

Terms of Reference

For

**Enhancement of Education Information Management System
(EMIS)**

**Component of Digital Schools under Digital Drukyul Flagship
Project**



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Ministry of Education

Royal Government of Bhutan

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1. Abbreviations

TOR	Terms of Reference
EMIS	Education Management Information System
AS-IS	Currently in use/practice
SABER	Systems Approach for Better Education Results
TO-BE	Future State of Application and Processes
SRS	System Requirement Specifications
FRS	Financial Requirement Specifications
BDB	Business Design Blueprint
SDD	System Design Document
SDV	Software Development Vendor
RFP	Request for proposal
BPR	Business Process Re-Engineering
UAT	User Acceptance Testing
NFE	Non-Formal Education
DYS	Department of Youth and Sports
DSE	Department of School Education
DAHE	Department of Adult and Higher Education
MDCA	Mobile Data Collection and Analytics
LMS	Learning Management System
SPMS	School Performance Management System
TESS	Tertiary Education Statistics System
NFCED	Non-Formal and Continuing Education Division
ECR	Extended Classroom Resources
ECCD	Early Childhood Care Development
SHND	School Health and Nutrition Division
EMD	Education Monitoring Division
RCSC	Royal Civil Service Commission
REC	Royal Education Council
RUB	Royal University of Bhutan
BCSEA	Bhutan Council for School Examinations and Assessment

NSB	National Statistical Bureau
DCRC	Department of Civil Registration and Census
DOI	Department of Immigration
DITT	Department of Information Technology and Telecommunications
MoE	Ministry of Education
MOFA	Ministry of Foreign Affairs
MOLHR	Ministry of Labour and Human Resources.
MOF	Ministry of Finance
BCRS	Bhutan Civil Registration System
CSIS	Civil Service Information System
ePEMS	Electronic Public Expenditure Management System
MYRB	Multi Year Rolling Budget
ePIS	Electronic Patient Information System
TVET	Technical Vocational Education and Training
GDC	Government Data Center
TWAN	Thimphu Wide Area Network
TAT	Turn around Time
ToT	Training of Trainers

2. Education Sector Background

Until the advent of modern education in Bhutan in 1961, monastic education was the main form of education. Monastic education has served the social, economic and spiritual needs of the country for centuries. Since the commencement of planned development in 1961, modern education has scaled up significantly and has played a principal role in the pursuit of political, cultural, environmental and socio-economic development of the country.

The Constitution of the Kingdom of Bhutan requires the State to provide education to improve and provide knowledge, values and skills to the population. It also mandates the provision of free basic education to all children of school going age and ensures that technical, professional and tertiary education is made generally available, some based on merit.

Bhutan has made commendable progress in this endeavour, particularly in enhancing access to education. However, more needs to be done to improve quality and equity in education. Bhutanese education system has grown both in terms of enrollment and scope. From 440 students in 11 primary schools in the early 1960s, there are over 179000 students in 1582 institutions offering general, vocational and non-formal education.

3. EMIS Background

Data is an important ingredient in any successful education system, the provision of which rests on the development of an Education Management Information System (EMIS). Increasingly, the focus of EMIS is moving away from using data narrowly for counting students and schools. Instead, they are using data to drive system-wide innovations, accountability, professionalization and, most importantly, quality and learning. Data can play an important role in informing decision making, enhancing effectiveness of delivery, and strategic planning. A data system can ensure that education cycles, from preschool to tertiary, are aligned and the education system is monitored so that it will achieve the ultimate goals of producing graduates who transition into the labour market and contribute to the overall national economy.

EMIS is one of the main systems that is operated by the Ministry of Education. It was established in 2010. The baseline data was collected for 2011. It is web-based system that collects extensive data on the following:

- Organization data comprising of HQ, Dzongkhag offices, Schools, Extended Classroom resources(ECR) and Early Childhood Care and Development Centres(ECCD)
- Staff information that includes HQ staff, Dzongkhag Staff, School Staff and ECCD staff.
- Students data that includes Continuing Education, Regular Students and ECCD Students

The main users of the current EMIS is the Ministry of Education. Inputs in the Annual Education Statistics are generated from the EMIS. EMIS has enabled online education data collection and reporting.

While the current EMIS has enabled creation of a centralized database of education data, there are some challenges. Some of the challenges are:

- Due to ever changing data requirements, the current system is not able to generate the data required for decision making. Policy dynamism requires more data that is not catered in the current EMIS.
- Multiple and duplicate data collection is happening as the system is not catering to several stakeholders.
- EMIS being developed in 2010, the user friendliness of the system is a major concern. The current EMIS also lacks dynamic reporting systems including dashboards.
- EMIS is not integrated with systems that either can provide data or consume data from EMIS. This has also affected the quality of some data in the EMIS.
- Current EMIS is developed using Zend Framework 1 which lacks support from the developers of the framework.

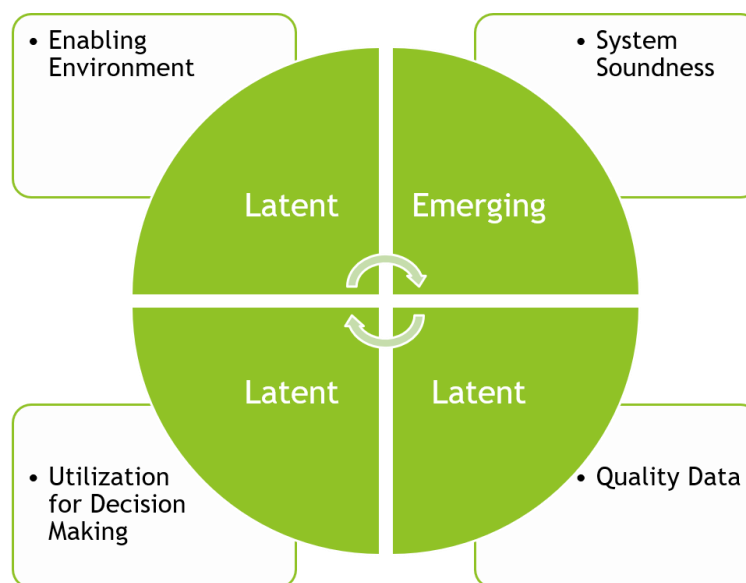
In the light of above, it has been decided not to make any further enhancements to the existing system, instead, a new version will be **developed from scratch**.

