



EMIS

**Education Management
Information Systems**



Building Sustainable Capacity for EMIS Implementation in Government Agencies: A Concept Note

December 2024



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Introduction

This concept note introduces a conceptual framework designed to support government agencies/ministries in developing, implementing, and maintaining effective and sustainable Education Management Information Systems (EMIS) practices within the education system. The conceptual framework outlines several components of an ecosystem that outline how a sustainable system is developed and maintained. It is aligned with the conceptual framework of the EMIS 2.0 Learning and Accountability System Architecture (LASA), which focuses on a virtuous cycle of quality data production and usage to enable data as a lever for change in education.¹

This concept note provides a starting point for education system stakeholders and ministry staff to overcome sustainability challenges that have hindered the successful implementation and sustainability of EMIS initiatives in the past.

This work is supported by a comprehensive website: The EMIS Knowledge Hub. Visit emishub.org for access to comprehensive resources, best practices, and tools tailored for every stage of EMIS development and operations, ensuring effective and sustainable EMIS implementation over the long term. The EMIS Knowledge Hub allows users to complete surveys to evaluate an organization's EMIS readiness and to assess a national EMIS.

What is EMIS?

An EMIS is a comprehensive system for collecting, processing, analysing, reporting, and disseminating data² and information at all levels of an education system. The EMIS is typically an interoperable system that manages data centrally and connects to multiple sub-systems, allowing data to be shared using data exchange standards³. Sub-systems typically fall outside the control of the Ministry of Education (MoE), and system adoption should be informed by policies and frameworks to ensure minimum level of compliance with data collection and sharing required.

¹ World Bank. 2022. Knowledge Pack EMIS 2.0: Learning and Accountability System Architecture (LASA).

² The EMIS must support the collection, dissemination and analysis of quality data, underpinned by sound governance, management and provisioning.

³ Data exchange standards are commonly agreed rules and formats to be used for sharing data across different systems.



Interoperable system



Interrelated components



Integrates capacity building

The EMIS collects education data from an interconnected decentralised collection of applications and then further combines, processes, analyses, and transforms the data to identify trend statistics, indicators, research results, and reports to provide the necessary information for planning, projection, and simulation models for planners and decision-makers.

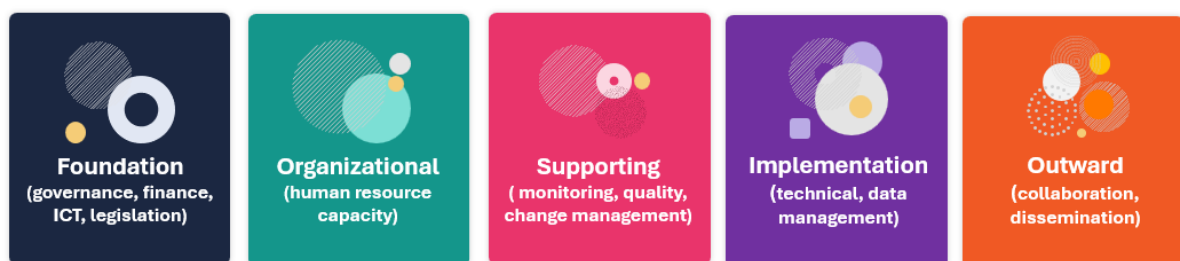
The EMIS provides accurate education system performance information and reports to stakeholders through various delivery mechanisms such as reports, dashboards, online portals, and data-sharing protocols to development partners. The information and reports delivered support strategic planning and management, governance and accountability, monitoring and evaluation, and digitized daily operational management of stakeholders to improve education system performance through various interventions.

