TERMS OF REFERENCE (TOR)

for

Development of an online lab information systems for DVH (61), FDIL (09), CDIL (01), CVH (01), District Nutrition Lab (21) and Mini diagnostic Lab (150)

(Package No.: LDDP/S-4)

TABLE OF CONTENTS

1. Background

The objective of the Livestock and Diary Development Project (LDDP) of Department of Livestock Services (DLS) is to improve productivity, market access, and resilience of small-holder farmers and agro-entrepreneurs operating in selected livestock value chains in target areas. LDDP has got setup with Veterinarians at district, and sub-district level. Veterinarians are engaged with initial disease diagnosis. If, necessary they send samples to lab for confirmatory diagnosis. Field offices receive medicine, vaccines to distribute to the owner/khamari of the species. It is required to keep track all of the medicines & vaccines stock they have received, and how many have distributed, and how many they have left in the stock etc. along with a requisition raising option also to the head office when the stock gets lower.

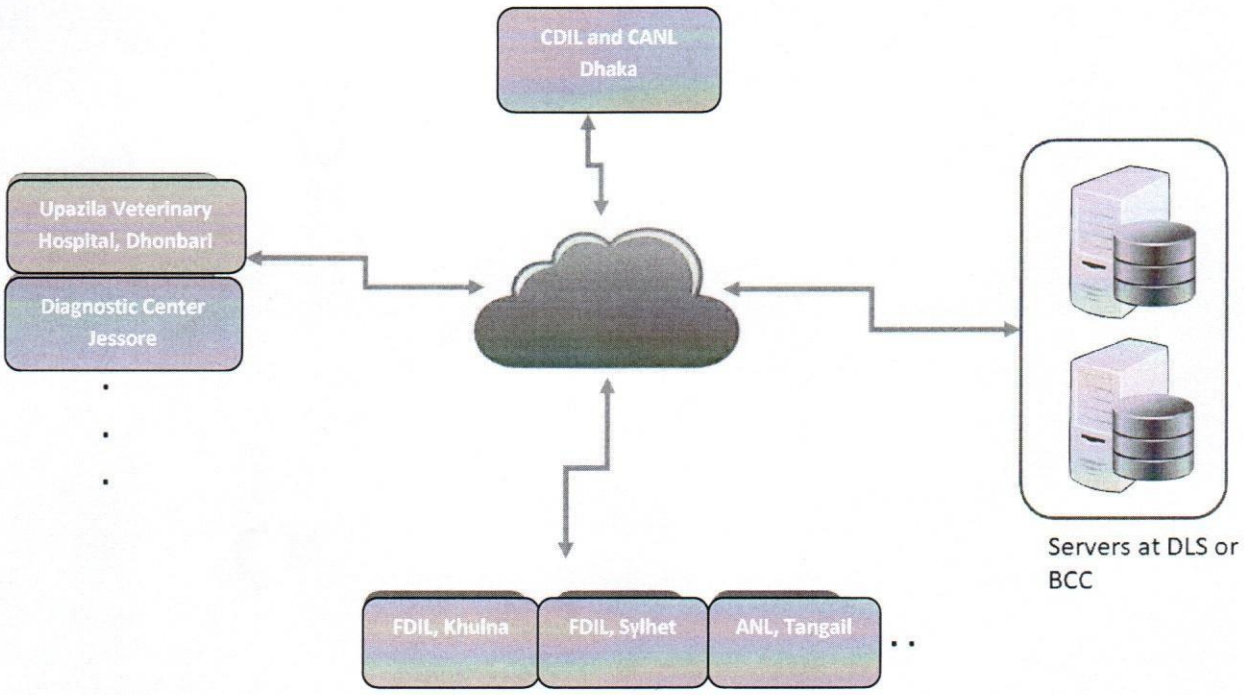
Upazilla Livestock officers (ULO) are also assigned to visit the house of the owner's/khamari's to serve their specie's by going outside of the office, system should have an option to enter or track such visit details with which location the officer went, which khamari required support, which species he/she given treatment, what kind of disease, status of the disease level or condition of the species etc.