4. EMIS Assessment

In order to address the challenges, a major review, assessment and need analysis to enhance the EMIS was conducted from December 2019 to March 2020. The assessment was done using Systems Approach for Better Education Results (SABER) framework. The SABER framework is a holistic approach to assessment of EMIS that identifies four core areas that are shared by education data systems as follows:

- **Enabling Environment** – Assessment of intended policies in relation to a sustainable infrastructure and human resources that can handle data collection, management, and access
- **System Soundness** – Assessment of the degree to which the processes and structure support the components of a comprehensive information management system
- **Quality Data** – Assessment of the degree to which an EMIS system accurately collects, securely saves, and produces high quality, timely information
- **Utilization for decision making** – Assessment of the reality of system implementation and utilization of EMIS information in decision making

The Assessment revealed following status from the four policy areas:



5. Objective of the Assignment

The objectives of the assignments are:

1. Institute an integrated and comprehensive EMIS.
2. Ensure quality data and information processing for evidence-based planning, decision making, interventions, research, monitoring and evaluation for all levels of stakeholders.
3. Ensure flexibility in system design to adapt/accept the changes in data that may be changed/required in future management
4. Improve data dissemination to support effective quality assurance and continuous improvement of data culture within and outside of the Ministry of Education.

6. Terms and conditions

Project Preparation

1. The SDV shall prepare and present a project plan, that includes project charter and implementation schedule.
2. The SDV shall familiarize the Project Team with MoE counterpart.

Analysis and Prototype

1. The SDV shall carry out an in depth study of the existing systems, process and requirements from different stakeholders.
2. The SDV shall apply process re-engineering wherever possible and propose TO-BE processes. SDV to obtain user acceptance on the TO-BE processes from MoE.
3. The SDV shall prepare and submit Software Requirement Specifications (SRS) document and Software Design Document (SDD).

The SRS and SDD shall consist of the following:

- i. The SDV is expected to deploy standard templates for this purpose. Some of the critical outputs, but not limited to, of the BDB phase will be as follows:
 - a. The master list of TO-BE and AS-IS processes
 - b. The users of the system, their roles, scope and access rights
 - c. The reporting requirements and report formats
 - d. The identification of interfaces, needs for integration and the scheme for integration
 - e. The data input requirements and format
 - f. The outputs formats requirements
 - g. The training and change management requirements
 - h. The hosting infrastructure sizing
 - i. Best practices
- ii. The SDV shall also ensure the following during the implementation:
 - a. Documentation of the functional specifications for customization, development, interface and reporting requirement (e.g. layout sets, daily status reports, reconciliation reports, etc.), based on inputs
 - b. Prioritization of the development efforts and estimates for reporting and customization requirements
 - c. Develop detailed technical design documents for all such development requirements including any data operation and security issues
 - d. The SDV shall wherever possible advise / propose to simplify the business processes so as to bring efficiency in the EMIS data management processes.
4. The SDV shall, upon acceptance of the SRS by MoE, design and develop a prototype that is in line with the requirements for better feedback.
5. Upon acceptance of the prototype by MoE, the vendor shall design and develop the system incorporating the feedback.

Realization

1. The system enhancement will be undertaken based on the approved SRS and SDD.
2. After completion of the enhancement of EMIS, trial run with EMIS data will be done to demonstrate the processes to the MoE. If need arises and the result is not up to the expectation of MoE, further re-configuration/customization will be done in order to close any gap left in meeting the desired objective.
3. The SDV shall also identify and configure the users of the system. Some of the other key activities to be executed are:
 - a. Integration of the detailed design across modules
 - b. Testing of configuration of modules
 - c. Identification of the fields that need to be captured for the Masters and mapping of the information with existing data to be migrated.

Project Management Services

1. MoE intends to complete the implementation and deployment of EMIS, within the time period of signing the contract for supply and implementation. The SDV is required to organize the project to ensure these timelines.
2. Deployment of resources to ensure that the project activities are carried out as per plan
3. Deployment of a project governance structure for effective monitoring, review and risk mitigation

Project Quality Services

1. The SDV shall ensure quality while implementing the system at all times. This shall be evaluated by the client or be outsourced in the long run. If the work is not up to expectation there could be legal consequences.
2. The SDV shall mention in their proposals any quality standards they practice or any certifications they have obtained in this area. Compliance with such quality standards will be closely monitored by the client. The client reserves the right to report to the concerned authorities, any breach pertaining to the quality standards that the Firms has claimed to adhere to.

Feedback, Monitoring and adoption

1. MoE may use the services of independent third-party expertise to assess, review and quality control of the project artifacts and deliverables.
2. The SDV shall put together a structure and mechanism for ensuring that all the key functional areas, users of each of the stakeholders are consulted, feedback adopted and key differences identified, so as to facilitate standardization as well as user adoption.
3. There may be three types of feedback for the deliverables – from the third party hired by MoE (if any), from the users/stakeholders and from the internal experts of the SDV. Since the feedback / audit findings for any rework is by nature correcting the inadequacy of quality of the work produced in the first place, MoE will not accept any change notice request for these reworks.
4. SDV shall build in adequate mechanisms to control the risk of time overruns possibly due to effort required to rework bad quality deliverables
5. SDV shall indicate in the beginning and during the start of each phase how it plans to take feedback and the mechanisms to incorporate the feedback into the project plan and deliverables.
6. SDV shall report to MoE how the feedback has been incorporated into the project deliverables and take a sign off from the designated authority of MoE.

Testing

1. The SDV shall prepare and present the test plan to be carried out by SDV and users to MoE. This should include standard functionality test cases for testing the system and test data for test cases prepared in consultation with users.
2. Upon completion of the system, the SDV shall carry out pre-commissioning tests such as unit, penetration, functional, modular and integration to assess, but not limited to, the following. The SDV shall share and present the report of the testing to MoE before conducting the UAT. The test report should include:
 - a. Conformance to the functional and technical requirements
 - b. Performance of the system with reference to response time and accuracy
 - c. User friendliness
 - d. Data quality test for migrated data
 - e. System and data security
 - f. Device and browser compatibility
3. MoE will identify and share with SDV the users who will conduct the User Acceptance Test.
4. The SDV shall present and prepare the documents for the test cases and scenarios, lay down expectations and present the system to the users during the UAT.

Data Migration

The EMIS has data on staff, student and organization. Yearly data has been saved by replicating the database. Data across all these databases are frequently used in reports. Enhanced EMIS will integrate data from different systems as outlined in this document.

1. The SDV shall prepare and present a detailed plan for data migration of all the data in current EMIS and other related systems (if required). MoE will approve the detailed plan before data migration.
2. The SDV shall migrate all data of the existing EMIS(from 2011) into the enhanced EMIS.
3. The SDV shall migrate the data from MDCA (2019) and SPMSS(from 2016).
4. The SDV shall report data quality and integrity for migrated data.
5. The SDV shall be responsible for data mapping and data cleaning.

