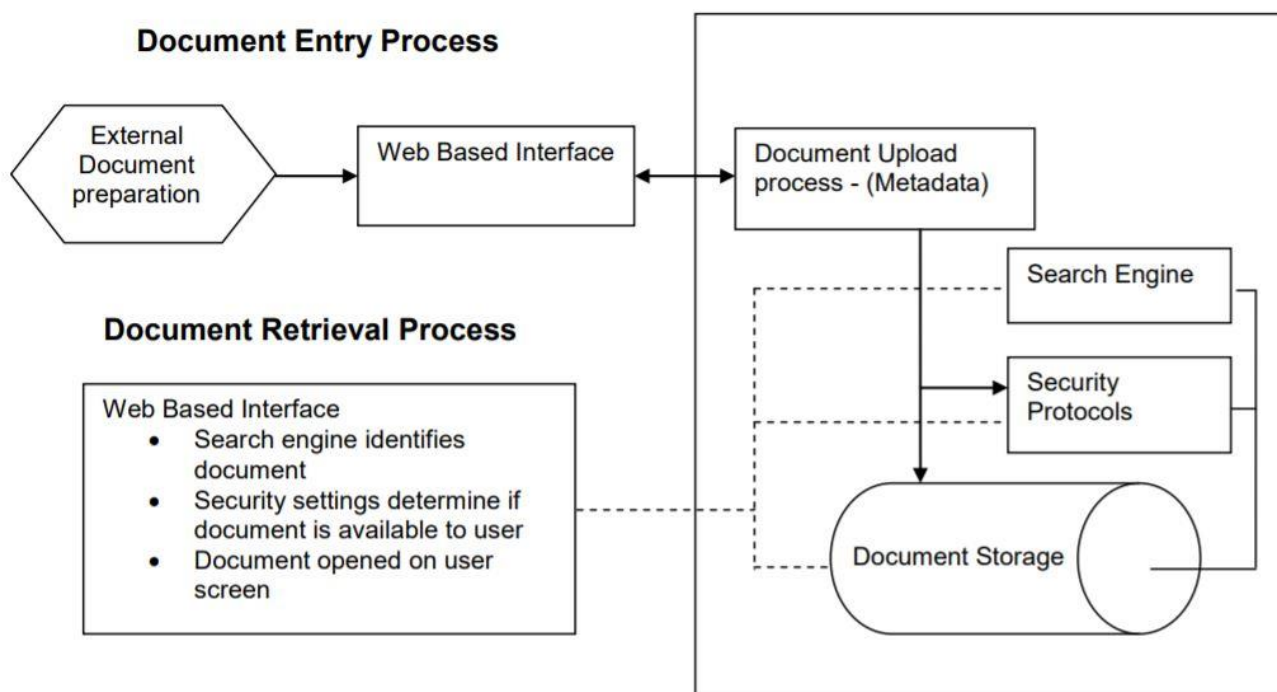
Figure: Archive Management System

Key Features:

- ➢ User Management
- ➢ Role Management
- ➢ Content Management
- ➢ Content Approval Workflow/ Approval Management
- ➢ Document library
- ➢ Manage documents and multi-level folders/ Document Categories

➢ Multi criteria advanced search features based on documents, boxes or location reference.
➢ Automatic cataloging
➢ Document version control
➢ Document event log history
➢ Merge multiple documents into single PDFs
➢ Bulk file uploads
➢ File routing and approval/ Document Sharing
➢ Customizable dashboard
➢ Advanced preview
➢ Log Management
➢ Tracking
➢ Barcode reading
➢ Integrations with different Systems
➢ Multi-level permissions and security
➢ Indexing & Optimization/ Verification Management
➢ Secured file and data exchange through super-secured encrypted channel to ensure required security for the ministry.
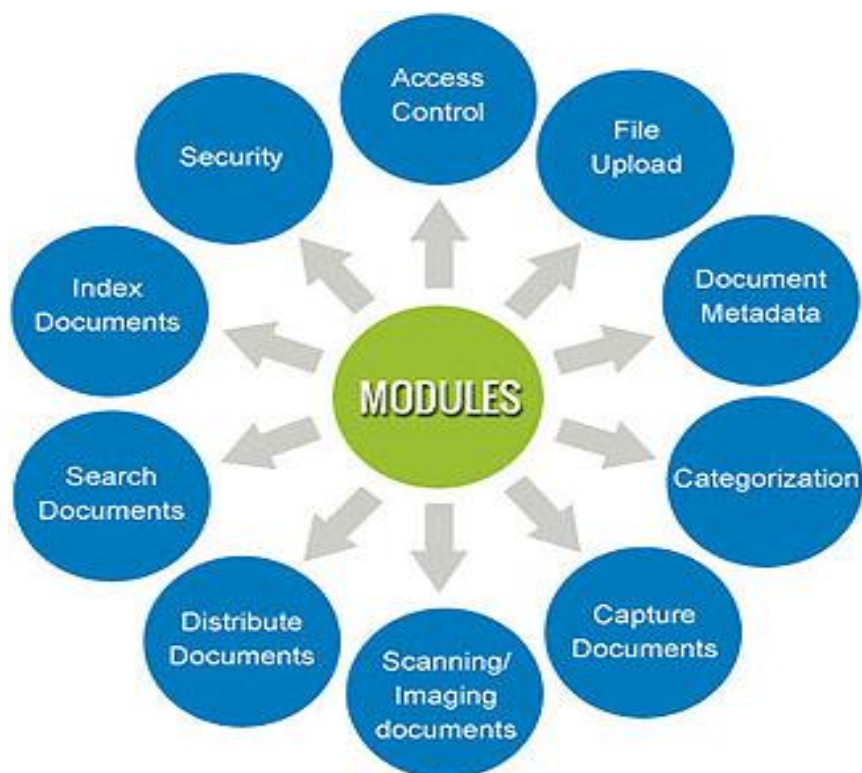
SN	Requirement
1.01	Ability to provide for user-defined indexes for easy search and retrieval of files
1.02	Ability to provide for filing and indexing of documents for quick retrieval
1.03	Ability to provide facility to add keywords with documents to act as quick reference for the documents
1.04	Ability to Support bulk uploading with indexing or import from other applications
1.05	Ability to support web interface for viewing image documents
1.06	Ability to facilitate zoom-in/zoom-out, zoom percentage and Zoom lens to zoom in on a part of an image and other image operations like Invert, rotate etc.
1.07	Ability to support Thumbnails on image documents and viewing of the same.
1.08	Ability Upon completion of search, immediately to display all selected images and support quick navigation through documents.
1.09	Ability to provide for save and publish common searches for quick access
1.10	Ability to provide for quick search within a saved search
1.11	Ability to provide for use a saved search as a template for similar searches
1.12	Ability to provide for rapid search and retrieval on multiple very large document repositories.
1.13	Search Criteria should be configurable
1.14	The Document management system shall support definition of Users, Groups and Roles relation in the system
1.15	The system shall support access permissions on Folders, documents and object level
1.16	The system shall support multiple levels of access rights (Delete/ Edit/ View/ Print/ Download)
1.17	The system shall support system privileges like Create/Delete Users, Define indexes etc.
1.18	The system shall support secure login id and passwords for each user and passwords shall be stored in encrypted format in database

1.19	The system shall support extensive password validations like passwords must be of minimum 8 characters, shall be alphanumeric, locking of user-id after three unsuccessful attempts, password expiry, password history so that passwords are not same as previous passwords etc.
1.2	The system shall support Disaster recovery by replicating the data at remote locations
1.21	The system shall support provide support for HTTP/SSL for secure data transfer
1.22	The system shall provide integration facility with another platform and shall support single sign on
1.23	The system shall support Extensive Audit-trails at document, Folder and for highest levels for each action done by particular user with user name, date and time
1.24	Support for rule and roles-based rights
1.25	Support for rights on administrative reports
1.26	Ability to restrict part of the document from selected users (document redaction)
1.27	Ability to classify the document under security levels and restrict document access through security levels
1.28	Ability to generate security related reports such as document uploading, downloading printing, etc.
1.29	Ability to provide item wise permission if required
1.30	Ability to restrict document viewing, printing, downloading and etc.
1.31	The system shall support web-based administration modules for the complete management of the system.
1.32	The admin module shall provide easy to use interface for Index structure definition, that can be used by different users
1.33	The admin module shall provide an interface for purging old audit trails and do selective logging i.e. select the system or application features for which the audit trails have to be generated.
1.34	Document management solution should be able to manage retention of the document base on the index
1.35	System should have the feature to restrict admin from unauthorized changes in the system. This feature needs to be flexible, which can be enabled based on organization policy.

1.41	Describe the features that enable Solution to scale for high-volume imaging applications.
1.42	System should have ability to tract the physical file location
1.43	Should be scanning capacity Up-to Legal size page
2	**Version Control**
2.1	Ability to manage version control of documents including check in, check out, view history, view latest version, write version comments, etc.

