Terms of Reference OF IEMIS Refining and Operationalization Consultant for Education Analytics

1. Overview

1.1 Background

IPA has been collaborating with Rwanda's Ministry of Education (MINEDUC) and its affiliated agencies since 2013, a partnership underpinned by a Memorandum of Understanding. Education data in Rwanda is currently distributed across multiple operational systems, including the School Data Management System (SDMS), the Comprehensive Assessment Management Information System (CAMIS), the Teacher Management Information System (TMIS), Inspection Systems (Ireme), the Higher Education Management Information System (HEC-MIS), and other sector platforms. These systems operate on heterogeneous technologies including PostgreSQL, SQL Server databases, REST APIs, and flat files, making unified data access and cross-system analytics difficult.

To address this fragmentation, MINEDUC has designed a centralized Education Data Warehouse under the Integrated Education Management System (IEMS), which is ready for operationalization. The IEMS is intended to serve as a unified analytics platform providing reliable, timely, and secure access to education data for planning, monitoring, and policy decision-making at all levels of the education system.

MINEDUC, in collaboration with IPA, therefore intends to engage an Individual Consultant on a short-term, output-based contract to deliver defined technical components for the operationalization of the IEMS Data Warehouse and the improvement of CAMIS Business Intelligence and Advanced Analytics capabilities. This is a time-limited technical assistance engagement, not an ongoing operational role. The Consultant will deliver specific data integration, transformation, and analytics outputs for the IEMS platform, and will ensure that MINEDUC and NESA technical staff are fully equipped to operate and maintain the system independently upon completion of the engagement.

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1.2 Scope

The overall scope of this consultancy contract is to deliver defined, time-bound technical outputs that operationalize the IEMS Data Warehouse for CAMIS and SDMS. This covers: hardening the CAMIS database security and access control; designing and implementing the Staging and Operational Data Store (ODS) databases; developing data pipelines from source systems; implementing data transformation and dimensional models for CAMIS and SDMS; building analytics dashboards using Apache Superset; and delivering training and a formal system handover to MINEDUC and NESA staff.

1.3 Objectives

The objective of this contract is to deliver a fully operationalized IEMS Data Warehouse as the central analytics platform for Rwanda's education sector, with CAMIS and SDMS as the initial data sources, and to institutionalize the MEL infrastructure for the STARS program within government systems. The Consultant will produce specific, verifiable outputs that leave the platform secure, reliable, and performant, and that provide actionable Business Intelligence and Advanced Analytics capabilities to education decision-makers systems. . Upon completion of this engagement, MINEDUC and NESA technical staff will be equipped to independently operate and maintain all implemented components. The results of this work will support evidence-based planning, monitoring, and policy decision-making by MINEDUC, NESA, Rwanda Education Board (REB), district education officers, and other education stakeholders.

2. Requirements

2.1 Tasks

- Conduct a technical assessment of the CAMIS database architecture, user accounts, privilege assignments, and authentication mechanisms; identify security gaps and produce a security assessment report
- Review and validate the existing IEMS Data Warehouse architecture; design and implement the Staging and Operational Data Store (ODS) databases, including schemas, naming standards, and metadata structure
- Configure data pipelines from CAMIS and SDMS source systems to the Staging database using appropriate tools (such as Airbyte, Change Data Capture, or equivalent); implement data validation, reconciliation, and pipeline monitoring
- Design and implement star schema dimensional models (fact tables and dimension tables) for CAMIS and SDMS; configure replication and high availability for Staging and ODS components
- Implement the data transformation layer for CAMIS using SQL-based tools (such as dbt or equivalent); develop data cleaning views, dimension tables, fact tables, surrogate key logic, Slowly Changing Dimensions, and scheduled automated jobs; load clean CAMIS data into ODS and validate
- Install and configure Apache Superset in a production environment; create CAMIS datasets and develop dashboards for national exam performance, school performance, student results, subject statistics, and the Teacher Imihigo dashboard; implement row-level security by district, school, and user role; configure user access roles for NESA, MINEDUC, district officers, inspectors, and IT administrators
- Conduct training sessions for technical and functional users covering all implemented components: database security and RBAC, Data Warehouse architecture, data integration and transformation, data validation and monitoring, Apache Superset analytics platform, and system administration and maintenance
- Deliver complete technical documentation for all implemented components, conduct knowledge transfer sessions with MINEDUC/NESA staff, perform final system validation, and complete formal handover of all system components

2.2 Deliverables

The below table shows the key deliverables and output linked with the defined tasks:

1	Technical assessment of the CAMIS database architecture	• Assessment of the CAMIS database architecture, user accounts, privilege assignments, and authentication mechanisms completed; security gaps identified and documented • Audit logging framework and protected audit tables deployed • Security hardening report shared with MINEDUC/NESA and IPA • Existing IEMS Data Warehouse architecture reviewed and validated
2	IEMS Data Warehouse architecture reviewed; Staging and ODS databases implemented; star schema models designed; data pipelines from CAMIS and SDMS configured	• Revised IEMS Data Warehouse architecture document validated against best practices and shared with MINEDUC and IPA