Training and Knowledge Transfer

1. The SDV shall provide a detailed training plan for different levels of system users before the start of training of users. The plan should contain an indicative list of training resources that would be allocated from the vendor's side and days required for training different levels of user. The MoE will approve the training plan before the training.
2. The SDV shall provide adequate and comprehensive training to users. The users refer to all system users including System Administrator, DBA, Network Administrators, managers and other end users specified by MoE.
3. The SDV shall provide trainees with soft copy and hard copy of training materials/manuals/videos that would cover all the facets of the system, system deployment & operation, server and system configuration and installation, backup services, security requirements, usage and other necessary technical services, one week before the training.
4. MoE shall provide the list of master trainers one week before the training begins.
5. MoE shall provide the necessary infrastructure for the training at a suitable location.
6. On completion of the training, the master trainers and users will be performing rigorous tests of the system and submit their observations. The observations will cover the following topics:
 1. Comments in User Interface and suggestions for betterment
 2. Comments on operational flow

3. Response time of the system
4. Bugs encountered and error management facilities
5. Data validation and security measures
7. The SDV shall accept and incorporate the comments and feedback received from the trainees during and after the training.
8. The Firms shall ensure the proper transfer of knowledge and capacity building for long term sustainability.
9. MoE shall deploy at-least one developer with the SDV development team to ensure adequate knowledge transfer. However, SDV should not bank on the MoE developer for achieving the deliverables but should engage them.

Cutover Strategy

1. The SDV shall provide a comprehensive cut over strategy including initial data take on, sequence of data takes on, set up of support helpdesk, helpdesk procedure to minimize business impact of cut over activities.
2. The SDV shall undertake the following to review readiness for “Usage Ready” of the EMIS:
 - a. Facilitate in setting up a central help desk for any queries.
 - b. Review the health, usage and performance of the system till it stabilizes
 - c. Ensuring resolution / documentation of all issues raised during implementation
 - d. Final configuration / integration, volume and stress testing
 - e. Switch over to production environment
3. The system will be declared “Usage Ready” when the following tasks / activities are accomplished satisfactorily:
 - a. UAT Signing
 - b. Infrastructure Commissioning
 - c. Data Migration
 - d. Training of TOT
 - e. Initial User creation / role identification. Users have to be migrated from EMIS.
4. The EMIS will be accepted only after successfully using the system for three months after “Usage Ready”
5. The SDV shall provide user adoption support between the period of “usage ready” and declaration as the system is accepted, by deputing technical and functional consultants at the client site. During this period the SDV shall provide hand holding support to the support team to carry out their activities using the EMIS.

Change Management

1. Since this is a fixed price project, the SDV is expected to complete the project without raising any requests for change and seeking the payments for them.
2. The change management cannot be invoked before the project delivery sign off. The change management will be need based and shall include:
 - a. Incorporation of new requirements due to change in rules and procedures at the client side.
 - b. It will be considered change management only if there is major customization in the existing system, such as addition of new modules and process flows to the system, etc.
3. The SDV shall quote the man-day rates for additional services under the financial proposal of this RFP.
4. Change requests should be routed through a standard process. If there is a genuine change to the scope of work, MoE will raise or accept change requests and pay for them.
5. Any minor changes such as fixing of bugs, software patches, issues related to report generation, minor version updates, small changes in the user interfaces within the existing modules without significantly impacting the process flow and database transactions shall not be covered by the change management contract.

Warranty, Support and Maintenance

1. The SDV shall provide a minimum of 2 years free warranty period. The warranty period shall commence after successful implementation of the project. The complete successful implementation shall be considered only when EMIS is fully rolled out to all the Dzongkhags and Schools.
2. The SDV should include the cost of AMC of the system per year in case MoE wants to extend warranty support.
3. The SDV shall provide free on-site support and incorporate any minor changes identified by MoE during the warranty period without incurring any additional cost.
4. The SDV shall provide bug fixing and support schedule with TAT. If the SDV, having notified by MoE, fails to rectify any of the defects (functional/ technical bugs, security issues, any other necessary technical support) within the period specified in this RFP, MoE may proceed to take reasonable and remedial action as may be necessary as per this RFP document
5. The SDV shall provide all updates, patches / fixes, version upgrades and new versions if any within 15 days of their availability and should carry out installation and operationalization of the same at no additional cost to MoE
6. The proposed solution or its component part shall not have reached or neared its end of life. In such a case, the vendor shall replace the solution at the cost price of the solution (software) in the contract.
7. The SDV shall accept responsibility for the successful implementation and operation of the EMIS and for the compatibility of the various software and hardware components.
8. If the Operating System or additional copies of Operating System are required to be installed / reinstalled / removed, the same should be done as part of Warranty.
9. The SDV shall carry out any requisite adjustments / changes in the configuration for implementing different versions of EMIS.
10. The SDV shall provide and implement from time to time the Updates / Upgrades / New Releases / New versions of the software and operating systems as required. The SDV shall ensure upgrades, updates & patches of the EMIS solution and tools to MoE.
11. Apart from bug fixes etc the following support shall be included:
 - a. Help desk operation – Initial response, immediate telephonic response and support for usage related and other minor problems.
 - b. Onsite Support – On-site support for hand holding the users, database recovery and data synchronization after crash, performance tuning, bug fix, update for all critical functions.
 - c. Operational Support – On-site operational support after implementation for at least six months
 - d. Documentation – upgrade the Documentation System on any new releases and provide updates of technical and functional manuals

SDV minimum team composition

1. The SDV shall have adequate technical manpower to carry out the project and complete it on time.
2. The SDV shall identify key personnel in the project. All the identified professionals shall be employed on a full-time basis and their responsibilities delegated based on the standard software development team.
3. The following is the **minimum** key team composition the firm shall have failing to which will lead to the disqualification of the bid document:
 - a. One Full time Bhutanese Project Manager with at least 3 years experience preferably with technical knowledge on EMIS/MIS.
 - b. One dedicated microservices solution architect who has worked on at least 2 projects that was on microservices design.
 - c. One DevOps engineer who has experience of 1 year in the DevOps field or should have worked on 2 projects on DevOps tools
 - d. One Application/System security expert with 2 years experience in the Application/System security.

- e. One database designer with experience of at least 2 years in database designing and administration.
 - f. Two full time Bhutanese senior developers with at least 3 years of experience in relevant field (Qualification and Experience evaluation will be done for Sr. Developers).
 - g. One Frontend (UX) Developer/Designer with at least 2 years of experience.(Evaluation will be done for UX designer/developer)
 - h. At least 3 developers(at least two bhutanese) excluding the aforementioned.
 - i. Additional staff like tester, document writer,trainer will be regarded as plus point for the SDV
4. MoE shall monitor and verify them through sealed and signed CV and certificates
 5. The Project Manager, Solution Architect,DevOps engineer,Security Expert and Developers or any other technical member of the team shall be involved in the project full time and shouldn't leave until the product is accepted by the client, unless under unavoidable circumstances whereby permission to replace a particular resource may be sought in written form, from the client on a condition that there would not be a major impact on the project. The SDV shall replace the personnel(s) within 7 days.
 6. The SDV shall submit the original CV with CID/Passport Copy for all the team members for this project. This shall be later verified by the MoE during evaluation as well as during the execution of the project.
 7. The SDV shall hire only a few key personnel and not all.
 8. SDV shall mention projects(software development) in hand.

Confidentiality of Data

1. Since the assignment entails handling of legacy data of National Education which could be classified and restricted in nature, all the team members from the SDV must provide security and confidentiality of data. Breach of this will be dealt with according to the laws of the Kingdom of Bhutan.