Based on the above requirements, the following modules may be considered as the primary scope for digital archiving system as reference but not limited to:

Module:01 Document Management			
SL	**e-Feature**	**e-Feature Description**	**Integration**
1	Document Archival	It provides a central repository to archive high volume of documents that can be accessed and shared between multiple users, locations or the entire enterprise. Different document types and content are archived through rights based archival.	
2	Document Category	There will have options to create different document categories to store and manage different types documents in the system.	
3	Document Uploading & Storing	The authorized users with specific accessibility will be able to upload documents in the system. The document will be optimized while uploading. The malicious documents will be detected and skipped automatically in the time of uploading to ensure secured environment. The system will have provision for bulk uploading of the documents. The meta information of each document will be stored while uploading of the documents so that the documents can be searched quickly.	
4	Document Versioning	It'll maintain different versions of the document while it's updated.	
5	Document Indexing & Processing	Centralized indexing and post branch scanning along with Maker-Checker scenario for document processing.	

6	Document Accessibility	User can mark the existing files and it is viewable only to the concern users or s/he can mark any document for editable, sharable or downloadable to everyone in the system or to a certain group of users. The system will maintain the accessibility strictly as per necessity. The system will allow lock/unlock folders/documents using secured password to ensure proper security as per necessity.	
7	Enterprise Search	The exhaustive document and folder searches on date, indexes and general parameters as well as full text search on image and electronic documents.	

Module 02: Administrative Management			
SL	**e-Feature**	**e-Feature Description**	**Integration**
1.	User Management	The system will have provision to Create / Update / Delete users and roles to perform their tasks in the system as per the assigned role.	
2.	Folder Management	This module is useful in the folders and sub folders management here authorized user can Create / Update / Delete folders or sub folders.	
3.	Access Management	This module is useful in assigning different roles and access rights to different folders for the different users. With this feature the application is completely secured towards unauthorized access keeping documents in safe hands	
4.	Log Management	The system will maintain logs of the update/changes of every documents.	
5.	Department / Work Area Management	This module is useful in case of defining work area of the users. Here authorized users can Create / Update /Delete department or division or work area.	

Module 03: User Authentication			
SL	**e-Feature**	**e-Feature Description**	**Integration**
1.	Access Identification	Any citizen accessing the system will be asked for valid phone number. An OTP sent to the phone over SMS will allow the user to be identified with a registered phone number.	TELCO

2.	Access Verification	User entering OTP sent over SMS can access the service list to use the system and thus access of valid users may be maintained. Once verified, User will be sent SMS notification stating Session access for time period.	
3.	Notification	Citizen get OTP over SMS and in e-Mail for verification confirmation message.	TELCO
4.	Dashboard	Stakeholder can see all applications, search, review, change status of applications. Number of applications, verified, not verified, and registered/ server applications will be calculated by system and statistics can be found in dashboard with detailed reports for date range, service type, category of certificate, served persons etc. Filter like physical delivery, electronic delivery, non-delivered applications should be possible.	

Module 04: Dashboard & Report Management			
SL	e-Feature	e-Feature Description	Integration
1.	Sectorial Progress	The dashboard will show sectorial progress of the ICT implementation. This can be in tabular format or in chart having sectors, Ministry/Division, Status (Completed, In-Progress/Ongoing, Depreciated, Not Done, etc.) etc.	
2.	Multi-Layer Dashboard	The system will have provision to display dashboard content and information in multi-layered approach based on the settings and access control. The system will have dynamic access control to manage this multi-layer features.	TELCO
3.	Report Management	The system will generate Ministry/Division/Department wise periodic reports. The system will also have options to generate custom reports based on custom date range and other parameters.	

Note: The interested vendor must comply with all the above-mentioned modules and features but do not have to be limited with this list only. It should be precisely noted here that at the time of system requirement analysis phase, the implementation organization/agency will have full right to include other features and functionalities those are completely relevant to this assignment.

3.1.2. Existing Documents Scanning & Archiving

There are several types of documents that needs to be digitized e.g. HR file, Administrative file, Various sections file and other correspondence file etc. The cumulative number of pages will be approximately 15 lacs. This entire digitization will be a service that vendor needs to provide for which below are the activities that needs to be performed.

1. Pre-process/Post Process
2. Scanning
3. Image QC
4. OCR
5. PDF Assembling
6. Up-to 3 fields index

Scanning Specification:

1. Raw File format: TIFF/JPEG Standard
2. File format: PDF
3. Resolution: 200 dpi
4. Color depth: 1 bit bi-tonal (B/W) and 24-bit color

In order to perform all of the above tasks, vendors are responsible for the followings.

1. HR – Pre-processors, Post-processors, Scanning Operators, Scanning Assistants, Indexing Operators/Data Entry Operators, OCR Operators, Uploading Operators
2. HR – Project Manager, Assistant Project Manager, Shift Supervisor, Network Engineers, Scanner Maintenance Engineer
3. Computers
4. Scanners (Enterprise Scale Book scanner, large format scanner, Overhead Scanners, Production ADF scanners, A0 Size Flatbed scanners) as many quantities required to complete the 15 lacs pages digitization within 4 months.
5. Accessories for Scanners i.e. Consumables Guillotine, stapler, scotch tape, pin remover, binder etc.
6. Printers (reporting purpose), Book Binding & Unbinding etc.
7. Provide advance level operational & maintenance training on digitization

Vendor is requested to submit a **"System Functional Requirements Description (Ref. Doc- 1)"** covering detailed functional scope to be covered in this project. In the proposal the vendor may add other relevant functionally described feature if they find it relevant.

Apart from this, the interested vendor should analyze the other scopes which are relevant to the areas covered above and should propose the best possible and comprehensive ICT solutions in their technical proposal. The ultimate modules and features of the proposed system will be finalized at the requirement study and analysis phase of SDLC based on

client's actual requirement, acceptance and vendor's best proposal/solutions relevant to the above-mentioned area and scope.

3.2. <u>Solution Architecture</u>

Solution architecture plays a useful role at the initial stage of understanding of the solution ideation, solution design, and solution implementation plan. Here the solution architecture is expected to establish the complete understanding of the business context .i.e Service delivery and receiving process in digital form, the vision, objectives and ultimate requirements of this solution for proposed application.

This architecture should define the process of developing and documenting covering the context of the proposed e-Service solution including all impactful and applicable architecture domains such as Micro-Service approach, accessibility, business, data, application, technology, integration, cross cutting issues like security, management operation etc. The solution architecture will elaborate and further decompose the target architecture into architecture deliverables for each architecture domain. The vendor shall submit a **"Comprehensive Solution Architecture (Ref. Doc- 2)"** in their technical proposal which may include business architecture, information architecture, application architecture, and technology architecture focusing on the scope mentioned in this TOR.

Understanding the context, objective and the functional scope of this proposed system. Vendor is expected to submit a comprehensive "**System User Management Plan (Ref. Doc-3)"** in the technical proposal which should include or cover categorization of major users, accessibility, authentication, authorization and overall management for the solution.

Note: In case of requirement for integration with e-filing system (Nothi) the vendor must include their Single Sign On solution in their proposed User Management Plan.

Vendor should submit a comprehensive plan and approach covering different types of users and their roles providing accessibility, privacy, confidentiality and transparency based on the given statics. Also have to mention the user friendliness login system.

If the proposed system is integrated and interoperable with government prescribed e-Filing system (e-Filing) then vendor will design the seamless, smooth and user friendly single login system.

4. SDLC Approaches & Methodology

Considering the current context of digital government implementation of Bangladesh, we've proposed hereunder a tailored SDLC methodology for the development of this

eService solution. Under the scope of this SDLC methodology, for effective, efficient, timely and fruitful development of this system and achieving early release as a tangible result, the scope of this project can be divided into 2 packages (components & modules) based on priority and dependency of the modules and features to be developed and released. At the project inception phase, the two packages components/modules will be defined by the concerned authority (implementing agency) discussing with the vendor.
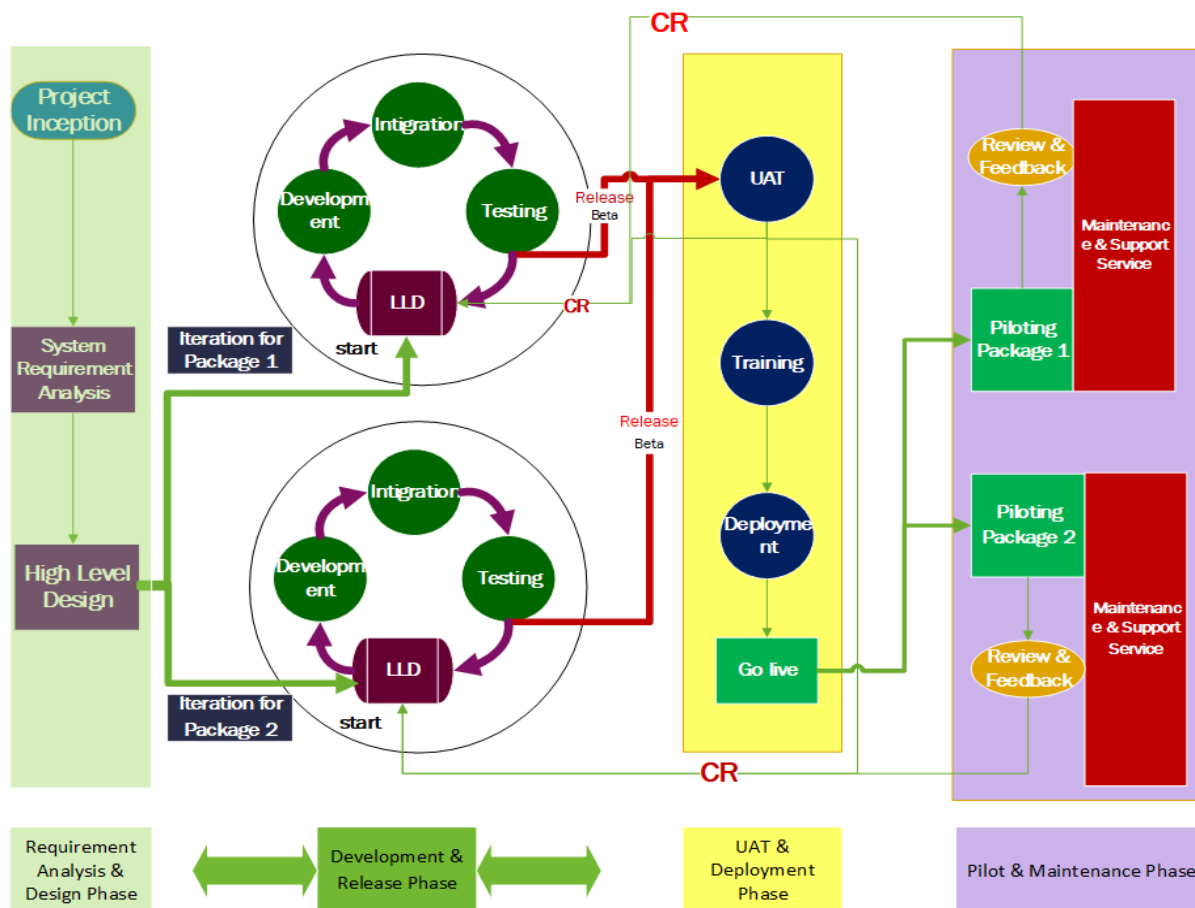
Figure: Hybrid SDLC Methodology