Therefore, to streamline the processes with the cooperation of Food and Agriculture Organization (FAO) of Bangladesh, LDDP has developed a solution named BAHIS (Bangladesh Animal Health Intelligence System). BAHIS is an evidence-based information system for control and prevention of emerging and re-emerging animal diseases and other animal related health threats, under supervision of the Department of Livestock Services (DLS). The main goal of this BAHIS system is to collect data, analyze data, and making decision. The system has both online and offline data entry facility. The offline system has full functionality of online system but can be accessed from remote without internet. It is a re-distributable stand-alone system with a tiny database system that can synchronize data anytime with main database system over internet. But BAHIS has got some limitations in terms of maintaining inventory of medicine, vaccines get distributed to all the UL offices and raising requisition before inventory getting lower, real time tracking of the ULO's regarding their visit, and due to the lack of computer networking/LAN/Internet connectivity nationwide offices, LDDP haven't able to manage and monitor everything with this existing solution of BAHIS.

Now LDDP, DLS is keen to upgrade, develop and implement their existing software solution of BAHIS, into a web & mobile apps-based Management Information System (MIS) that will provide better management, tracking, monitoring and analysis of livestock disease diagnosis, inventory of medicines along with diagnostic materials, and treatment through FDIL, CDIL and Diagnostic centers. Existing system of BAHIS already in place, however with much limitations regarding current computer networking/LAN/Internet connectivity, and enhanced connectivity in current scope, this project is aimed to overcome current limitations and add more or additional functionalities/modules through upgraded web & mobile apps-based Robust, Dynamic, and User Friendly/Oriented Solution.

This Upgradation, and Development of the new system named as "Disease Information Reporting and Traceability Management System", shall be performing a strong integration

procedure to link with the existing system of BAHIS, and it should not be overlapping with BAHIS, and this upgraded solution shall be monitoring, tracking and managing all the activities 10 Field Disease Investigation Lab (FDIL), 21 Animal Nutrition Lab (ANL), Upazila Veterinary Hospitals, centrally from Central Disease Investigation Lab (CDIL) and Central Animal Nutrition Lab (CANL) at Dhaka. Along with it, LDDP also planned to establish 150 diagnostic centers all over Bangladesh, and the newly established diagnostic center, Central Artificial Insemination Laboratory, Veterinary Public Health & Microbiology Laboratory, will also be monitored from through this solution gradually.



2. Objective of this Assignment

The main objectives of the proposed automation are:

- Capture Disease Investigation and Diagnosis information to a central database and produce MIS and analytical reports;
- Capture Farm Assessment Monitoring data into a central database and track monitoring progress and generate different monitoring reports;
- Capture Information of Participatory Livestock Assessment and tracking of Assessment Visits;
- Inventory Management of Medicine and diagnostic materials at all Centers;

- To maintain digital archive for projects and tests/analysis reports from all kinds of labs;
- Central monitoring of overall activities and data.

3. Functional Requirements

3.1. Major Inputs:

3.1.1. Clinical

3.1.1.1 Patient Registration

i. **Owner Information:** Name, Village, Union, Word, Gender, Mobile Number, NID… etc.

ii. **Patient Information:** Species of patient (Cattle, Goat, Chicken, Duck, Buffalo etc.), Patient Type (Household/Herd), Purpose of Owner (Hobby, Meat, Milk, Multipurpose, Work etc.), Total number, Number of Sick, Number of Dead etc.

iii. **Sample Test Result:** Test result for various types of tests i.e. Microscopic, Rapid Test, Postmortem Examination, Ear Examination, Urine. The test result should be captured in system guided way. The result capturing interface should be according to test type. Only valid result should be able to enter.

iv. **Diagnosis Result and Treatment Information:** List of Diagnosis results i.e. Anaplasmosis, Anthrax, Brucellosis etc. should be populated as per selected species. User should be able to select one or more diagnosis result from the list. Number of treated patients and number of advised patients to be captured.