Confidentiality of offer

1. The details of the offer proposed by the Firms or its acceptance thereof with or without modifications by the client shall not be passed in part or full to any third party without the prior written approval of the parties involved.

Ownership of Source Code and other Intellectual Property

1. MoE shall be the rightful owner of the Source code and all the Intellectual Property associated with the EMIS and shall have full rights over the ways they can use these resources.
2. The entire software component developed as part of this assignment shall be the sole property of MOE. The SDV will have no right to commercially use or apply the software elsewhere.
3. The SDV shall provide all rights/ownership and all source code and documentation for Database, Applications, Mobile Apps and Hardware Interfacing (API).

Use of Source Code Management Tool

1. The vendor is also recommended to use source code management (SCM/VC) tools to manage the source codes.
2. The SDV shall setup and manage the source codes using source code management tools.The source code repository should also provide visibility to MoE focal on the features closed and pending. It should also support management of product backlog and sprint backlog.
3. Identified technical personnel(s) from MoE shall be trained on source code management tools set up and usage by SDV on the onset of software development.

Naming Convention / Standard

1. In order to keep source codes organized, the SDV must strictly follow standards for forms, reports, database, triggers, views, stored procedures, functions, source code comments, etc. across the system.

Compliance to IT Standards

1. The SDV must work in close consultation with the NEA & eGIF team at DITT to ensure proper compliance with Nation Enterprise Architecture and eGIF.
2. The system should adhere to the following standards:
 - a. Electronic Government Interoperability Framework (eGIF) Standards (<http://egif.moic.gov.bt>)
 - b. Information Management Security Policy of RGoB
 - c. eGovernment Policy

Integration with External System

EMIS will be interoperating with many systems at data as well as system(API) level.

1. SDV shall ensure that any integration required with an external system should be done using the National Data Hub Platform and National Single Sign On Platform (wherever applicable). The national datahub platform is based on WSO2 and is managed by DITT, MoIC. The national Single Sign On Platform is based in WSO2 Identity Management platform
2. SDV shall develop APIs in case of non-existent APIs for systems that EMIS is to interoperate with in consultation with DITT.

Data, Local Services, Personnel and Facilities to be provided by MoE

1. MoE shall provide office space at the site during the testing phase.
2. The SDV shall provide a development environment.
3. MoE shall provide required information on the existing systems within MoE
4. MoE will provide technical counterpart (Technical Working Committee and IT support team) and will liaise with the SDV for any technical aspects.
5. MoE shall make necessary logistic arrangements for TOT training.

Backup and Recovery

1. The SDV shall propose a backup and recovery plan in the technical proposal.
2. The SDV shall propose a hosting requirement that includes backup and disaster recovery plans (including load balancing techniques and replication services) during software development.
3. The SDV shall ensure at least 99% uptime of the system.
4. SDV shall ensure daily automatic database backup and log files. Full system backup should be taken as and when changes take place.
5. The problems other than hardware failure shall be addressed by the SDV under warranty support for the first 24 months from the UAT.
6. SDV shall provide strategy relating for addressing data recovery caused by hardware failures.
7. The SDV shall also provide adequate training to MoE on System Administration and Database Administration so that routine checks, backup and recovery can be handled in-house.

Platform and Technology

1. The system should work in a TWAN environment with an appropriate built-in facility to capture and store data in a centralized database at GDC / MoE. If TWAN is not available then the system should be also accessible through the internet.
2. The core development platform should be implemented using any Open Source Framework and the backend database should be FOSS based DBMS. The necessary inputs and the possible outputs could be

generated from the system should strictly conform to what has been finalized in the SRS document and subsequently the prototype.

3. The system must also make use of any popular front-end UI frameworks (such as Twitter Bootstrap, Foundation, Google Material Design, Semantic UI, etc.).
4. The backend should be developed based on MicroFrameworks (for example: SpringBoot (Java), Lumen (PHP), Flask (Python), Net Micro framework).

Solution Architecture

1. By design the application should be decomposed into independent microservices where the SRP (Single responsibility principle) should be applied. Also, identify the boundaries of the services and align them with the business capabilities.
2. Make sure that the microservices design ensures the agile/independent development and deployment of services.(Please refer the DevOps section stated below for more details on this)
3. Make use of messaging streams/queues wherever there is a need of communication between the services.
4. The application can adopt any of the microservices design patterns that is globally practiced; for instance Database as a service or schema as a service

DevOps

1. The entire development lifecycle should be automated using various DevOps tools.
2. All the services should be hosted inside containers which should adhere to the policies and standards set by the DITT.
3. There should be at least 2 environments configured within the application ecosystem so that there is an uninterrupted transition against each deployment.
4. The production environment should be deployed in the clusters which will be configured by the DITT in the GDC. Since the clusters will be designed and developed using Kubernetes Engine, the application should be built using all necessary DevOps tools that support the cluster's technology.
5. The application should be capable to dynamically scale up and down (horizontally) based on the parameters/metrics set by the DITT/stakeholders.

Hardware Requirements

1. The SDV shall provide the list of required hardware (Server) equipment wherever required along with specifications for the proposed system to run at optimum performance. They will also recommend minimum specifications for the best desktop, laptop and smartphone to use the system.
2. The server Operating System and Database Server shall be provided by the client for final deployment of the solution.

Reports

1. The reporting will have to be done graphically as well as in text/tabular format based on roles and parameters.
2. The report generation in the proposed system would have two categories, the standard reports and ad hoc reports – which must be dynamic. The standard reports will be designed and uploaded during the development/implementation and for ad hoc reports; the system will have a customized Query Builder feature. In every report there must be a facility to generate and export it to MS Excel Sheet, CSV, XML, HTML and PDF formats.

Development Methodology

1. Modular based approach based on prototyping model must be used for the design and development of EMIS. The vendor shall adopt Agile Scrum methodology or any other better methodology for the development activities to ensure that the actual requirements and feedbacks are incorporated. The methodology must be explained in detail in the technical proposal.
2. The SDV shall carry out at least 4 iterations of requirement or specification reviews for each sprint before implementation of the next module from the product backlog. The MoE team will review the outcome of each iteration.
3. The SDV shall provide updates to MoE on functional features, presentation of views, demos, etc. of the system every fortnightly.
4. The SDV shall provide means for communicating project issues through more than one identified point of contact.