The methodology covers the following phases:

4.1. Phase-1: System Analysis & Design

4.1.1. Project Inception:

The SDLC process will be started from this phase. Project will be initiated with a kick off meeting between vendor, implementing agency & relevant stakeholders. At this phase, the entire project scope mentioned in TOR will be briefed and discussed extensively, the package boundaries will be defined, preliminary project implementation timeline, project management plan format & content structure will be discussed. At the end of this phase, vendor will submit a comprehensive and detailed project management plan for client's approval with a

power point presentation and submit hardcopy of documents. On receipt of approval of the project management plan, only the phase will move to **Phase 2**.

Deliverables: Approved Project Management Plan

4.1.2. System Requirement Analysis:

The vendor will initiate the project with this phase which includes requirement finalization for the entire (Package 1 and Package 2) project scope from functional aspect.

Proposed e-Services requirement study, analysis and finalization is a very important phase in the entire SDLC. It is expected that, the selected vendor will carry out detailed requirement study and analysis on each and every scope of e-Service that mentioned in the TOR. Under this scope of work, the selected vendor has to analyze the detailed functions, processes, documents, actors, service delivery sites and infrastructure of the relevant services precisely of the concerned organization. At this phase, vendor's ultimate objective will be finalization of the e-Service requirements in details under the scope of TOR and receiving approval of the concern organizational authority. Here vendor is requested to propose and submit a software requirement analysis plan which should cover the relevant activities to be performed, required timeline, specific deliverables to be produced, determine dependencies and resources to be used.

Deliverables: Software Requirement Specification (SRS) and UI based non-functional prototype/ Mock.

4.1.3. High-level System Design (HLD):

The phase-2 is entirely dependent on phase-1 deliverables which will only be initiated after the completion of phase 1.

The scope of the high level design phase will be based on the entire project's (Package-1 and Package-2) approved SRS. However the HLD document (if required) can be updated based on the changes of SRS i.e. version changed of SRS on received CR.

Here, high-level design will ensure the architecture that would be used for developing this e-Service solution. The architecture diagram will provide an overview of an entire system, identifying the main components that would be developed for the e-Service and their interfaces.

The ultimate deliverables of this design will be high-level design document or HLDD which adds the necessary details to the current project description to represent a standard model for coding. This document includes a high-level architecture diagram depicting the structure of the system, such as the database architecture, application architecture (layers), application flow (navigation), security architecture, technology architecture and integration blueprint.

Deliverables: High-level design document or HLDD.

4.2. Phase-2: Development & Release:

Based on the priority, importance and dependency, the project scope will be divided into two or multiple Packages as per organizational consideration and decision. Each Package will be completed through an iteration. The iteration process may follow the scrum process with several sprints of Agile Methodology. The iteration includes several steps such as LLD (Low Level Design), Development, Integration, Testing, Review and Release. For detail clarification the "Iteration 1" steps for Package 1 are described below:

4.2.1. Iteration 1 for Package 1:

Low-level design (LLD) is a component-level design process in which the actual software components, modules and functional requirements are designed. This process can be used for designing data structures, required software architecture, source code and ultimately performance algorithms. Vendor will have to submit a report on LLD based on which development will be started.

Deliverables: Package1 LLDD version 1.0

4.2.2. Development:

At the development stage based on the LLDD, a development team will be mobilized who will start the coding process following the standard code convention, code level documentations, header of each file, algorithms, interfaces, code compression and APIs should be supplied with proper description within the given schedule as per the plan. The team will strictly follow the standard procedure of version control of codebase, database and related files using stable version control tools. The vendor will use standard project management tools to manage and track issues as well as monitor development progress. The client (Govt.) or client nominated representative/product owners need to have access and control to the version control system and in project management tools to manage and monitor the development process.

Deliverables: Developed   features/modules/components/applications,   code documentation, algorithm & interface related documents, development & versioning report, Test driven development (TDD) approach should be included at this stage to ensure smooth development etc.

4.2.3. Integration

Considering the Integration requirements and scopes defined in the SRS, HLDD & LLDD for this e-Service application, the vendor must perform the planned integration

activities. At this stage, the vendor will perform all necessary above mentioned tasks & follow guidelines regarding integration to make the e-Service application interoperable.

Deliverables: Integration testing reports, Integration activity report

4.2.4. Testing

Software testing process is one of the most vital phases through which it will be expected to evaluate each and every functionality of the proposed software application with an intent to find whether the developed application's functional features meet the specified requirements or not.

The vendor should prepare an extensive testing plan so that any functional failure can be detected and corrected timely and properly. The scope of the software testing should include the examination of code as well as the execution of the code in various environments and conditions as well as examining the aspects of the code; does it do what is required.

The vendor must propose a comprehensive testing plan in their technical proposal for this e-Service application starting from development to deployment that is covered in the full test life cycle. This testing plan should cover all the standard testing approaches applicable for this e-Service solution 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. The vendor should submit testing plan which may include standard test approaches. Some are mentioned below as examples for reference.

1. Unit Test
2. Installation testing
3. Compatibility testing
4. Smoke and sanity testing
5. Regression testing
6. Stress Testing
7. Acceptance testing
8. Alpha testing
9. Beta testing
10. Functional vs. non-functional testing
11. Continuous testing
12. Destructive testing
13. Software performance testing
14. Usability testing
15. Accessibility testing
16. Security testing
17. Concurrent testing
18. System testing
19. Integration testing
20. Performance testing.

Deliverables: Test Plan, Test Scripts, Test Logs, Test Reports, Feedback.

Note: Based on the Test reports and received feedback (Change Request) the LLD, version, developed application may be changed accordingly.

4.2.5. Release:

After successful completion of "iteration 1" that is predefined, successive steps will be executed properly with expected quality, the developed application will be released as a Beta version considered to be deliverable of this iteration. In case of unsatisfactory testing reports, the iteration will be continued accordingly without any release.

Deliverables: Released application (Package 1) with versioning

4.2.6. Iteration 2 for Package 2:

For another package i.e. another same iteration may be started based on the mobilized team's availability and mobilization plan. Like for iteration 1, the engaged team for LLD will be released almost just after entering into the development step, so that team could be assigned for the LLD of iteration 2. In the same way, the development team of iteration 1 will be engaged mostly till integration, therefore a part of this team can be mobilized for the development phase of iteration -2. Therefore, based on the availability of adequate resources, engagement and mobilization plan, vendor may run both packages i.e. 1 and 2 almost simultaneously at different development iteration plan. In this case, iteration -2 will follow the same steps like Iteration -1 to deliver the package and release as a BETA version for UAT and deployment.

4.3. Phase-3: UAT & System Deployment

As soon as one iteration releases any developed application after completing the predefined steps and processes, this released version will be entered into this immediate phase i.e. UAT and system Deployment. The basic objective of this phase is to receive user feedback, adjust them, take final consent or acceptance of user, and ensure system testing for deployment, training and taking final deployment actions to GO LIVE. There may be basically 3 major steps are involved in this phased which are described hereunder:

4.3.1. User Acceptance Test (UAT):

Just after the release from an iteration as BETA version, developed application will enter into this UAT Process. At this step, the system will be tested by the users of different levels extensively to receive their precise feedback and review. Based on the received feedback and review, the process may lead to the previous state i.e. may enter into the previous iteration again with defined CR to adjust. Finally when user's valuable feedback and review will be addressed, this application will be ready for User Acceptance. This step will end with the user acceptance for the BETA version to move forward.