3.1.2. Farm/Community Assessment

3.1.2.1 Capture Farm Assessment According to Approved Farm Assessment Format of LDDP, DLS along with Established Biosecurity Protocol, including followings:

i. **Assessment Type:** First Assessment Report, Follow-up monitoring report, Farm Closure Report

ii. **Farm Profile:** Owner Info, Location, Species, Purposes.

iii. **Visit Info**

iv. **AI and Other Economically Important Diseases Vaccination Practices Info**

v. **Biosecurity Practices:**

A questionnaire will be there with most of the questions' answer options are Yes and No. Questions should be fixed as well as addition able. Sample questions are below:

a. A.1 Outside vehicles do not enter farm, only essential vehicles

b. A.2 Only workers and approved visitors enter far

c. A.3 No manure collectors enter farm

d. A.4 Farm area is fully fenced and duck/chicken proof

e. A.5 Dead birds disposed safely

f. A.6 Signs posted

g. B.1 No movement of vehicles in and out the production area

h. B.2 Only workers enter production area

vi. **Antibacterial Usage:**

vii. **Capture the farmer's concerns.** What would the farmer like assistance with? There will be 5/6 input box to enter farmer's concerns. User can select an item from a pre-populated list or can enter free text.

viii. **Provide a list of new biosecurity practices** agreed with farmer. There will be 5/6 input box to enter biosecurity practices. User can select an item from a pre-populated list or can enter free text.

3.1.2.2 Disease Investigation According to Approved Formats of Disease Act-2005, including followings:

i. **Village/Farm Profile**

ii. **Meeting Information: Questionnaire/Checklist for meeting information is like below:**

a. Were the investigators called out to the community to investigate sick/dead birds?

b. Did the investigators conduct a meeting to build network or to raise community awareness on avian influenza control?

c. Did the investigators search for sick/dead birds?

d. Were there any sick/dead birds found?

iii. **Administrative officers'/staff's info**: Officers or staffs name, dates of working days and nights.

3.1.2.3 Sample Submission According to Approved Formats of Disease Act-2005, including followings:

i. Location Information

ii. Firm/Backyard/Other

iii. Species/Source (Deshi (Backyard) Chicken, Sonali Chicken, Brown Commercial Chicken, White Commercial Chicken, Duck), Numbers of Samples Collected, Sample Type and Description, Sample ID (As Written On Sample Tube Or Container)

iv. Sample Sent to (FDIL, CDIL, BLRI, Other)

v. Sample Collected By

3.1.2.4 Nutritional Sample Submission

vi. Location Information

vii. Food type/source/provider

viii. Food Quality Inspection

ix. Analytics of Inspection

x. Detail testing and reports

3.1.2.5 Integration with existing system of BAHIS

3.1.2.6 User Management

- Different Access Roles can be defined dynamically and user can be assigned to multiple roles.
- Role wise access permissions for system functions/interactions can be defined.
- User wise FDIL, CDIL, Others information can be accessed.
- User's mail address and mobile number has to be captured and should go through SMS/ mail validation process.
- Password recovery option should be there through email and SMS

3.1.2.7 **Document upload** facilities with necessary validation of size and file types. Document Title and short description.

3.1.3. Inventory Management

3.1.3.1 Defining Inventory Items with their attributes

3.1.3.2 Inventory Requisition Process

3.1.3.3 Stock Issue Register

3.1.3.4 Stock Receive Register

3.1.3.5 Stock Position, Stock Level Alert

3.1.3.6 Inventory Write-off Process

3.1.3.7 Opening and Closing Stock

3.1.3.8 Track Batch and Expiry of Stock

3.2. Major Outputs:

1. Patient and Farm listing and detailed view
2. Diagnosis and treatment Analytical reports with filtering of CDIL, FDIL, District, Sub-District etc.
3. Tracking and follow-up of treatment.
4. Farm assessment analytical reports
5. AVIAN Influenza Investigation reports
6. AVIAN Influenza sample submission tracking and management
7. Stock Position Report
8. Stock Movement Report
9. Dashboard: Dashboard must be dynamically customized as per user's privileges
10. Analytical Reports including different types of Charts
11. Dynamic reporting (User can select data columns from a pre-defined entity and fields list and generate reports)

3.3. Other Functional Requirements

1. As this software will be a data entry intensive application, the system should allow easy, friendly and guided data-entry facility.
2. In relevant cases, an input should be able to select from a list of values.
3. Searching of all type of records should be able with relevant filtering fields. For example, Farm owner/Khamari information should be able to find by NID, Phone Number, Partial Name etc. or their combination.
4. Uniqueness/Identity has to be maintained in necessary cases to avoid duplicity and data inconsistency.
5. Both English and Bengali language has to be supported.
6. Necessary Printout for different documents/data can be taken.
7. Mobile App has to be developed for field level data capturing.
8. Login with google account can be performed.