Security Features, Audit Trail and Data Integrity

1. Ensure all the communication between the client side and the server side follows the OAuth 2.0 protocol with PKCE(Proof Key for Code Exchange).
2. All container and application configurations should pass/comply with the security standards set by the DITT.
3. The system should provide the highest degree of security in the architecture. The SDV must suggest security solutions required in the system in the technical proposal.
4. The SDV shall implement agreed security components.
5. Some, security and data integrity features, but not limited to, that should be proposed in the technical bid are:
 - a. Security features that provide data integrity features that will prevent more than one user from changing the same information simultaneously.
 - b. The system would ensure that the users follow standard login procedures using proper encryption solutions
 - c. Provision of access/change rights of database and application based on user roles.
 - d. Include up-to-date CAPTCHA programs as a remedy to stop spam and other intrusions wherever required.
 - e. Handle Session Hijacking, session replay, etc
 - f. Input Validation to prevent attacks such as buffer overflows, cross-site scripting, SQL Injection, etc
 - g. Session based interface landing and logout features for inactive users.
 - h. Information deemed confidential shall be encrypted.
6. SDV shall implement full audit trails and logs mechanism for content changes performed by system users. All changes to data and who changed it and when it was changed must be captured.
7. SDV shall maintain time series data so that certain information is not lost with passage of time and repeated updating.
8. After the system is developed and deployed, the system will be scanned for vulnerability testing tools. The SDV shall be responsible to fix any vulnerabilities related to the application within the project contract period.
9. The system must have standard security features inbuilt so that the application has all the checks and balances to ensure the integrity of data and the system does not have any flaws or bugs which inadvertently or by design, permit the users to tamper, alter or modify any data without the appropriate permissions.

Access Control

1. Support integration with a single-sign-on authentication and provide role-based authorization controls to different aspects of the data.
2. The access to the different modules within the system shall be done through a common login page.
3. The SDV should develop an efficient, secure, faster and easier login page for all types of users.
4. The system shall have provision for the management of user access rights both at individual or group level. The system shall limit the number of the access attempt.
5. The application should also support account locking, password lifetime and password complexity verification.
6. The Firms should develop SOP and standard forms for user registration.
7. The system shall have user access control and access authorization to relevant information and operation.

Password Policy

1. The SDV shall implement a secure password policy that includes encryption of passwords.
2. The system should have provision to allow users to request passwords and automatic retrieval of passwords through SMS, App Notification or email should be incorporated.
3. In the event, if the user is not able to change the password, the administrator should have the privilege to reset the user password.

Concurrency, Browser Compatibility and Bandwidth Optimization

1. The system including the database must be capable of handling at least 20,000 concurrent accesses at a time. However the Result Processing System will have more (around 100000)
2. The system developed must be compatible with and well rendered in the latest version of web browsers and commonly used operating systems and should have capacity to handle high usage. .
3. The system must be compatible with any devices and must run on any screen sizes.
4. The system should smoothly function even with slow internet connections like dialup broadband connection, mobile broadband of 2G and 3G in the remote schools.
5. Page load time for every interface should be below 5 seconds.

Mobile App for Data Collection, Submission and Data Viewing

1. Mobile application for viewing and submission of education data that has capability of local storage in absence network connectivity. The app shall automatically synchronize with the central database when the device is connected to the network.
2. The mobile app must be developed based on users.
3. The Mobile App platform will be made available by the procuring agency.
4. Mobile applications for data visualisation should be incorporated.
5. The Mobile App should also provide features to access data as and when required. Data access will be based on the access control privileges and role-based access of data.
6. These apps should at least work on iOS and Android phones irrespective of the versions

Negotiation

1. Negotiation here refers to priority of works to be carried in phase wise manner of the project and also not all the works and service in bid shall be procured or availed by MoE. In some cases, some works might be replaced by other works where the amount charged by the vendor shall be the same as work

in contract which is replaced. It also refers to terms of payments which should be proposed in the financial proposal.

Responsibility

1. Client
 - a. Shall ensure fortnightly updates are reviewed and comprehensive requirement specifications are provided within review period;
 - b. Shall maintain the delay register and notify the vendor of all delays in writing;
 - c. Shall appoint the point of contact or project focal person(s);
 - d. Inform the stakeholders and arrange for joint sessions with the firm
 - e. Ensure that payments are made as per the contract

2. SDV
 - a. Shall set up a dedicated development environment at their premise with proposed team members working on the project.
 - b. Shall ensure timely delivery of deliverables;
 - c. Shall provide work schedules and meeting dates one week prior to the meeting so that meetings may be arranged without delay.
 - d. Shall maintain the delay register and inform the client on the delays
 - e. Shall bear the travel required for consultations. This should be included in the overall financial proposal and will not be taken up separately.

Timeframe

The time frame for the work is 8 months including Training of Trainers.

Competent Business Entity

1. All Firms participating or entering into joint venture with participating Firms/s for this project are to provide following:
 - a. Copy of Business/Trade License or Registration Certificate for specific service required in TOR.
 - b. Tax Clearance Certificate.

Other Requirements

1. The proposed solution shall be a secure web-based system providing seamless movement between screens and modules, user interface (UI) screens across the entire application. It shall have the capability to be interfaced with a wide variety of hardware and software with a high level of security for the protection of data.
2. The system shall provide common look and feel, consistent controls, navigation keys and shortcut keys across all modules.
3. Form validations and navigational directions and messages shall be implemented comprehensively wherever necessary to ensure user friendliness and provide inbuilt easy reference.
4. All CRUD operation database queries shall be strictly verified for better performance. Data encryption, stored procedures and triggers shall be used to ensure intelligent transaction capabilities and security.
5. Use of proprietary or enterprise version software tools requiring license procurement has to be reviewed and approved by ICTD, MoE.
6. SDV shall be responsible for any proprietary licenses needed during development and implementation of the software.
7. The system shall be able to move between pages without reloading and losing information entered in the previous page.

8. The system shall provide a fast and efficient searching mechanism in relevant forms using the alphabet, numbers and alphanumeric characters/ text. The search shall be able to give the search result within the time frame of 2-3 seconds. The proven solution shall be used to handle ever-increasing data volumes over the time period data for facilitating faster searching.
9. The Firms shall strictly follow standards practice for forms, reports, database, triggers, views, stored procedures, coding etc.
10. The system should be flexible enough to accommodate the frequent changes and open to customization as required in future.
11. The system should be flexible and scalable in terms of performance and functionality.
12. Provide online help options that can be updated on an ongoing or as needed basis.
13. SDV shall deploy high quality graphic user interface (GUI) tested for usability according to industry practices compliant with WCAG 2.0 standards.
14. Enhance data quality and accuracy by controlling for data conformity (e.g. CID number format, dates) in accordance to industry best practices
15. Provide the ability to check data integrity and validity via various cross-referencing filed verification checks. Use of drop down for data selection wherever needed.
16. Provide error messages that are user-friendly and advise of possible corrections.
17. Ensure document repository employs a data directory schema to organize files
18. Provide flexible functionality for use at National level, dzongkhag level, schools and program levels

7. Project Deliverables

1. The following is considered the mains deliverables that should be formally handed over in print and in soft:
 - a. A fully functional system developed and deployed
 - b. Software Requirement Specification Document (High-level SRS and Low-level SRS)
 - c. Software Design Document (SDD)
 - d. Functional and Technical Specification Document
 - e. Functional/Non-functional Prototype
 - f. Working and Tested Software with source code and IP rights
 - g. All the training materials including videos
 - h. Setup and Release notes for each new release
 - i. Test Cases and Reports
 - j. All database scripts with data
 - k. Training of trainers/users and report on training of users/trainers
 - l. All the Plans and Reports must be documented.
 - m. Any other relevant documents, supporting software, etc.
2. It is expected that the project will move from one phase to the next only when the deliverables of that phase are accepted. Some of the key deliverables which will signal the successful completion of each of the phases shall be as in the following table. The SDV is encouraged to propose any additional deliverable(s) for comprehensiveness, based on their experience of delivering similar projects, which can enhance the quality of work.
3. The SDV is required to provide the details of the corresponding deliverables for each of the milestones as well as the delivery of priced items at these milestones. This milestone to deliverables & supply listing will be the basis for payments for the corresponding priced items.