Deliverable: Accepted application (With version) and UAT Report

4.3.2. User Training:

After completion of the UAT, at this step, User training will be required to be provided as per predefined project management plan and timeline. User training has to be very extensive and detailed so that users of each level will receive this training and will be capable to operate and run this system without any major technical dependencies.

Deliverables: Training Manual, Training Plan, Training Feedback, Training Report

4.3.3. Deployment

Deployment is a very important step in the SDLC before going LIVE where different types of necessary and standardized activities should to be performed as per predefined plan. The deployment plan should be prepared in a comprehensive manner choosing the appropriate deployment method and right deployment checklist. Automating deployment process as much as possible is a wise decision at this step. Obviously adopting continuous delivery and using integration server is necessary. Deployment preparation also may include another code deploying entering version release notes, checking that the required server is running smoothly and configuring staging environment properly. At this step, there are various testing processes that should be performed as a part of the obvious process. The deployment test plan and method should be chosen well ahead. This may include deploying the update to test environment, running each and every test code/scripts and reviewing results. Finally this deployment process may continue with copying the updates to the production environment, running any necessary scripts, setting changes for live and testing on the live server before going LIVE.

4.3.4. Go Live:

Successful deployment of any developed and tested application will lead finally to the "GO LIVE" state. The inauguration of the application may take place immediately when it enters into this stage. As inauguration is the formal session to expose or open the application to the end users/citizen, therefore proper consent of the concerned implementation Organization/Agency is required before going LIVE.

4.4. Phase-4: Piloting & Maintenance

It may be stated that the pilot phase will be started immediately with the starting of "GO LIVE" which should last a maximum of 3-6 months based on the decision of the implementing Agency/Organization and predefined accepted pilot implementation plan. The vendor will provide all necessary support to ensure smooth operation in the pilot phase. It may be mentioned here that, some change requests (CR) based on the end users review and feedback at this piloting stage may be required to be accepted and CRs will be adjusted through predefined development cycle. Obviously at this stage, those CRs must be considered aligned to the Terms of Reference (ToR) of the assignment avoiding major functional changes that may create alternation on architecture, database structure and development complexity. In this case, CRs related to UI and UX, frontend scripting and content presentation level may be accepted. In this piloting phase, technical support, continuous training, timely reporting, receiving end user's feedback and measuring the overall performance of the application are the important factors that should be taken care of by the vendor at this stage.

4.4.1. Maintenance & Support:

Maintenance phase will be started in this SDLC methodology. This phase is very important because the actual maintenance support service will be started by the vendor and the implementing organization will also take measure for scale up implementation of this software based on the result of the pilot. Those two important issues of this methodology are described hereunder:

In case of software implementation, especially for the e-government, maintenance support service plays a very vital role. Vendor needs to provide this maintenance support service as per the predefined plan and action which will be approved by the implementing organization at the inception phase under the project management plan. At this maintenance phase, the main objective will be ensuring this e-government or digital service application operation is running smoothly, uninterruptedly and without any hassle or complexity. Some factors mentioned below are very important at the time of maintenance support service by the vendor.

1. The developed and deployed digital eservice application should run smoothly and bug freely.
2. In case of any technical problem or support requirement, vendor's response for solution has to very prompt.
3. Based on the type of technical complexity and support requirement, the response and problem solution plan has to be predefined and precise through a signed SLA.
4. Vendor must consider contingency plan to manage and solve sudden complexity, technical problems arose and support request.
5. The help desk remote support should be comprehensive, strong, standard and adequate.
6. Improving user engagement, user training and receiving user review & feedback should be considered in the maintenance support plan.

7. Communication, software performance evaluation, continuous improvement for user satisfaction and right time reporting to the concern authority should be planned well ahead and execute the same timely as standard service.

Based on the analysis of the impact of piloting phases and adjusting the plan, scale up implementation has to be done. In this case, the vendor will provide proper guidelines and different kinds of planning support to the organization so that the implementing organization can complete the scale up successfully

<u>Deliverables</u>: Support and Maintenance Plan, SLA, Running Digital Service

Note : The above mentioned hybrid methodology is proposed based on the e-Government Application/Digital Service implementation context, priorities, dependencies and challenges. This hybrid methodology has been proposed here customizing few popular SDLC methodologies like Agile Scrum, etc. Understanding the scope of the project and other important context and factors, vendor may follow this proposed hybrid methodology, or may customize it as per necessity or may propose any other different SDLC methodology with proper justifications in their technical proposal. The project implementation time plan /schedule should be proposed in the technical proposal completely based on the chosen SDLC methodology   by the vendor.

But vendor is requested to describe the **<u>"SDLC Methodology (Ref. Doc- 4)"</u>** for this project in details in their technical proposal covering the following

1. Diagrammatic representation of the proposed SDLC showing the phases, methods, processes, flow, steps, deliverables etc.
2. Proper justification/rationality for choosing the SDLC and context/factors considered in choosing the same. The advantages of this SDLC should be stated very clearly and precisely in respective of this project scope/context.
3. Detailed activities/tasks and description of each and every phase /step which will be performed under the scope of this SDLC for this project like Inception , Requirement analysis, Design , Testing, Development , Deployment etc. This description of each phase/step should also include the purpose, deliverables/documentation, dependencies of this SDLC.
4. The probable risk , challenges , threats of this SDLC that vendor is assuming

5. Non-Functional Requirements

5.1.   <u>Application Compliance Requirements</u>

5.1.1. Web Application

1. The application which is a web based solution, should be hosted in a centralized Web-server
2. The application should be developed following Service Oriented Architecture (SOA)
3. Application should support MVC framework.
4. Considering the operating/client environment at different levels 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. The application should have the ability to seamless integration with future module / components / applications
7. Application should be lightweight and rich client-side scripting
8. UI should be developed based on the analysis of UX.
9. Any web interface of this application should be fully responsive

5.1.2. Mobile Application Requirements

1. The mobile application version of the system should be developed for Android and iOS.
2. The mobile app should have the capability of displaying system notifications
3. Functionality for registration options for service recipients
4. App should enable compact view of services for service recipients.
5. There should be an option to auto synchronization with the central database with apps local database on the availability of the Internet connectivity.

5.2. Coding Conventions

The vendor must follow the standard coding styles to produce high-quality code for further usage of the code in terms of reusability, refactoring, task automation, language factors etc. The vendor should submit a standard coding convention approach, which may include different conventions like commenting, indent style, naming etc. following the best coding practices.

Note: A comprehensive "**List of Standards (Ref. Doc- 05)"** based on the latest technology to be complied for web and mobile platform regarding this eService solution development and operation will be preferred in the vendor's technical proposal.

5.3. Integration Requirements

As a government system or e-Service application, integration with the required and other prescribed national systems is very important and essential. Only by proper integration and interoperability, an e-Service application can drive the ultimate citizen benefits with the optimum use of technology from manual to digital transformation. Here, vendor should come

up with an integration plan in their technical proposal considering and understanding the scope of the e-Service application as per this TOR. The possible integration scopes of this e-Service application are mentioned below as a reference for the vendor

SL	Name of System to be Integrated/Scope of Integration	Purpose of Integration	Organization
01.	SMS Gateway Integration	Notification to Authorized Users.	Telecom Operator
02.	e-Filing	For approval of files and documents etc.	a2i – eFiling
03.	ADP/RADP Management System	ADP/RADP Management System	Plannind Division
04.	PMIS	Project Management Information System	IMED

To establish an integrated digital government and ensuring the interoperability among the e-government/eServices of Bangladesh, integration is one of the key factors which should be considered as a topmost priority. The proposed eService solution must comply with all national e-Government standards which are prescribed by the BNDA (Bangladesh National Digital Architecture) or any relevant and authorized government authority. Only an integrated and interoperable e-government/eService solution can fulfill the ultimate objectives of digitalization with the optimum use of latest and standards ICT.

The vendor can follow standard integration mechanism such as exposing standard Restful APIs for the service process in different components so that any component or service can exchange data and related resources whenever it is required by satisfying the Govt. Agency's business purposes. The digital services should be able to exchange data with other digital systems within the particular Govt. agency as well as with inter-agency solutions. So, the vendor will develop a standard API manager following international standard so that the data sharing can happen efficiently and standard securities will be maintained smoothly. The digital solution must address the stated interoperability and integration issues of the agency for systems' sustainability and end-to-end digitalization issues which is the ultimate goal of digital transformation.

5.3.1. Option 1: Integration Guideline (Prescribed by a2i):

The vendor can follow the standard integration mechanism of Office Information and Service Framework (OISF), developed by a2i, ICT Division as a mediator for various e-governance solutions. Via this framework various e-governance solutions can use different services that are provided by different solutions.