9. Audit log for activities (who, when, what) performed by users must be preserved
10. The web application must be mobile friendly and mobile responsive.
11. Export facilities must be there for all entities/records into CSV, HTML, EXCEL, PDF etc.
12. Import facilities must be there for all entities/records (With validation). Upload Templates will be downloadable
13. GPS location have to be captured from the uploaded images/videos

4. Non-Functional Requirements

a. Integration Requirements:

This system should have integration ability with existing system of BAHIS and other systems/MIS through standard APIs according to the needs. Through integration this system may periodically sync information from mentioned external systems or call other's systems API for necessary data.

To establish an integrated digital government and ensuring the interoperability among the e-government/e-Services 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 Service Provider 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 Service Provider 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.

b. Application Compliance Requirements

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

Mobile Application Requirements

1. The mobile application version of the system should be developed for Android.
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.

c. 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 Service Provider developed application will be hosted in government provided data center i.e. National data center (NDC). Therefore, at this stage, Service Provider is requested to submit a **"Hosting Architecture & Requirements"** in their technical proposal for this application considering the issues mentioned below-

- Hosting requirement /environment (hardware, servers, network, security, storage, traffic, firewall, bandwidth etc.)
- Hosting architecture
- Data growth and scalability plan
- User handling/load balancing mechanism
- Licensing issues
- Scheduled backup & restore requirements
- Disaster recovery requirements
- Monitoring tools requirements.

Supplier has to host this software application on at least 2 servers with adequate capacity (minimum 8 CPU, 16GB RAM, 100GB Storage) and will provision for at least 500 GB space additional storage.

d. Security and Privacy Requirements

The Service Provider should submit an extensive **"Security and Privacy Plan"** including comprehensive security architectures in their technical proposal for this proposed application considering the following issues:

1. Project technical scopes
2. Functional and nonfunctional requirements and ultimate objectives
3. User roles - Accessibility, Authentication, Authorization and Accountability
4. Importance of data management & data privacy
5. Strength of technologies to be used for development, operate & maintenance
6. Deployment & hosting
7. A checklist of security measures to be taken for this solution

System Security Requirements (But not limited to)

1. The Service Provider 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 Service Provider should consider (but not limited to) common vulnerabilities such as SQL Injection, Cross Site Scripting (XSS) etc.
3. Service Provider 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 Service Provider shall minimally provide Access control, Authentication and accountability security mechanism 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.

e. Sizing, Performance and Scalability Requirements

1. The system processing shall be scalable to support the volume estimates for a period of 5 years at a 25% annual growth rate.
2. The system shall be designed to handle estimated 200 simultaneous connections (online users) when it is ultimately rolled out.
3. The Service Provider must conduct an extensive load testing task taking above factors into consideration and submit a load testing results.
4. The database architecture should be such that the system is available to user 24x7x365 days a year without any unapproved downtime.
5. 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 with speed of 1 Mbps.
6. Average transaction response time, on-submit response-time, or any other database access/search time should be less than 4 seconds when the system solution is accessed over the intranet with speed of 1 Mbps.
7. Considering the network infrastructure challenges in Bangladesh, the solution must support low bandwidth conditions for the services defined in the functional requirements.
8. In case of mobile application also, this should support very low bandwidth even in 2G network provided internet bandwidth.
9. The proposed solution should be highly scalable to accommodate current and future requirements within the scope of the scope mentioned in the TOR
10. Analyze the requirements whether both horizontal scaling (scale-up) and vertical scaling (scale-up) will be required for this application or not?
11. The e-Service application should be provided with appropriate caching mechanism to handle very high-traffic scalability
12. The Service Provider may propose here other relevant measures for the application scalability.

f. Business Continuity

Business Continuity plan will play a very important role by creating the systems of prevention and recovery to deal with potential threats and risk of the software. Service