8. Scope of the Project

1. While high level needs are specified under the scope of the project, **the SDV is expected to conduct a thorough need analysis of the requirements of the system through stakeholder consultations and conduct study of existing systems within MoE.** The requirements may change according to requirement analysis.

The enhanced EMIS should have following, but not limited to, provisions:

Landing Page

1. Login link
2. Display of general statistics for public view.
3. Display of information with regard to EMIS for public view.
4. Feedback submission form

Login Page

1. Username and Password
2. Password retrieval
3. Captcha capture
4. User registration

Home Page

1. Space for Notice board
2. Links to Help files(Videos, presentation, documents) and FAQ
3. Role based Dashboard
4. Role based Menus.
5. Display information as required.
6. Password reset.
7. Logout.

Administration Module

1. User profile management
2. Password reset management
3. User roles, rights, Access, Privileges, resource and scope management
4. Back up management
5. Report management
6. User registration
7. Feedback
8. Master/Metadata management

Student/ECCD children Admission

Current process of tracking the admission at school level has its own challenges of tracking and managing the applications. Once admissions are accepted, schools update data into EMIS leaving a short window for data inputs prone to errors. Further there is duplication of efforts in capturing data during admission and EMIS input for students accepted for admission. In order to avoid duplication of efforts in data capture and reduce errors, it is recommended to have a student admission system integrated within EMIS.

1. Admission module will cover the admission students and ECCD children.
2. Admission module will also cover transfer of students between schools and ECCD and between schools.
3. Admission module will also cover transfer of ECCD children to preschool.
4. Student admission and transfer can be initiated via a web request which will flow into the student admission module in EMIS.
5. Admission module should capture the student projection of school per year .
6. Student data is expected to be integrated with BCRS, Immigration System, MoF system and MoFA System.
7. Student code should be generated by the system upon new admission.

Student/ECCD children/CE Data

Current EMIS holds information about students/children in schools and ECCD centers. Student, ECCD Children and CE student details have different sets of data. Student transition from ECCD to schools is tracked through a unique identity of student called studentcode. Additional information on students are required.

1. The SDV should carry out an indepth analysis on ECCD and student data needs.
2. This module should have the provision to add, edit, delete and update students/ECCD children/CE, based on user roles and scope.
3. This module will cover, but not limited to, the following information:
Student photograph, Student demographics information, parents information, learning outcome, Health, extra curricular and co curricular activities, SEN, Behavioural data, transfer details ect
4. Data of students admitted in schools will be automatically flow from the admission module.
5. Student information component consists of student details and functions as a simple student information system for all students across the country. Centralized student information base as a component of MIS provides adequate information on individual students and can be used to trace the education cycle of individual students starting from pre-primary to higher secondary levels.
6. The student transfer features will allow tracking transfer of students. It will allow recording of movement of students. Transfer of student System should implement complete process of student transfer from application process to final placement of student.
7. Student data is expected to be integrated with BCRS, Immigration System, MoF system and MoFA System.

Organization

1. This module should have the provision to add, edit, delete and update HQ, Dzongkhag offices, Schools, ECCD centers and other organisations based on user roles and scope.
2. HQ, Dzongkhag offices, Schools, ECCD centers and other organisations will have some common and some different sets of data.
3. Data on HQ, Dzongkhag offices and other organisation will include, but not limited to, the following information:
Basic Information like address, location, contact information etc.
4. Data on schools/ECCD centers will include, but not limited to, the following information:
 - a. Information like address, location, contact information, WASH, SEN facilities, Equipments, Furnitures, Facilities(games infrastructures), Visitors, Class Creation, Structures, School Management Board, Parent Teacher Association.
 - b. Other Assets – Assets like furniture, computers, vehicles, Textbooks, computers, Printers, Electricity,Water, Bathrooms, Internet Access, Phone connection, Medical Supplies or Medical support.
 - c. Infrastructure Assets – Buildings, classrooms, science labs, toilets, library, playground, Multi purpose Hall etc.
 - d. School GIS Details and display in Map.
 - e. Asset Management functions that allows management of information related to operations and maintenance of all infrastructure assets;
5. School Financial data that needs to be managed in EMIS include:
 - a. School budget details – activities and funding
 - b. Data on conditional transfers like meal plan, subsidies on learning materials (calculators, workbooks, etc.

- c. Funding breakdown per school like Government Grants, tuition fees, donations, other grants, school revenues
- d. Expenditure records – capital and recurring
- e. Valuation of assets under the school
- f. Ability to determine unit cost per student

Human Resource Data

The EMIS holds Human resource data of Headquarter, Dzongkhag, Youth Centers, Schools and ECCD Centers. Current information on staff in EMIS include: Personal information, relatives information, appointment, qualification, training, special education, language, transfer, promotion, secondment, contract, salary, leave, co-curricular, subject taught and other details. RCSC's Civil Service Information System(CSIS) also holds similar data with respect to Civil Servants. However, CSIS does not hold data on private school staff, eccd center facilitators and other staff that are not civil servants.

1. The SDV is expected to conduct a thorough analysis, recommend levels of integrations and integrate EMIS with CSIS for civil servants information. Staff, apart from those captured by CSIS, should be captured by EMIS.
2. Apart from information in CSIS, other information requirement analysis on staff will have to be conducted.
3. MoE has a Teacher Requirement Exercise(TRE) system that uses information from EMIS. The SDV shall integrate/upgrade TRE along with EMIS.
4. To improve quality of data in the system, there should be provision to incorporate automatic generation of office orders etc.

MDCA(Mobile data collection Analytics)

SHND, DSE collects school nutrition and student health data for monitoring the health of the students to assess the impact of improvement on education outcomes. Currently the MDCA server is hosted ex-country posing data security and loss risks. Further the system uses a lot of manual process to capture the data in excel and does manual updates into the application making the process cumbersome and time taking. There is data duplication between MDCA and EMIS.

1. The SDV to conduct thorough need analysis and incorporate/integrate MDCA with EMIS. As the data collection cycle differs with EMIS, it would be ideal to host as a microservice integrated with EMIS.