Context Diagram
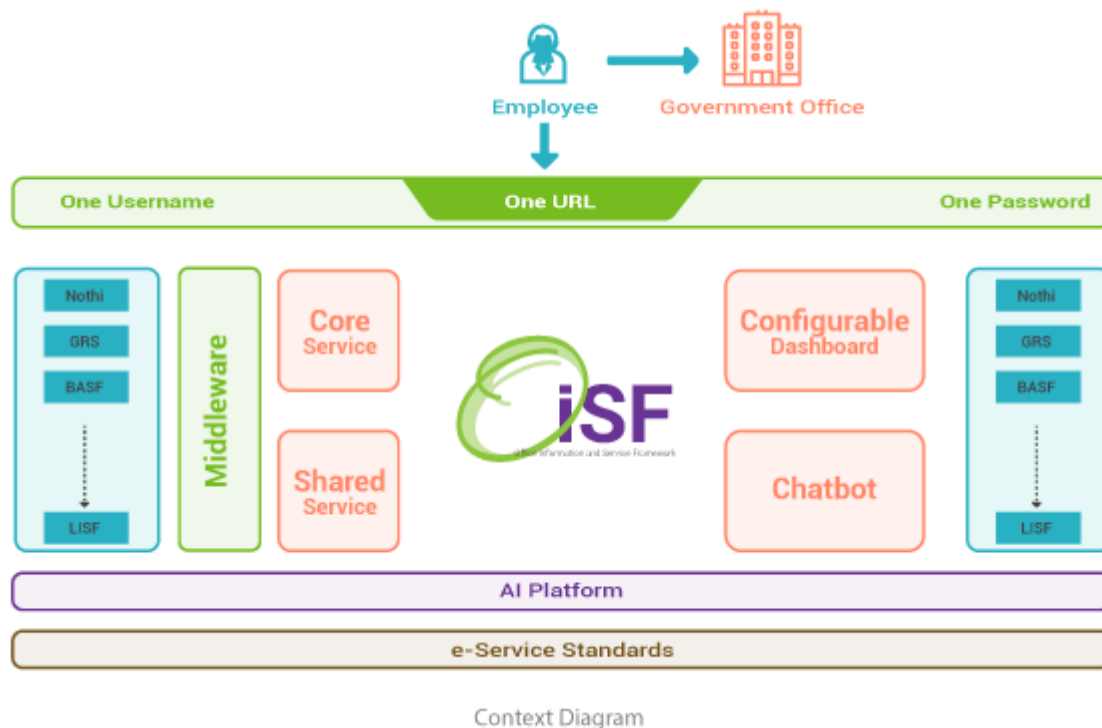
If system is integrated with OISF then following information can be invoked

1. Office Information
2. Employee Information
3. GEO Information
4. Users Information
5. Organogram

And following shared services can be accessed (not limited to)

1. E-Nothi
2. GRS (Grievance Redressal System)
3. SSO (Single Sign On)
4. Digital Signature

Apart from these, there are some predefined standards described under OISF. Standards are defined as an established norm or requirement about systems. OISF works as a mediator of different systems. It connects multiple systems and manages coordination among them. So to communicate properly and fruitfully, some predefined standards need to be followed. Otherwise system to system communication will be in jeopardy. Because of this, OISF is introducing some standards that every e-governance system must follow to Integrate with other systems. To develop any e-governance solution which can be communicated with other e-government solutions, vendor must follow the same standards which are defined under OISF standard documentation provided by a2i in OISF portal: http://doptor.gov.bd/newportal/. Those standards are

1. Data Standard
2. Integration Standard
3. Security Standard
4. Deployment Standard
5. Technology Standard
6. Application Standard
7. Biometric Standard
8. Payment Standard
9. Citizen Core Data Standards (CCDS)

5.3.2. Option 2: Integration Guidelines (general):

Based on the consent and approval of implementing organization (concerned authority) at system requirement analysis phase of software development, vendor may follow customized integration framework complying BNDA guidelines, published e-government policies & acts and international standards/conventions for minimizing system's operational dependencies and strengthening sustainability.

The vendor is requested to submit an **"Integration Plan (Ref. Doc- 06)"** in their technical proposal for this eService solution covering the functional, technological, business, strategic, implementation, dependencies and activity related aspects.

5.4. Hosting Requirements

Bangladesh Government is providing an extensive and standard hosting facility for all types of government organization applications and software that is named as National Data Center under Bangladesh Computer Council (BCC). It may be mentioned here that the vendor developed application will be hosted in government provided data center i.e. National data center (NDC). Therefore, at this stage, vendor is requested to submit a **"Hosting Architecture & Requirements (Ref. Doc- 07)"** in their technical proposal for this e-Service application.

Note: If any implementing organization decides to host this e-government/eService solution in their own or any nominated data center, understanding the strength and capacity of this data center and hosting requirements, vendor must guide implementing organization well ahead of the time of system design phase. So, implementing organization can take necessary measures to ensure hosting facilities which will be required at the time of hosting the developed system.

5.5. Security and Privacy Requirements

The vendor should submit an extensive **"Security and Privacy Plan (Ref. Doc- 08)"** including comprehensive security architectures in their technical proposal for this proposed e-Service application considering the following issues:

1. Project technical scopes
2. Functional and nonfunctional requirements and ultimate objectives

3. Concerned service provider organization's operational environments and capacity
4. User roles - Accessibility, Authentication, Authorization and Accountability
5. Importance of data management & data privacy
6. Strength of technologies to be used for development, operate & maintenance
7. Deployment & hosting
8. Service recipients and providers security, confidentiality and privacy
9. A checklist of security measures to be taken for this solution
10. Overall security standards which should be applicable for an e-government system.

Apart from these, the vendor should keep in account the following considerations as well as vendor should provide a checklist based on system and hosting security plan (i.e. fraud, hacking, money laundering etc.) & the test report of that checklist.

5.5.1. System Security Requirements (But not limited to)

1. The vendor should follow any of the industry standard secured development methodology such as (but not limited to) Comprehensive Lightweight Application Security Process (CLASP) by OWASP etc.
2. The vendor should consider (but not limited to) common vulnerabilities such as SQL Injection, Cross Site Scripting (XSS) etc.
3. Vendor will undertake responsibility for Input Validation Controls, Authorization/Authentication Control and other security controls in place in both testing and production environment of application.
4. The following vulnerabilities must be checked and ensured security from the beginning:
   a. Cross Site Request Forgery (CRSF)
   b. Cross Site Scripting (XSS)
   c. Session hi-jacking
   d. Session Fixation
   e. SQL Injection and Code Injection
   f. Input Validation/Filtering
   g. Output Escaping
   h. Secure File Access
5. The vendor shall minimally provide Access control, Authentication and accountability security mechanisms for backend operations of the System.
6. The proposed security solution shall be scalable and should not affect the performance by creating a bottleneck or single point of failure to the overall system.
7. The system should provide tamper-proof audit trails and logs for administrator or auditor to check for the actions committed by users. The audit trails shall consist of following details but not limited to:
   a. Login and logout
   b. Attempts to access unauthorized resources
   c. User profile changes
   d. Past audit events.

e. Track all actions performed on documents attached/uploaded.

f. The system should have provision to assign the access rights of other resources on need basis to authorized users.

g. Information in the System that is deemed to be sensitive shall be encrypted and protected from accidental and/or unauthorized modification.

h. The System shall provide automatic session disconnection for inactive user after session time [Proposed best practice session time] is over.

i. The system shall protect the audit trails from being modified by unauthorized personnel or privileged users.

5.5.2. Security requirement for electronic payments & transactions (But not limited to):

1. Solution should be PCI DSS compliant.
2. Solution should comply with all standardized security features, message protocols and encryption.
3. Payment Gateway should have DC and DR as per international standard guideline.
4. Payment Gateway should comply with international monetary security standard and must be certified by internationally recognized security authority and financial payment related auditors.

5.6. Sizing, Performance and Scalability Requirements

1. The system shall be capable of handling online functionalities for a database of at least 10,000/Year service recipients and in terms of service provide 8 Offices and 120 System Users.

2. The system processing shall be scalable to support the volume estimates for a period of 10 years at a 20% annual growth rate.

3. The system shall be designed to handle estimated Medium Scale: 500, simultaneous connection (online users) when it is ultimately rolled out.

4. The vendor must conduct an extensive load testing task taking above factors into consideration and submit a load testing results.

5. The database architecture should be such that the system is available to user 24x7x365 days a year without any unapproved downtime.

6. 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.

7. 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.

8. Considering the network infrastructure challenges in Bangladesh, the solution must support low bandwidth conditions for the services defined in the functional requirements.

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

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

11. Analyze the requirements whether both horizontal scaling (scale-up) and vertical scaling (scale-up) will be required for this e-Service application or not?

12. The e-Service application should be provided with appropriate caching mechanism to handle very high-traffic scalability

13. The vendor may propose here other relevant measures for the e-Service application scalability.

   Note: The vendor should submit a **"Strategic & Action Plan for System Optimization (Ref. Doc- 09)"** including the method of sizing, mechanism and measures that will be taken for ensuring the standard of performance mentioning proposed system's functional process and completion of standard time and scalability of this eService solution

5.7. **Interoperability and Data Exchange**

   The selected vendor must develop this e-Service 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 current and future systems.

   The following are the key expectations on interoperability requirements:

1. The system should be designed for interoperability using industry standard protocols.
2. System must expose data by Advanced Message Queuing Protocol and REST via TLS
3. All imported data must undergo data validation to ensure full integrity.
4. Data exchange within the system at different levels via the internet shall be encrypted.
5. The system should have functionality to exchange data with other own systems or external institute systems.
6. The system shall have functionality to export/import files based on the standard template defined through web services and/or API

   Full API documentation must be provided so that third party integrators can integrate their system with this system.