Creating a sustainable organizational ecosystem for EMIS implementation

Understanding the EMIS Ecosystem

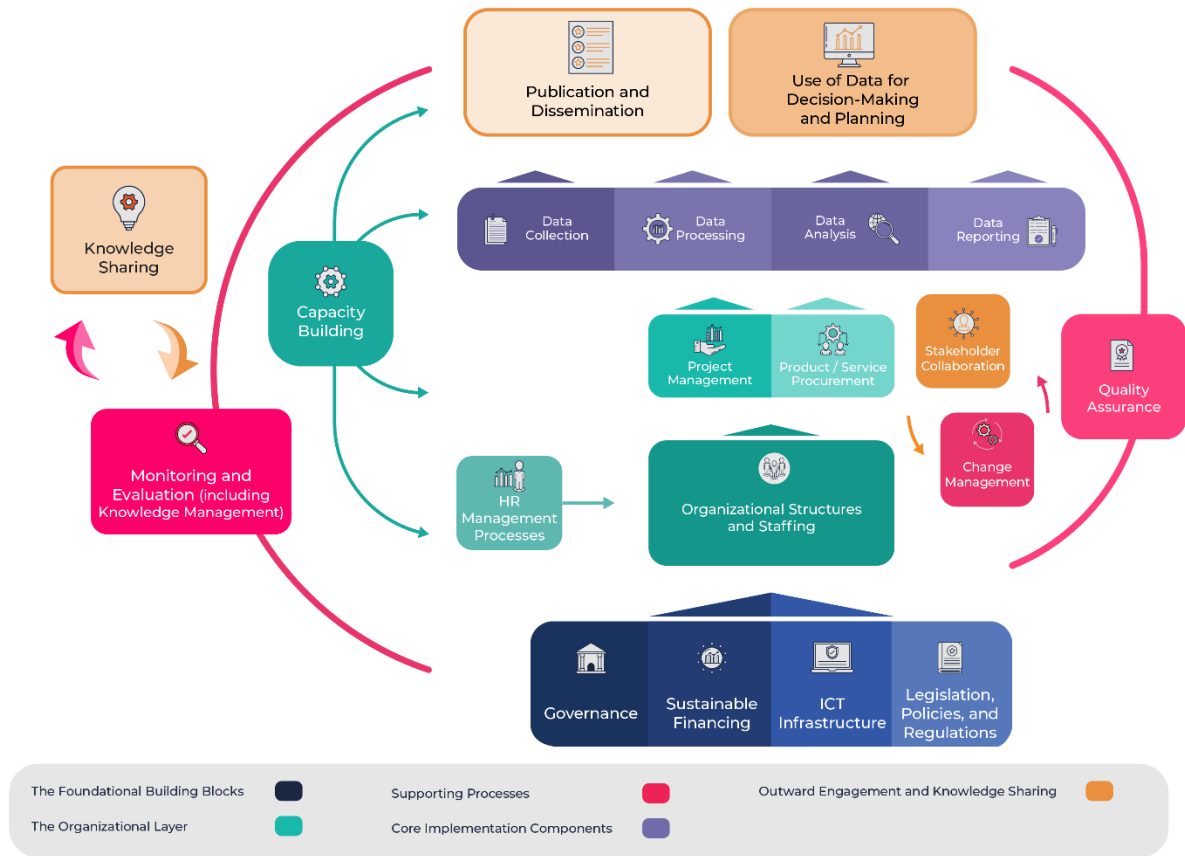
The EMIS Ecosystem has five interconnected sections, each of which contribute to the overall functioning of the ecosystem.

Figure 1 Sections of the EMIS Ecosystem



Each section has corresponding components that contribute to and shape the overall ecosystem, as shown in Figure 2 below.

Figure 2 The EMIS Ecosystem



Why an Ecosystem?

The term ‘ecosystem’ reflects the idea of sustainable organizational capacities. This is an attempt to recognize the interconnected, organic nature of the various components that contribute to effective and sustainable implementation of an EMIS. The organizational ecosystem diagram above illustrates the interplay between policy frameworks, organizational structures, technological infrastructure, human resources, data processes, and stakeholder engagement. Each component within the ecosystem plays a vital role in supporting and enabling the successful sustained implementation and management of an EMIS.

Critically, this is not a static structure or a linear, logical process; it is dynamic and human-centred, with multiple potential entry points that can be used to strengthen it, none of which is inherently superior to any other. However, any such capacity-strengthening strategies need to consider the interconnected nature of the ecosystem and potential implications for changes rippling through that ecosystem over time. Interventions that target individual components in isolation are most likely to fail, or at least have limited impact, over time.

By adopting an ecosystem approach, government agencies can better understand and address the complexities and interdependencies involved in EMIS implementation. This holistic perspective allows for identification of gaps, challenges, and opportunities across various domains, enabling targeted interventions and collaborative efforts to create a supportive and enabling environment for EMIS initiatives.

The ecosystem approach also recognizes that EMIS implementation units are not solely responsible for its success but rather exist within a broader network of stakeholders, including policymakers, teachers, learners, technology providers, and civil society. Effective collaboration and coordination among these stakeholders are essential for developing a shared vision, aligning efforts, and leveraging diverse expertise and resources.