SPMS(School Performance Management System)

The School Performance Management System under Education Monitoring Division assesses and ranks the school using Gross National Happiness, Health and Student Learning Outcomes. Basic school details along with school infrastructure is captured in SPMS which are duplicated in EMIS.

1. The SDV to conduct thorough need analysis and incorporate/integrate SPMS with EMIS. As the data collection cycle differs and SPMS manages high volumes of data, it is recommended as a microservice with single sign on from EMIS.

Approval processing

There are a lot of manual processes involved before the data gets updated in EMIS. Details relating to teacher transfers, school upgrades and other activities had been affected in paper however updates in EMIS were missed out.

1. In order to avoid such key updates, SDV shall study, design and develop request and approval system to manage the following:
 - School/ECCD Upgrade/Merger/Bifurcation and related activities.
 - School/ECCD Name and location change
 - School/ECCD registration/opening and closures and other operations
 - Teacher data correction
 - Student data correction
 - Other activities as needed.

Given that the Approval system will need a separate workflow, it needs to be a microservice updating data into EMIS.

Result Processing

Student results and learning outcome form a key data in EMIS. Currently there is no system to process results of students and update in EMIS.

1. SDV shall conduct a thorough needs analysis and develop a result processing system.
2. Result processing systems should have capability to process summative assessment as well as continuous formative assessment(CFA).
 - a. Continuous Formative Assessment
 - I. CFA will be done as using different Assessment Techniques and tools
 - II. Currently CFA will be piloted to class PP to III and later till VI
 - III. Academic learning shall be assessed and recorded based on four achievement levels
 - IV. Affective domain shall be assessed based on the demonstration of personal characteristics by a student which is also based on 4 achievement levels.
 - V. Generation of final progress report
 - VI. Reporting frequency is quarterly based.
 - b. Summative Assessment
 - I. For class X and XII, integration with the RPS of BCSEA is required.
 - II. For classes V-VIII and XI summative assessment is still carried out.
3. Result Processing system should have provisions to
 1. Capture quarterly/bi-annual data
 2. Capture other non-grade data
 3. Process results
 4. Generate progress reports
4. Following are the expectation, but not limited to, of result processing system
 - a. Tracking of learning outcome data including grades, national assessments and classroom assessments
 - b. Linkage of student learning outcomes to teachers through assessment data
 - c. Linkage of student learning outcomes to schools through assessment data
 - d. Ability to access student performance data by students and parents
 - e. Subject level learning outcome data
 - f. Ability to track students that need remedial help
5. As the result processing system manages high volumes of data, it is recommended as a microservice with single sign on from EMIS.

Indicator/projection data

Currently, analysis and calculation for indicators are done manually. Data from EMIS is exported to statistical software and other data needed for Education Sector Indicators is also entered manually or imported through excel in the statistical software and indicators are calculated through the statistical packages.

1. The SDV shall conduct a thorough analysis of other data requirements to generate international, national, agency and dzongkhag indicators of the Education Sector. The EMIS should have provision to enter this data, including projections from NSB, BLSS and MOHCA like population data, literacy data, age breakdown of population ect which are required to calculate the indicators, yearly.

2. All international, national, agency and dzongkhag indicators of the Education Sector should be generated by EMIS.
3. There should also be provisions for adding projection data at Dzongkhag/School level to calculate Dzongkhag/School level indicators.

Reporting and Analytics

1. Business Intelligence Analytics and Reporting Engines are powerful tools to collect and process data into a single repository and generate reports, dashboards, self-service consumers of data and information. The SDV shall propose and integrate a reporting and analytics engine which can gather data from all surrounding systems(DYS/DAHE Systems etc) and micro systems into a single repository with a relational definition for users to self-service any reporting and analytics needs. SDV to deploy a robust reporting and analytics engine.
2. SDV shall develop a comprehensive reporting (visualizations, descriptive, analytical). The system should provide a multi-level reporting component and also provide for School level reporting, national level reporting, Dzongkhag level reporting, data cleaning reports, compliance monitoring and indicator Reports, student level current and longitudinal reports.
3. Role based comprehensive, understanding and visually pleasing dashboard to present required information and indicators should be developed.
4. The actual number of reports to be determined in consultation with the Ministry of education and its stakeholders. The indicative type of reports is:
 - a. Indicator report for all agency, national and international indicators.
 - b. School reports by school profile, total schools, stage, gender, ownership, are, climatic condition, active/inactive, established year, etc.
 - c. Enrolments reports by stage, grade, age, student with special needs, new entrants, classes by gender, etc.
 - d. School facilities report by building information, labs, library, sanitation, equipment, electricity, drinking water info, rooms (classrooms and admin rooms) info, playground information, etc.
 - e. Staff reports by number of teachers and admin staff, by qualification, by study field, by regular teachers or contract, teachers on leave, non-teaching staff, etc.
 - f. Graduation report types of education, Dzongkhags, school, stage, gender, etc.
 - g. Number of schools, students and teachers in re-primary education
 - h. Number of schools, students and teachers in community-based educations
 - i. School performance and efficacy data – Student to teacher ratios, student to classroom ratios, student to school ratios, graduation rates for school by grade per year
 - j. School plan and milestones
 - k. School ranking (can be done through integration with SPMS)
 - l. School performance tracking through integration with SPMS
 - m. Financial assistance data like school feeding program data
 - n. School improvement program data through integration with SPMS
5. Facilitate intelligent querying from database (e.g. the possibility of auto generation of queries through selection panels selecting types and level of indicators, and/or using text)
6. Descriptive data analytics
7. Data tabulations (e.g. summarizing databases on different indicators such as teacher-student ratio by relationship between school attendance and learning)
8. Data Associations (e.g. relations between data indicators or different data fields such as behavioural issues and school leaderships)
9. Correlations (e.g. determining causality and effect across different parameters)
10. Projection, predictive modelling and scenario analysis.

Integration with other systems

1. The enhanced EMIS is expected to be integrated with several internal and external systems to enable data exchange. All the integrations are to be achieved using National Data Hub and Enter.
2. The system will also be sharing data with other systems. Appropriate APIs are to be developed by the SDV.
3. Following are the minimum systems required to be integrated with EMIS. However, this is an indicative list.

DYS Portal

DYS Portal is a web-based application used by DYS for delivering youth services covering counselling, scouting and sports services. DYS caters to youths in the school as well as out of school. Youth activities at school level are managed by school personnel while out of school are supported through youth centers. Currently school level youths' details are captured at DYS portal including basic details. EMIS captures student details in greater detail compared to DYS portal.

1. SDV to include school level youth details in EMIS to avoid duplication and implement using one system.
2. SDV to provide data handoff relating to school youths to DYS portal as needed by DYS.
3. SDV to propose and implement solutions for integration.

NFE-MIS

NFCED under DAHE manages non-formal and continuing education around the country. There are instances where school drop outs enroll into NFE programs. In some cases, learners from the NFE system re-enroll into the formal education system.