5.8. **UI/UX.**

   The vendor must propose a **"UI/ UX Plan (Ref.Doc-10)"** containing UI designing method and tools, UI design Activity plan, prototype or Mock Up design for both web &

mobile, expected result & their finalizing process of that UI/UX design. Apart from this, the vendor should consider the following issues as requirement at the time of UI/UX plan.

1. The system interfaces should be highly user friendly, easy to navigate and ensure fast loading.
2. The UI shall be designed by using well-established, supported and lightweight UI framework so that it follows widely used industry flow patterns
3. UI shall be easily configurable if any changes are needed
4. Menu, content and navigation shall be based on the user entitlements, roles and permissions.
5. Vendor is requested to include five important features considering service recipient five UI for each platform i.e. mobile, web. Those UI should be design professionally & hardcopy color page so that UI design capacity & standard will be able to measure.

5.9. Digital Service Toolkit and Guide

A 360 degree guide of service using updated technologies will create a significant impact in case of using the implemented digital service by the system user (service providers& recipient).This toolkit & guide service may be implemented in different modalities as mentioned below:

5.9.1. Digital service receiving guide:

Digital service receiving guide: In both of the platform of web & mobile applications, the service recipient who are not even tech literate should be able to find an easy way to make them easily oriented for the digital service they would like to receive from application. Both the platform (Web & mobile) with few clicks should have easy content read & multimedia/ animated/video which is easy to view & understand receiving process, guideline & examples. The content can be focused on service receiving eligibility, requirements & step by step service receiving process for each & every service.

5.9.2. Smart guide for Digital features:

Smart guide for Digital features. In both the platform mobile apps & web in case of receiving any digital service in each interface of digital feature, the service recipient will find a default "guide/help link" by clicking on this meaning. Instance guide service can be availed like step by step pictorial action flow or video/multimedia content to use this feature & other relevant smart or interactive contents to receive instant support.

5.9.3. Digital user manual:

For all types of usage, vendor must prepare easy accessible & focused training manual which will also be available in mobile apps & web application also. The user manual should be smart enough so that the target users can receive the training by himself or herself without a trainer intervention also. The content should not be prepared only based on text but also the info graphic, pictures, animation, diagrammatic presentation, multimedia should be used smartly. The digital training guide or manual may be hosted into the e-learning platform of

a2i, ICT division named Muktopath for larger promotion, advertisement, accessibility & cost effectiveness. The digital training can be provided by using Muktopath e-learning features easily in this regard

Vendor is requested to provide a comprehensive "**Digital Service Toolkit & Guide plan (Ref.doc-11)**" for all the service to be digitalize.

1. User (service recipient/ provider) will use this system in a very simple, fast and interactive way.
2. Vendor should plan properly during content designing & development so that it will be easier for non-technical & non tech savvy users.
3. This digital guide has to be implemented for each & every service of this system for each platform i.e. web, mobile.
4. All the digital content guidelines must be interactive so user can navigate the system by hearing, listening & reading.
5. Content creation methodology, activity & standard should be included in the plan.
6. Vendor's innovative & future context plan of this digital toolkit & guideline considering all the users will be appreciated

5.10. Language Support

System's default language will be Bangla. The e-Service system should support multilingual option i.e. Bangla and English for both the Web version and Mobile Apps. All the user interfaces will be able to display and input controls can take input both in Bangla and English. System/App users can choose and set his/her preferred language in profile setting for the system interfaces. The system should support Unicode for the Bangla Language.

5.11. Accessibility

Vendor must develop this e-Service application ensuring access for the citizens (Service Recipients) with disabilities in different standardized accessible formats. E-Service application should be developed in "universal design" and "assistive technologies". Accepting and facilitating the use of sign languages, augmentative and alternative inputs and all other accessible means, modes and formats for inputs and outputs as per their choice by "Service Recipients" with disabilities; all e-service features (Web application or Mobile Application) should be usable with the help of screen reading software by the service recipients with disability.

5.11.1.Internet and Web-based Content Accessibility Checklist

Accessibility Checklist		
SL.	Items to Check	Details
1.	For anything on a web page that is not text, is there a text	• Anything that is not text on a web page usually includes, but is not limited to, an image, graphic, audio clip, applets (small application running within a web browser,

	equivalent for that item?	i.e. text chat window, etc.), tickers, or other feature that conveys meaning through a picture or sound. Examples include buttons, check boxes, pictures and embedded or streaming audio or video. • Providing a text equivalent means that words are being used to describe what an item (that does not physically consist of text) actually is, why it is there, and any information being communicated by the use of that item or the item itself. • Check that all images have accurate and meaningful text equivalents. Images mostly use an "alt-tag" or "longdesc" attribute as part of the object. To check, mouse users can roll their cursor over an image. If a text label or window pops up, then it has a text equivalent. Screen reader users can listen to see if an image is identified and described. It is also acceptable to simply include a text description above or below the image. For example, "The picture below shows…" • Ascertain that images of text, graphical text (pictures of text), or text that is part of an image have a text equivalent. Be sure that the text equivalent correctly describes the image or communicates any information as part of the image. For example, if the image itself contains words, be sure the exact wording from the image is used within the text equivalent. • Ensure any audio has a text equivalent, such as a text transcript.
2.	Is captioning, audio descriptions, or other equivalent provided for presentations that utilize both audio and video at the same time? Is captioning, descriptions, or other alternatives synchronized with the presentation?	• Determine that all audios have been captioned for the deaf and hard of hearing, and all videos have audio descriptions for blind and visually impaired. • Ascertain that captions and audio descriptions are synchronized correctly with the audio and video. For example, synchronized captions allow someone to read captions and also watch the speaker's relevant body language. • Remember that this only applies to multimedia presentations, i.e., those presentations utilizing both audio and video at the same time. For example, the audio and video web cast of a program would need to be synchronized. An audio web cast would require a text transcript. A silent (no audio) web slide show would require a text equivalent for any images.

3.	If color was removed, would it inhibit use of the web site?	To check, view the page using a monochrome monitor (ex. black and white monitor, etc.) or by printing a page to a black and white printer.
4.	Is color being used to emphasize text or indicate an action?	If so, an alternate method needs to be included so users can identify what is being emphasized by the use of the colored text or action.
		For example, if all links on a web page are blue, than underlining the links is an acceptable method for identifying blue colored links. Another example, if users are prompted to press a green start button, than a text label above the green button saying "press green start button" is an acceptable method.
5.	Do web pages ignore user defined style sheets?	Style sheets are formatting instructions on how a page should be displayed (can also include how it is printed and presented). For example, a user specifies that they want their browser to view pages with extra-large font with white characters on a black background. These preferences are set up for all pages viewed.
6.	Does a web page override or ignore user settings?	To check, disable style sheets within the browser (Check browser's help menu for instructions) or try changing the font size or background colors through the browser's settings.
7.	If a link is embedded in an image, is there an equivalent text link?	• Frequently, a web designer will use an image map which contains a link or set of links. • Check to see if the image has any text links or labels. In some cases, you may have to move the mouse around the image to see if different text labels appear over different portions of the image. Screen readers will announce "image map link…" when a link is detected. These text labels alert users that by clicking or selecting the link in this particular region of the image, it will retrieve a specific web page. This is an example of a client-side image map which can be quite accommodating to people with disabilities and those using assistive technology. • On the other hand, there are image maps that do not indicate to the user which specific web page will be retrieved when a particular region of the image is selected. These are called server-side image maps, because the computer or server hosting the web page determines which page is sent based on portion of the

		image selected. These are not accessible image maps, requiring a redundant text link on the same page retrieving the same pages as those links used in the image map.
8.	If information is displayed using a table(s), can columns and rows be identified by screen readers?	Using a screen reader, listen to how the table is read aloud.
9.	If frames are used, are they accurately text labeled?	Frames are used to visually separate information on a web page.
10.	Does anything on the page blink or flicker?	Ask if the web designers can prove whether any blinking or flashing elements have a frequency greater than 2 Hz and lower than 55 Hz. This requirement is necessary because some individuals with photosensitive epilepsy can have a seizure triggered by displays that flicker or flash, particularly if the flash has a high intensity and is within certain frequency ranges.
11.	Do web sites not conforming to acceptable and approved accessibility standards offer a text only equivalent of their web site?	• The World Wide Web Consortium's (W3C) Web Accessibility Initiative Guidelines and Section 508 are the two widely accepted authorities on Web accessibility and design. • Web sites that cannot adhere to the accessibility guidelines set forth by W3C and Section 508 can offer a text only equivalent for all the information displayed and all functions available.
12.	If scripting is used, such as JAVA, etc., is there a text equivalent so assistive technology, like screen readers, can read the information?	An example of scripting could be a stock ticker on a web page that is animated, refreshing, and displaying information. Another example is using an image, that when a mouse cursor rolls over the image, additional information pops open on the screen, and then disappears when the mouse cursor rolls off.
13.	If online forms are used, can people using adaptive technology fill in	• Can a keyboard be used to access all the form fields? • Are text labels used either inside or near form fields to identify what information users should be entering? • Can a screen reader identify the form(s)?