Provider is requested to propose a Business Continuity Plan for this e-Service application. Regarding business continuity, you may take in account the followings issues if applicable or suitable for this software Application

- All standard backup facilities should be supported by the system which can be started with disk-based backup facility.
- Data and the Operating system core component will be separated. A ghost image of the Operating system will always be available in case of rebuilding the server. All data can be restored in the data drive once the Operating System is restored.
- System can also have an automated Backup mechanism by which users can schedule the backups and the system will take the backups without manual intervention.
- System must check for the media and generate a report on backup with date time and details of backup.
- If a restoration fails for any reason, the system should prompt with proper error messages and suggest what has to be done to rectify the situation via on-screen, logs, email and text messages.
- System should maintain an automated recovery system and all versions of backup will be maintained. At any given point in time, the versions and incremental backup details can be retrieved from the system.
- The system may be hosted in virtual servers or containers. A restore of a virtual server/container is much easier and faster compared to a single host server.

g. Interoperability and Data Exchange

The selected Service Provider 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

h. UI (User Interface) / UX (User Experience).

The Service Provider must propose a UI/UX plan 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 Service Provider 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.

i. System Audit

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

- Log the users who are accessing the system
- Log the parts of the application that are being accessed
- Log the fields that are being modified
- Log the results of these modifications
- Log attempted breaches of access
- Log attempted breaches of modification rights
- Timestamp.

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

j. Tools and Technologies to be used

Service Provider is recommended to choose the appropriate tools and technologies (Open Source is preferable) to be used for the development and implementation of the software application. The selected Service Provider has to consult with responsible technical team of LDDP (client) to finalize the tools, technologies, framework and platform with the approval of same authority's consent.

The main components of the software will be web based applications. It should be run in Windows/Linux 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 support native Android.

Understanding the details scope of this project, Service Provider is requested to submit a detail **"Tools & Technology plan"** in their technical proposal following the table format mentioned below

Issues/Phases/Purpose	Used Technology/ Tools	Justification for use	Alternative Tool/ Technology
Project Management xd			
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			

k. Language Support

The 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.

l. Coding Conventions

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

m. Documentation

Detail and proper documentation of such ICT based project like software 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 standard documentation approach at each phase of e-Service development and implementation project. Service Provider should include an extensive documentation plan of this project in their technical proposal, which may cover the followings

- Documents titles phase or activity wise
- Purpose of document
- About the format of documents (if possible only index or fields)
- Type of expert and skilled resource will be used for documentation
- Document priority and dependency
- Time requirement for preparation (If applicable).

5. Work Scope

The Service Provider will be required to complete the development and deployment of the platform following the SDLC methodology and perform the relevant activities accordingly within the stipulated time.

a. 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 parts. Each part 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 parts become smooth and organized

At this system-designing phase, Service Provider may perform following designing related task and produce various standards System Designing Documents (SDD):

- Identifying module, components, tasks, I/O and functional features
- Specifying technical and functional requirements
- User Interface design
- Description of UI and requirements
- Preparing the use cases
- Defining Integration and interoperability scope
- Designing system architecture
- Determine process and data flow
- Database design
- API design
- Finalizing tools, technologies and frameworks to be used etc.

Here Service Provider is requested to cover system designing plan in detail in their technical proposal, which may include relevant activities, approaches, methods, documentations and deliverables. Prototype Design: The approval of the design includes the approval of a web version of prototype which is expected to consist all features/functions with dummy data. Prototype designing will be in iterative approach and will have to go through several review and correction steps.

b. Development & Release:

Each part's components/modules and features will be developed and released in an iterative methodology with predefined steps i.e. LLD, development, Integration and Testing passed. After successful completion of this part 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 part.

c. Testing:

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

Some are mentioned below as examples for reference.