The Foundational Building Blocks




Governance



Governance structures and processes define the standards and requirements to ensure that the EMIS ecosystem contributes meaningfully to achieving the goals of the country’s education system and policies. A well-functioning EMIS governance structure will inform and align the components of the EMIS ecosystem to create an integrated, sector-wide ecosystem covering all education and administrative levels, while also providing a mechanism to hold all role players to account for their contributions to successful EMIS implementation.

Effective governance is characterized by these functions:

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- **Establishment of a formal governance committee or similar structure and terms of reference for its operations:** A dedicated committee should be established to oversee EMIS implementation. The committee should represent all relevant stakeholders and EMIS user groups. These stakeholders may include a high-level political figure, the project leader, managers from the Ministry of Education (MoE) and other government agencies, a legal advisor, regional representatives, representatives from educational institutions, principals' associations and teacher unions, and possibly development partners.
 - **Standards for ethical governance:** A set of standards should be developed to outline the ethical responsibilities of stakeholders from different ministries or departments regarding EMIS implementation.
 - **Review and updating of the EMIS implementation plan:** A multi-year plan for EMIS implementation contains targets and budgets. The governance committee should oversee the plan and the process of its annually review and updating.
 - **Defined procedures for monitoring and evaluating the system:** The governance committee should operate by a clear set of procedures for monitoring the implementation of the EMIS and its deliverables, including sustainable financing, information and communications technology (ICT) infrastructure, changes in the system that require adaptation of the EMIS, and the implementation of special projects.
 - **Review and approval of policy:** The governance committee should review and approve EMIS policy revisions, processes, and standards at regularly determined intervals.
 - **Assessment, approval and recommendation of resources:** The governance committee should identify the resourcing needs for EMIS implementation, stipulate priorities for implementation, and recommend and approve the necessary resources and budgets.
 - **Management of risks to EMIS implementation:** The governance committee should assess and manage risks, conflicts and problems related to EMIS implementation and adjust management plans accordingly.
 - **Responsive decision-making:** The governance committee needs to exercise sound judgment and oversight to continuously improve the EMIS ecosystem, ensuring responsive decision-making in relation to evaluating all its elements.

Effective governance will ensure that the EMIS ecosystem consistently supports the achievement of strategic vision and plans for education and the needs of different stakeholder groups in the education system, while complying with relevant legislation and policies.

Sustainable Financing



Sustainable financing means that a range of reliable and consistent sources of income are available to develop, operate, and maintain the EMIS and its associated sub-systems. It encompasses all levels of the education system, from the MoE to the institutions. Effective mobilization and use of financial, human, and infrastructure resources in the ecosystem is crucial to ensuring the sustained operation and success of the EMIS.

Securing sustainable financing begins with a strong political commitment from the national government to support a well-functioning EMIS. This is because the most reliable source of income should be predictable annual government budget allocations based on accurate and informed projections of the costs related to developing and maintaining the EMIS over a long period of time. An informed budgeting exercise at the national level considers the capital costs, recurrent costs and human resourcing costs required to develop and/or strengthen the EMIS, aligned with national strategic objectives for the education system. Multi-year cost projections are essential for this exercise, especially if the initial development of the EMIS requires extensive investment or phased implementation. Budgeting exercises should be completed well in advance of government budgeting decisions.

The national government and the EMIS unit, along with provincial or regional representatives involved in EMIS design and implementation, need to identify the specific infrastructure, technology, and human resourcing needs for EMIS implementation, develop a clear, multi-year plan of activities for implementation, and then cost each item in the plan as accurately as possible. Once approved by the national government, budget allocations should ideally cover the costs of maintaining the EMIS each year, as well as some development or capital costs. Budget allocations should be released ahead of each financial year, eliminating delays in expenditure for implementation. In addition, the MoE can source additional funding from development partners where possible, but such funding should not be regarded as guaranteed other than for special projects or once-off investments. Another aspect of sustainable financing is reducing wasteful expenditure. This can be achieved through detailed planning aligned with strategic objectives and business requirements for developing the EMIS, and various other cost-cutting strategies.

Strategies to predict and reduce costs in EMIS implementation may include:

- Aligning EMIS implementation plans with the strategic objectives for the EMIS.
- Developing a detailed, multi-year, costed plan of activities for phased EMIS implementation.
- Using service providers that offer discounts to government departments and institutions.
- Securing multi-year contracts with service providers at discounted rates.
- Having pre-existing agreements with service providers in different provinces or regions where applicable.
- Where possible, enforcing prescribed services and applications to reduce staff training costs, multiple vendor support contracts, and inter-system integration costs.
- Moving from manual data collection and administration to digital processes to improve staff efficiency and increase access to data for up-to-date reporting.