	and submit all the required information?	• Do the forms follow a logical order? For example, if a user hears "Last Name" is the corresponding form the area where they would enter their last name?
14.	Is there a way for users, especially those using screen readers to skip repetitive navigational links?	Navigational links are a set of routine navigation links frequently used to move users to pages within a web site, usually located on the top or side of each web page. For example, "Help," "Contact Us," etc. links that all appear on the same page within a web site in exactly the same way and location.
15.	If users are given a certain amount of time for an action or response, is there any indication how much time they have left or an option to request more time?	Some web pages may expire or time out after a certain amount of time, and refresh the entire page, for example those requesting personal information.
16.	Unicode character set for Bangla	Use of Unicode character set for Bangla - Interspersing Bangla and English in the same page should be avoided until such time that there is a screen reader which can handle multiple languages.
17.	Accessible documents on web pages	Where it is not possible to make a document accessible, then an alternative, accessible format should be downloadable along with the original image file.
18.	Navigation mark-up	Use of heading level 1-6, in addition to navigation links like 'skip to main content'.
19.	HTML validation	HTML is the simplest programming language used for website development and is accessible on all browsers — desktop browser or a mobile browser. All web pages should have HTML validation.
20.	CSS validation	Content presented with CSS errors may lead to serious problems such as overlapping of content, making it almost impossible to read. CSS errors may also prevent some users from successfully carrying out custom CSS processing to set the preference of color and size of text and object to suit their vision requirement.
21.	Color adjustment	High contrast and font customization options should be

	option	available
22.	Labeling of Links	Labeling links correctly rather than just 'click here'- i.e., descriptions should be accurate. 1. The web page has a descriptive and informative page title. 2. A sign language video is provided for all media content that contains audio. 3. The page is readable and functional when the text size is doubled. 4. All page functionality is available using the keyboard

5.12. <u>Tools and Technologies to be used</u>

Vendor is recommended to choose the appropriate tools and technologies (Open Source is preferable) to be used for the development and implementation of the e-Service application. The selected vendor has to consult with a2i, ICT and implementing organization (client) to finalize the tools, technologies, framework and platform with the approval of same authorities consent.

The main components of the software will be web based applications. It should be run in Windows/Linux/OSx operating system at user's end and should be compatible with all major browsers such as – Internet Explorer, Firefox, Google Chrome, Opera etc.

The System UI should be compatible with Tab & Smart Phone browsers and in case of Mobile Apps should be support both Android and IOS.

Understanding the details scope of this project, vendor is requested to submit a detail **"Tools & Technology plan (Ref.Doc-12)"** in their technical proposal following the table format mentioned below

Issues/Phases/Purpose	Used Technology/ Tools	Justification for use	Alternative Tool/ Technology
Project Management			
Version Control			
System Requirement Analysis			
System Design			
Development (Client end)			

Development (Server end)			
API/Web services			
Apps			
Testing			
Integration			
Hosting & Deployment			
Documentation			
QA			
Helpdesk/Support			
Reporting			
Communication			

6. Project Management

6.1. Implementation Timeline

Vendor must complete the project within a stipulated timeline based on the proposed SDLC methodology. The project timeline can be divided in four below phases that is – Requirement Analysis & Design, Development & Release, UAT & Deployment, Piloting & Maintenance.

"Project Implementation Timeline/Schedule (Ref.Doc.13)"

The project is divided into 4 phases. The entire assignment is divided as following phases:

PHASE-I: Requirement Analysis & Design:

Duration
2 (Two) Months

PHASE-II: Development & Release:

Duration
7 (Seven) Months

PHASE-III: UAT & Deployment:

Duration
1 (One) Months

PHASE-IV: Piloting & Maintenance:

Duration
2 (Two) Years

6.2. Pilot Implementation Requirements

The selected vendor has to conduct package wise (as per priority and readiness) pilot implementation of the e-Service software solution in pilot areas which will be decided by implementing agency. Vendor will submit the detailed **"Pilot Implementation Plan (Ref.Doc.14)"** in the technical proposal in which the following may be considered to incorporate:

1. Vendor will be required to provide on-site support in pilot phase to ensure smooth operation.
2. Vendor must provide extensive, premium and time-bound support at the pilot phase. The detailed support modality, methods, standard and relevant activities should be mentioned in the proposed plan.
3. Vendor will submit a performance assessment report at the end of the pilot phase covering pilot result/output, impact/outcome, scalability, stability and sustainability for full-scale implementation.
4. The criteria/key factors based on which the pilot evaluation will be conducted should be mentioned in the proposed plan.

6.3. Documentation

Detailed and proper documentation of such ICT based project like e-service application development and implementation for Government is very vital and essential. Documentation is required for any such project as reference, knowledge transfer, analysis of development and implementation history, baseline information for any modification or change, guidance etc. In this issue, Vender should show highest-level of professionalism for delivering the standardized documentation approach at each phase of e-Service development and implementation project. Vendor should include an extensive **"Documentation Plan (Ref.Doc-15)"** of this project in their technical proposal.

6.4. <u>Work Distribution and Team Composition</u>

The vendor is expected to provide work distribution and team composition plan based on the project scope, their proposed SDLC methodology and work and project implementation plan. The interested applicant (Vendor) should provide a **"Work Distribution & Team Composition Plan (Ref.Doc-16)"** in their technical proposal describing the different teams with required HR positions that will be allocated at various phases or steps of proposed SDLC and project implementation. In the case of running multiple phases or steps or activities, the team allocation plan mentioning the number of HR positions should be planned and described precisely. In the team allocation plan, each HR position should also be described with the roles, amount of involvement (man-day/man-month), expected deliverables and required skill and expertise. However, for proper execution of the project i.e. e-Service application development, the vendor shall include at least the following HR positions as minimum project team requirements:

SL	Position	No. of Person
1.	Project Manager	1
2.	Software Architect	1
3.	Business Analyst	1
4.	System Analyst	1
5.	Database Administrator (DBA)	1
6.	Sr. Developer/Programmer	2
7.	Developer/Programmer	4
8.	Mobile Apps Developer/Programmer	1
9.	Security Expert	3
10.	QA Expert (Test Engineer)	2
10.	System Administrator	1
11.	Deployment Expert	1
12.	Technical Document Expert	1
13.	UI Designer	2
14.	UX Expert	1

15.	Graphics Designer	1
15	Digital Content Developer	1
16.	Training Expert	2
17.	Implementation Engineer	1
	Totals	**27**

For Maintenance Service & Support:

	Key IT Personnel	**No.**
1.	Service Manager	1
2.	Helpdesk Support Executive	2
3.	Software Maintenance & Support Engineer	3
4.	Developer/Programmer (On Demand)	2
	Totals	8

Note: Please consider, the above mentioned project team composition has been proposed here mentioning minimum size of team with required HR positions for evaluation only. Vendor may propose any additional HR positions as per their SDLC methodology and work plan in the technical proposal as their plan.

6.5. Quality Attributes and Assurance

The Quality attributes and Assurance plan will describe the standards, processes and procedures in this e-Service application development life cycle which will be used to support the consistent delivery of high-quality, professional standard e-Service application and services provided in the support of an automated environment. The quality assurance process will be concerned with establishing the authority of the QA function, quality assurance standards, procedures, policies, and monitoring, and evaluation processes to determine quality in relation to established standards. Quality assurance activities will concentrate on the prevention of problems through the continuous improvement of processes.

In order to provide high quality products and services, each support team will adhere to processes, procedures and standards. Quality Assurance (QA) is a process used to monitor and evaluate the adherence to processes, procedures, and standards to determine potential product and service quality. It will involve reviewing and auditing the products and activities

to verify that they comply with the applicable procedures and standards, and will assure the appropriate visibility for the results of the reviews and audits.

The vendor is requested to provide an extensive "**Quality Assurance Plan "Ref.Doc.17"**" with measurable attributes for each phases of this e-Services development life cycle in their technical proposal.

6.6. <u>Data Management and Migration of Legacy Data</u>

Under the process of service to e-Service transformation, during e-Service activation or deployment, it might be necessary to move the legacy data of prevailing services. In that case, the vendor may require to perform different relevant activities that may include data collection, softcopy conversion, data filter, data cleansing, data verification, data processing, data entry, data migration and overall data management. Here, it is expected that, the vendor will propose their detailed **"Data Management and Data Migration Plan (Ref.Doc.-18)"** for this e-Service application considering the estimation of legacy data mentioned below which will be required to migrate into the developed application.

Data About	Description	No of Pages	Current Status	Amount of Data	Dependency

The plan may cover amount of data to be migrated, activities to be performed, the amount of resources to be used, required time for different data migration phases for different activities (data collection, hardcopy to softcopy conversion, data entry, data transformation from soft copy, data filtration, data cleaning, data verification) etc.

6.7. <u>System Audit</u>

This e-Service system will 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

1. Log the users who are accessing the system
2. Log the parts of the application that are being accessed
3. Log the fields that are being modified
4. Log the results of these modifications
5. Log the attempted breaches of access
6. Log the attempted breaches of modification rights
7. Timestamp.

It should be ensured that 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.

Vendor is requested to submit their proposed "**Audit Plan (Ref. Doc- 19)"** including strategy & standard measures in their technical proposal.