		• Staging database operational with naming standards and metadata structure; ODS implemented with defined schemas; replication configured for both • Fact tables and dimension tables designed for key CAMIS and SDMS business processes • ETL/ELT pipelines from CAMIS and SDMS to Staging operational (Airbyte, CDC, or equivalent) • Data validation and reconciliation procedures implemented; pipeline logging and monitoring configured
3	CAMIS and STARS data cleaned, transformed, and loaded into ODS; shared dimensions consolidated	• Transformation architecture document produced; SQL/dbt transformation models for CAMIS and STARS implemented with version control • Dimension and fact tables populated with clean CAMIS data; scheduled CAMIS transformation jobs operational • SQL/dbt transformation models for STARS implemented following the same standards as CAMIS; STARS dimension and fact tables loaded into ODS • Shared dimensions aligned and deduplicated across CAMIS and STARS; scheduled STARS transformation jobs configured • Data validation reports confirming ODS accuracy and readiness for the analytics layer
4	CAMIS and STARS analytics dashboards developed and deployed on Apache Superset	• Superset installed, configured, and accessible via HTTPS in production • CAMIS datasets created (exam results, student performance, school statistics, assessment) • Dashboards developed for national exam performance, school performance, student results, and subject statistics along with STARS analytics of Teacher Imihigo calculations • Row-level security configured by district, school, and user role • User roles configured for NESA administrators, MINEDUC analysts, district officers, school inspectors, and IT administrators • Analytics documentation produced and technical team trained on CAMIS dashboards
5	Training, knowledge transfer, and formal system handover completed	• Training sessions conducted covering: database security and RBAC, Data Warehouse architecture, data integration and transformation, validation and monitoring, Apache Superset, and system administration • Training materials and user guides delivered to MINEDUC/NESA • All technical documentation reviewed, finalized, and shared with MINEDUC/NESA and IPA • Final system validation report completed and signed off by MINEDUC/NESA • Formal handover of all system components to MINEDUC/NESA technical staff completed

2.3 Schedule

This contract will last 45 days. The 45-day consultancy engagement is structured around the completion of five defined deliverables, each corresponding to a 5- to 10-day work period. Each phase builds directly upon the outputs and progress of the preceding one. The 45 working days are not consecutive calendar days but are distributed across different months within the contract period, in accordance with the sequencing of deliverables and the operational requirements of each phase. Payment will be linked to the acceptance of deliverables rather than to time worked. The Consultant retains full flexibility in scheduling and approach provided that deliverables are submitted within agreed timelines and meet the quality standards specified in this SOW.

3. Required Qualifications and Experience

The assignment requires a highly qualified and experienced Senior Software Engineer with demonstrated expertise in the development and management of large-scale information systems, particularly within the Education sector.

- Bachelor's degree in Computer Science, Software Engineering, Data Science, Data Engineering, Information Systems, or a related field. A Master's degree is an added advantage.
- Minimum of ten (10) years of proven professional experience in the IT industry.
- Minimum of five (5) years of professional experience working in the Education Sector within IT-related functions.
- Minimum of five (5) years of hands-on experience in PostgreSQL database administration within production enterprise environments.
- Proven experience implementing and managing PostgreSQL logical and streaming replication, Change Data Capture (CDC), database auditing and security hardening, and Role-Based Access Control (RBAC).
- Strong experience in designing and implementing Data Warehouses and Operational Data Stores (ODS) using PostgreSQL, including Star Schema modeling, Fact and Dimension tables, and ETL/ELT processes.
- Proven experience implementing analytics and Business Intelligence solutions using Apache Superset, Power BI, or SQL-based reporting platforms.
- Strong practical experience with data transformation technologies including dbt or SQL-based transformation frameworks and Airflow or scheduler-based automation.
- At least one internationally recognized certification in PostgreSQL database administration or equivalent database systems certification.
- Experience with Government IT systems or national-scale Education Management Information Systems (EMIS) is an advantage.
- Strong analytical and problem-solving skills; excellent communication and documentation abilities; capacity to work effectively in multidisciplinary teams.

4. Skills and Competencies

- Technical mastery in architecting and managing scalable PostgreSQL-based analytics platforms and Data Warehouses.
- Ability to design and implement enterprise dashboards and reporting systems using Apache Superset and/or Power BI.
- Strong troubleshooting capabilities for replication, ETL failures, performance issues, and database incidents.
- Ability to work independently, deliver within deadlines, and manage concurrent workstreams.
- Strong documentation, knowledge transfer, and capacity-building skills.
- Commitment to data confidentiality, security, and compliance with government data protection standards.

5. Application Process

Interested candidates should submit:

- An updated CV.
- A cover letter explaining their relevant experience.
- Technical and financial proposals.
- At least three references from previous similar assignments.

INTERESTED APPLICANTS MEETING THE POSITION REQUIREMENTS SHOULD SENT THEIR APPLICATION ON RWA_proposals@poverty-action.org

APPLICATIONS WILL BE CONSIDERD ON A ROLLING BASIS. APPLICATIONS SUBMISSION DEADLINE IS **June 15, 2026, no later than 5h00PM**. ONLY SHORTLISTED CANDIDATES WILL BE NOTIFIED.