- Unit Test
- Functional Test
- Installation testing
- Compatibility testing
- Smoke and sanity testing
- Regression testing
- Stress Testing
- Acceptance testing
- Alpha testing
- Beta testing
- Functional vs non-functional testing

- Continuous testing
- Destructive testing
- Software performance testing
- Usability testing
- Accessibility testing
- Security testing.

d. UAT:

User Acceptance Test (UAT) is a very vital and essential phase in the e-Service development lifecycle. At this phase, all types of users must test the developed e-Service application by themselves and have to provide a details feedback/ test report. Based on the UAT report, Service Provider has to update the application accordingly to ensure user satisfaction by making it more user friendly. Here, it is expected that, considering the type of users and their role in the e-Service application, the Service Provider must propose a comprehensive UAT plan in their technical proposal which may cover the followings:

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

e. Management and Migration of Legacy Data

Under the process of application deployment, it may be necessary to move the legacy data of prevailing services. In this case, Service Provider may require to perform different relevant activities that may include data collection, softcopy conversion, data filter, data cleansing, data verification, data process, data entry, data migration and overall data management. Here, it is expected that, the Service Provider will propose their detail data management and data migration plan for this application considering the estimation of legacy data mentioned below which will be required to migrate into the developed application.

The plan may cover amount of data to be migrated, activities to be performed, 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.

f. Deployment and Implementation

This is the phase of SDLC, when the consent is being given to "GO LIVE" of the developed system after completed all kinds of development integration, testing and hosting. This is very crucial and sensitive stage for a Government application because at this stage the system becomes public and expose to access towards all levels of users. The Pilot or full-scale

implementation period starts formally in this stage only. Service Provider is requested to propose their deployment and implementation plan covering the major activities to be performed, the deliverables to be provided etc.

g. Training and Knowledge Transfer

- The Service Provider must propose a detail training plan for the users of the application.
- The Service Provider should include necessary training methodology, documentation and training materials support in their training plan
- The training materials may include user manual, administration manual, quick start tutorial, online help, frequently asked questions
- The training plan must describe the sequencing, time, duration and resources involved in implementation of each of the consultant's proposed training activities.
- The training plan should contain full course descriptions for all courses that to be carried out for respective users.
- The Service Provider should develop multimedia training materials for all users. These materials shall be available for viewing and reviewing for all users through a web portal.
- The training instructions should support both English and Bengali language.
- The training activities should cover the training feedback, evaluation and report also.
- The Service Provider also need to propose their smooth, efficient and effective knowledge transfer idea and plan here in this technical proposal with the training plan.

h. Maintenance and Support Service

The selected Service Provider has to provide a period of 01 (One) year maintenance and support service. After the development and deployment phase when the implementation period starts the Service Provider has to provide maintenance and support service for the 01 (One) year. The 1st year maintenance should be provided as free warranty period. The Service Provider must provide a detail maintenance and support service plan in the technical proposal, which may include the followings:

- Support service types and mode of services
- Service desk functionalities
- Configuration management
- Change management
- Service layers for support
- Tools will be used for Support service management
- Communication management and modality
- Release management
- Incident management
- Problem management
- SLA (Service Level Agreement)

- Maintenance and support service related reporting
- Support service types
- Service Log Management

In the maintenance period, Service Provider has to provide ad-hoc reports from the database which is not possible to produce from the built reports in web module. Service Provider will also have to deliver minor modifications within the existing process scope.

Apart from the above mentioned issues, if Service Provider thinks any other issue to be included in their plan, it would be considered as added value addition.

i. End User Call Support

The selected Service Provider has to provide a period of 01 (One) year end-user support service. After the development and deployment phase when the implementation period starts the Service Provider has to provide end-user support service for the 01 (One) year. The 1st year maintenance should be provided as free warranty period. The Service Provider must provide a detail of end-user support service plan in the technical proposal, which may include the followings:

- Support service types and mode of services
- Service desk functionalities
- Service layers for support
- Tools will be used for Support service management
- Communication management and modality
- Support service related reporting
- Support service types
- Service Log Management

In this support period, Service Provider has to provide at least 2 dedicated persons who will attend end-user support call during office hours. These support persons must have adequate knowledge on the domain as well as the software features.

j. Project Timeline

Service Provider must complete the project within a stipulated timeline based on the proposed SDLC methodology. The project timeline can be divided in 4 below phases that is – Requirement Analysis & Design, Development, UAT, Deployment, & Piloting, Maintenance & Support. Below are the expected timelines for the mentioned phases.