1. SDV to keep options in EMIS for NFE to validate for any details available in EMIS during registration and vice versa for continuing students.
2. Some reports and analytics from NFE-MIS also should be integrated to present comprehensive data on the education sector.

DAHE DB

DAHE currently manages students under scholarship as well as student students studying abroad on private sponsorship. While students apply for scholarships or provide updates on education outside, it is recommended to validate/fetch details from EMIS as needed in order to avoid duplication of data capture and storage. Some reports and analytics from DAHE DB also should be integrated to present comprehensive data on the education sector

LMS

Learning management solution supports assessment of learning outcomes which form input for result processing of students. Student registration details need to flow from EMIS to LMS for respective schools and classes. LMS needs to integrate with EMIS to populate student details into LMS. LMS needs to provide assessment details into the result processing system for processing and publication of student progress reports. SDV needs to keep provision to download student data from EMIS to LMS.

TESS

The Tertiary Education Statistics System holds a summary of tertiary education status in Bhutan however it doesn't capture the student studying abroad. The system is rolled out to the 19 Tertiary Institutes (TEIs) in Bhutan. The TEIs updates the system annually.

Some reports and analytics from TESS also should be integrated to present comprehensive data on the education sector

BCSEA

BCSEA is mandated to assess and process results for high stake examinations. Details of students taking high stake examinations taken from EMIS while results are part of key information of students in EMIS.

1. Two-way integration is recommended with BCSEA so that students' details are handed off to the BCSEA system for high stake examination students. BCSEA System to hand off student results to EMIS.

INSET

Inservice Training for Teachers currently deployed with EMIS with single sign on facility supports management and monitoring of training for teachers. INSET Modules need to be upgraded along with EMIS upgrade as INSET activities for teachers form input to EMIS.

1. SDV to upgrade INSET along with EMIS.

TRE

Teacher recruitment application is currently deployed with EMIS with single sign on feature. Teachers recruited using TRE flow into EMIS once recruitment is completed.

1. SDV to upgrade TRE module along with EMIS.

SEN

SEN module is currently hosted with a single sign feature with EMIS. Data for schools with SEN support in EMIS flows into the SEN Module.

1. Given that SEN Module and EMIS is tightly integrated, SEN Module needs to integrate/upgrade along with EMIS.

DCRC System

DCRC records census of Bhutanese nationals including family details and household details. EMIS records personal and demographic details of students which are being captured at schools manually. Manual data input is prone to errors and mismatches with DCRC details. To avoid such issues, it is recommended to fetch student and staff data from DCRC using a CID number and replicate in EMIS with no option to edit the details. Nevertheless, there are exceptions where CID has not been issued. For such exceptions, it should be possible to manually enter details by the user.

1. SDV needs to design an interface with DCRC for fetching details using a CID number. Users should have options to manually capture data for students and staff whose CID are in process.

DOI System

DOI System records all expatriates and families living in Bhutan. Manual data input is prone to errors and mismatches with DoI details. In order to avoid such issues, it is recommended to fetch data from the single source of truth for personal details using a unique identifier from DOI system and replicate in EMIS with no option to edit the details. Nevertheless, there are exceptions where DOI unique identifiers are in process. For such exceptions, it should be possible to manually enter details by the user.

1. SDV needs to design an interface with DCRC for fetching details using a CID number. Users should have options to manually capture data for students and staff whose CID are in process.

MoFA System

MOFA System records all diplomats and families living in Bhutan. Manual data input is prone to errors and mismatches with MoFA details. In order to avoid such issues, it is recommended to fetch data from the single source of truth for personal details using a unique identifier from MOFA system and replicate in EMIS with no option to edit the details.

1. SDV needs to design an interface with MoFA for fetching details using a CID number. Users should have options to manually capture data for students and staff whose CID are in process.

NSB

NSB holds population data and other statistical details. Data from NSB is key for calculation of education indicators in conjunction with data from EMIS.

1. SDV should design and deliver an interface with NSB to data exchange with NSB.

CSIS

CSIS keeps records of all civil servants in the country. Teachers and MoE employees are part of CSIS. Given that staff details are available in CSIS, it is recommended to get details from CSIS through an interface thereby reducing manual entry errors in EMIS.

1. HR module of the system will have to be integrated with the CSIS system of RCSC.
2. The SDV shall conduct a thorough analysis of CSIS and propose levels of integration.

ePEMS

ePEMS tracks and controls expenditure for schools. Integration is needed to get the expenditure details by school from the Ministry of Finance and update in EMIS.

1. SDV to design and implement integration with the Ministry of Finance for expense updates. Provisions must be kept to update expenses in EMIS manually.

MYRB

MYRB tracks and manages budgets for MoE and schools. Integration is needed to get the budget details by school from the Ministry of Finance and update in EMIS.

1. SDV to design and implement integration with the Ministry of Finance for budget updates. Provisions must be kept to update the budget in EMIS manually.

ePIS

ePIS collects and stores patient information and medical records of patients. ePIS records will cover students and staff as well. Staff and student health forms critical information in EMIS, timely and accurate needs to be available for analysis and planning. Integration with ePIS is recommended with features to update the information in EMIS till such times ePIS is rolled out.

1. SDV to design and implement integration with ePIS for seamless two way information sharing with features to update details manually.

Gyelsung Application

Gyelsung program is expected to be applicable to all students completing class 12. Applicants will need to be screened with MoE as part of validation. Once applicants are accepted, student status is expected to be updated as Undergoing Gyelsung.

1. SDV to design and deliver integration with Gyelsung for data sharing as well as update EMIS on the status of the student.

9. Payments Terms and Liquidated Damages

Payment Terms

MoE proposes the following terms of payment:

- a. 10% of the quoted amount after will be paid as mobilization fund after signing the contract
- b. 5% will be paid on all SRS Sign Off
- c. 5% will be paid on all prototypes.
- d. 20% will be paid upon completion of 4 modules/system
- e. 20% will be paid upon completion of other modules/system
- f. 10% will be paid upon completion of User Acceptance Testing
- g. 30% percent will be paid upon delivery of all the deliverables and acceptance of deliverables by MoE. However, 10% from this last payment will be retained as a security, which will be released upon the

submission of Bank Guarantee from a reputed financial institution of Bhutan. The Bank Guarantee will be released only after the completion of Warranty Period.

- h. All payments will be made in Ngultrum

Liquidated Damages

SDV shall pay liquidated damages to MoE at the rate per day stated in Procurement Rules and Regulations. Bidder shall pay LD amount at rate of 0.1% per day for each day delay to maximum of 10% of the quoted amount.

Note:

- 1. Any important requirement or concerns with regard to this project which is not reflected in this document (TOR) shall be included in the contract document during the award time. Any work in TOR need not be carried out should be replaced or complemented with another work which is equal in terms of time and cost.*
- 2. Besides this all firms are not to just rely on TOR, but expected to visit the ministry to understand the requirements of the client and come up with the best solution required.*