6.8. Training Plan

In case of eGovernment/digital service's successful implementation, user training plays one of the most vital roles in the entire implementation cycle. Vendor must consider government culture, convenience of government officials & staff and ICT literacy & expertise at the time of designing user training plan for the eGovernment/digital service implementation. Based on the requirements, target prospective participants and implementation scope, vendor may plan for user training in 4 different modality; i.e., 1) Direct User Training, 2) TOT, 3) Refresher Training, 4) e-Learning Platform (Muktopaath) based training. The vendor is requested here to submit a detailed **"Training Plan (Ref.Doc-20)"** in their technical proposal considering the following:

1. Training Schedule & program details
2. Methods & modalities of user training
3. No. of targeted user groups and participants
4. Strategy of ensuring training standards
5. Methodology for evaluating performance
6. Ensuring smart training with latest tools & technologies
7. Innovative, user friendly, & multimedia training materials
8. Team composition, skill and expertise as training provider

Please **note** that, the training infrastructure like venue will be provided by the implementation organization.

6.9. End User Engagement

End user engagement is very important for e-government implementation especially for the citizen centric digital service delivery. Vendor should measure involvement of end users during development and the constant incorporation of feedback to provide high-quality end-user experience satisfying usability test. Based on different types end-user group, vendor may require to consider the following at the time of preparing **"End-User Engagement Plan (Ref.Doc-21)"** which is required to be submitted with the technical proposal,

1. Purpose of end-user engagement.

2. For ensuring end-user behavior, proposed method & activity.

3. Define indicators & factors of the outcome for end-user engagement.

4. Determining area & boundary of end-user's Engagement & there degree of involvement.

5. Mentioning vendors & implementing organization's roles in engaging end-users for large scale implementation.

6.10. <u>Risk Management</u>

Software development is an activity that uses a variety of technological advancements and requires high levels of knowledge because every software development project contains elements of uncertainty. This is known as project risk. The success of a software development project depends quite heavily on the amount of risk that corresponds to each project activity. As a project manager, it's not enough to merely be aware of the risks. To achieve a successful outcome, they must identify, assess, prioritize, and manage all of the major risks. A standard risk management process includes the following steps:

1. *Identify* risks and their triggers
2. *Classify* and prioritize all risks
3. Craft a *plan* that links each risk to a mitigation
4. *Monitor* for risk triggered during the project
5. Implement the *mitigating action* if any risk materializes
6. *Communicate* risk status throughout project

The vendor should submit a **"Risk Management Plan (Ref.Doc.-22)"** addressing all types of risks including above mentioned steps following standard risk management principles and their mitigation plan

6.11. <u>Expected Deliverables</u>

Considering the scope of services and work of this project and based on the proposed project development & implementation methodology (SDLC), the vendor is requested to submit a comprehensive **"Project Deliverables Plan (Ref.Doc.-23)"** in their technical proposal describing the SDLC phase/steps/action wise timeline based deliverables mentioning different formats and types.

For better clarification, some of the deliverables examples are mentioned below:

1. Project inception report
2. Project management plan
3. System requirement specification (SRS)
4. System design document (HLD and LLD as SDD)
5. Complete source code with documentation
6. Test plan with testing reports
7. Integration plan and reports
8. Mobile Application (Android and iOS)
9. Web application

10. SLA

6.12. <u>Copyright</u>

Bangladesh Parjatan Corporation (BPC) shall be entitled to all proprietary rights including but not limited to patents, copyrights and trademarks, with regard to many Vendor.

All kinds of source codes including code documentation and other approved documents (all versions trail, products, developed applications, documents and all kinds of deliverables) which bear a direct relation to or are made in consequence of the services provided by the vendor under this scope of this TOR will be owned by Bangladesh Parjatan Corporation (BPC).

At the request of the Bangladesh Parjatan Corporation (BPC), the vendor shall assist in securing such property rights and transferring them in compliance with the requirement of the applicable law. After the completion of the project, such rights will be handed over to the Bangladesh Parjatan Corporation (BPC) that will be produced at the time of entire system development and implementation life cycle under the scope of this TOR and will be owned by Bangladesh Parjatan Corporation (BPC)

The vendor should properly deliver the entire approved source codes and other deliverables to the Bangladesh Parjatan Corporation (BPC). The vendor cannot claim any royalty or authority of any sort in case of replicating the source code or database or any other deliverables under this TOR for any future use that Bangladesh Parjatan Corporation (BPC) and the Government of Bangladesh may see fit.

Any studies, documents, reports, graphics or other materials prepared by the vendor for this project under this TOR shall belong to and remain the property of Bangladesh Parjatan Corporation (BPC).

6.13. <u>Maintenance and Support Service</u>

The selected vendor will require to provide maintenance and support service for this developed, deployed, piloted eGovernment/digital service application. After the development and deployment phase as soon as the application goes Live, having consent and acceptance from the implementing organization, immediately the pilot implementation phase will be started including the maintenance and support service. Vendor will require to provide maintenance and support services plan for next **2 (Two) years**. If this project is divided into multiple packages (as planned), then maintenance phase will be started from the piloting independently for each package. Here it is expected that, the vendor must provide a detailed **"Maintenance and Support Service Plan (Ref. do-24)"** including proposed SLA in the technical proposal. The proposed SLA should include time bound service delivery layers, modality & compensation plan, which may also include the following:

1. A Proposed SLA plans
2. Support service types and mode of services
3. Help desk functionalities & facilities and capacity
4. Configuration management and Change management
5. Service layers for different types of support
6. Tools & technologies will be used for Support service management
7. Communication & report management
8. Incident & Problem management
9. Support Service Log Management
10. Support feedback & service evaluation methodology

Support & maintenance plan should be comprehensive and well elaborated to ensure proper support to the end users. Apart from above mentioned issues, if vendor thinks any other issue/method should be included in their plan which assures proper standard support & maintenance of this   eGovernment/digital service application which is suitable for implementing organization, it would be considered as added value addition.

Out of this two year of maintenance period; after one year, vendor will require to submit a comprehensive managed service plan to implementing organization exploring each & every scope of switching operational modality from AMC to Managed service for ensuring easy manageable, hassle-free service delivery & minimized operational cost in operation. The proposed managed service plan will not only be cost effective & efficient in operation for quality service delivery for the implementing organization, should be also viable for the vendor i.e. more sustainable & win-win for both parties. The managed service plan will be a guideline & support for the implementing organization for important & crucial decision making regarding switching modality to AMC to Managed Service just after the expiration of two years maintenance & support period. For effective collaboration & proper decision making, the implementing may consult with Access to Information Programme (a2i), ICT division in this regard. In this case the organization will require to take measures by maintaining the necessary legal formalities before the expiration of two years maintenance period for smooth switching towards managed service modality with proper knowledge transfer. At the time of preparing managed service plan after one year maintenance & support service period the vendor should consider the followings:

1. Business feasibility study.
2. Determining the cost of operation.
3. Infrastructure requirements.
4. HR requirements.
5. Service simplification & SOP.
6. Breakeven & ROI analysis.
7. Risk & dependencies.
8. Stakeholders' roles & responsibilities.
9. Sustainability & business continuity

10. Technical operation & service delivery standard
11. Continuous improvement scope
12. Performance evaluation

Note: Please note that submitting the "The Managed Service" plan by the vendor will be one of the major deliverables of the 1st year maintenance plan before the expiration to the organization including extensive feasibility study. Here vendor is requested to add this as a deliverable in the **"Project Deliverables Plan (Ref.Doc.-23)"** Plan that is going to be submitted by the vendor with the technical proposal.

6.14. Performance Review

As per the predefined performance review plan of different stages of SDLC, the vendor will take necessary actions so that it will be possible to evaluate the performance at different levels of their activities and the deliverables based on indicators/factors precisely. Those indicators, standards and factors for performance evaluation have to be defined earlier at the time of project management plan. Here vendor is requested to submit a proposed **"Performance Review Plan (Ref.doc-25)"** for the entire design, development, and implementation cycle mentioning the indicators, measuring strategy and expected review scopes.

6.15. Knowledge Transfer

The Knowledge Transfer Plan should provide a comprehensive approach to transfer the responsibility for maintenance and operations from the vendor to implementing organization or their nominated agency. While designing a smooth, efficient and effective **"Knowledge Transfer Plan (Ref.doc-26)"** vendor should consider the following:

- Strategies, methods, milestones, schedules & their duration of accomplishing target.
- Vendor will propose required technical capacity, number of resources mentioning their roles & responsibilities from implementing agency to carry forward this plan.
- Vendor will need to identify the risks, craft a mitigation & contingency plan.
- Vendor needs to propose a method of evaluating & verification of the standard of knowledge transfer plan.

7. Conclusion

The ultimate expectation is to implement this e-service of Ferry and IWT Passenger Service Management System for Bangladesh Inland Water Transport Corporation to provide improved services to its service recipients in reduced timeframe to minimize cost & without being present at BIWTC offices, to ensure transparency and accountability in service delivery as well as to create a digital service delivery system through online. Online software & mobile App integrated with existing systems has to be designed, developed and implemented

for this purpose. The vendor has to ensure that all technical difficulties should address in professional and effective manner. Finally, vender has to obtain completion certificate from BIWTC before handing over the system to BIWTC. The authority BIWTC will own the copyright on all of the work designed and developed.

Keeping the above in mind, here the vendor has to design, develop and implement a web and mobile based end to end solutions of Ferry and IWT Passenger Service Management System for Bangladesh Inland Water Transport Corporation, where a comprehensive technical proposal will play a very important role to understand that, the vendor has fully visualized the system requirement, development requirement with tools and technologies, constraints and challenges of implementation and thus present the best solutions in their proposal.