Phase	Timeline to Complete (From Inception)
Requirement Analysis, Design	3 Weeks

Development	9 Weeks
UAT, Deployment, & Piloting	12 Weeks
Maintenance & Support	1 Year from Live

k. Work Distribution and Team Composition

The Service Provider is expected to provide work distribution and team composition plan as deemed suited based on this project requirements and milestones and as per their proposed development and implementation methodology approach. The interested applicant (Service Provider) should provide a team composition plan in their proposal describing the position, roles, tasks to be assigned, expected man-days of involvement, expected deliverables and required skill and expertise.

Sl. No.	Position	Quantity (Man-Month)	Qualification
1	Project Manager	6	Minimum Bachelor degree in Computer Science or equivalent degree with minimum 12 years' experience in Software Solution Development, Implementation and Software Development Management. Proposed personnel should have minimum 5 years' experience in government project management.
2	System Analyst/Software Architect (2)	6	Minimum Bachelor degree in Finance, Information Technology (Preferably software), Accounting, Business Administration. The applicants should have experience in Business/System Analyst in MIS software for 8 years.
3	Database Engineer (2)	6	Minimum Bachelor in computer science or equivalent. Proposed personnel should have at least 6 years' working experience.
4	Sr. Software Engineer (2)	6	Minimum Bachelor in computer science or equivalent degree. Proposed personnel should have at least 8 years' working experience with minimum 5 years' experience in related projects.
5	Software Engineer (4)	8	Minimum Bachelor in computer science or equivalent degree. Proposed personnel should have at least 5 years' working experience with minimum 3 years' experience in related projects.
6	App Developer (2 Person)	6	Minimum Bachelor in computer science or equivalent degree. Proposed personnel should

			have at least 5 years' working experience with minimum 3 years' experience in related projects.
7	QA Expert	4	Minimum Bachelor in computer science or equivalent degree and 05 years' experience with minimum 03 years' experience in related field.
8	UX/UI Designer (2)	4	Minimum Bachelor degree in any computer science or equivalent with at least 3 years' working experience in related field. Expert skills in graphic, visual design and web design.
9	Jr. Developer/Software Tester (6)	8	Minimum Bachelor in computer science or equivalent degree with minimum 3 years of working experience.
10	Technical Document Writer	3	Minimum Bachelor in computer science or equivalent degree with minimum 5 years of working experience.

6. Expected Deliverables

Considering the scope of service and scope of work of this project and based on the proposed project development & implementation methodology, the Service Provider must submit here a complete list of all types of deliverables will be produced throughout the entire project timeline whether those are materials, services, applications, source codes, documents, plans, reports etc. in a table format mentioning the stages, activities and timelines.

Some examples of the deliverables are mentioned here under for your reference.

- Project inception and management report
- System requirement specification (SRS)
- System design document (SDD)
- Complete source code
- Detail source code documentation
- Test plan with test scripts and testing reports
- Technical documentation (system architecture, module integration points, workflow engine, data dictionary, user manual etc.)
- Training plan and reports
- Training materials and user manuals
- Integration plan and reports
- Mobile Application
- Web application
- UAT Report
- Maintenance, agreement & SLA

- Maintenance and support log
- Change Log
- Hosting requirement specification, plan and report
- Implementation plan and report
- HR activity plan and report
- Progress and review reports.
- Piloting Feedback Report

7. Copyright

LDDP/DLS shall be entitled to all proprietary rights including but not limited to patents, copyrights and trademarks.

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 Service Provider under this scope of this TOR will be owned by LDDP/DLS

At the request of the LDDP/DLS the Service Provider 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 LDDP/DLS 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 LDDP/DLS

The Service Provider should properly deliver the entire approved source codes and other deliverables to the LDDP/DLS The Service Provider 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 LDDP/DLS and the Government of Bangladesh may see fit.

Any studies, documents, reports, graphics or other materials prepared by the Service Provider for this project under this TOR shall belong to and remain the property of LDDP/DLS

8. Conclusion

The scope is defined in this TOR and it is expected to have a profound solution proposal from the Service Providers interested for the development of the web based MIS for LDDP, DLS.