Information and Communications Technology (ICT) Infrastructure



ICT infrastructure is the technological backbone that enables collection, processing, analysis, reporting, publication, and dissemination of data in the EMIS ecosystem. It includes the hardware, software, networking solutions, and technical services required to support the EMIS and inter-related systems.

Robust and reliable ICT infrastructure and software platforms are crucial for ensuring the effective operation of the EMIS across diverse educational settings. They should have the capacity to scale the operation when required, horizontally and vertically across the EMIS ecosystem.

This component involves the acquisition, deployment, and maintenance of various technological components, including:

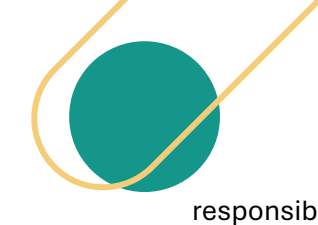
- **Hardware:** Computers, mobile devices (such as smartphones and tablets), servers, storage devices, peripherals, and other physical equipment necessary for data collection, processing, analysis, reporting, publication, and dissemination of education system data.
- **Software:** Survey collection and administration tools, data cleaning and statistical analysis tools, data warehousing and transformation tools, database software, locally situated or cloud-based school management information systems (SMIS), learning management systems (LMS), financial management systems, infrastructure management systems, human resource information systems (HRIS), digital learning, centrally hosted or cloud-based EMIS applications, and applications supporting the creation and dissemination of education system information reports.
- **Hosting environments:** Physical or cloud-based infrastructure that hosts the hardware, software, and data. This includes data centres, server rooms, and cloud computing platforms that provide scalability, reliability, and security for the EMIS and interrelated systems.
- **Connectivity:** Reliable and high-speed internet connectivity, including broadband, wireless, and mobile networks, with built-in redundancy that enables the secure transmission of data throughout the EMIS ecosystem.
- **Network infrastructure:** Routers, switches, wireless access points, firewalls, and other networking components that facilitate connectivity and ensure efficient data transfer.
- **Security measures:** Encryption, access controls, firewalls, antivirus software, and intrusion detection systems to safeguard data integrity, privacy, and system security.
- **Accessibility:** ICT infrastructure should enable and support accessibility among all users.

Considering its integration with other components in the organizational ecosystem, effective ICT infrastructure implementation requires skilled personnel, well-defined roles and responsibilities, and alignment with organizational policies and legal frameworks. It also depends on sustainable financing models to support acquisition and maintenance or periodic upgrades. Additionally, robust cybersecurity measures are imperative to protect sensitive data and ensure privacy compliance.



Legislation, Policies, and Regulations

Legislation, policies, and regulations are implemented at all levels of the education system. Legislation refers to laws that are passed by Parliament, which must be followed. For instance, a country may have an Education Act that mandates the number of years children must spend in basic education, or the language/s of instruction to be used in schools, along with the specific roles and



responsibilities of the Ministry of Education in governing education (including its role in EMIS implementation). Policies are topic-specific guidelines that provide context for how to achieve certain goals or objectives. For example, an admission policy may outline the rules, procedures and processes to be followed in admitting students to schools. Regulations are specific rules or guidelines set by a government department that stipulate how legislation and policies should be adhered to or implemented (for example, how school principals should implement a new policy on administering examinations). Regulations and policies may be adjusted or amended from time to time as the needs of the system evolve, but laws cannot be changed unless new Acts are passed in parliament following a rigorous process.

The design of the EMIS needs to be aligned with the laws, policies, and regulations of the education system. This is because the EMIS codifies those policies. Policies are also needed to guide the design and implementation of the EMIS itself. Developing and adopting a comprehensive strategic vision for the EMIS is a critical first step, informed by the national legislative environment defined for the education system. This strategic vision then needs to be underpinned by policy documents and regulatory instruments that support the range of implementation processes needed to achieve the strategic vision for creating an enabling environment to promote evidence-based decision-making at all administrative levels. Innovative support technologies should be used to aid in the design and implementation of strategic policies.

The national and institutional policy environment to support strategic planning and decision-making in EMIS should cover at least the following topics:

- Governance.
- Funding and procurement.
- Infrastructure and innovation.
- ICT.
- Accessibility.
- Content licensing and use.
- Capacity building.
- Human resource policies.
- Quality assurance.
- Procurement.
- Data protection (including data security) and privacy.
- Data management and integration.

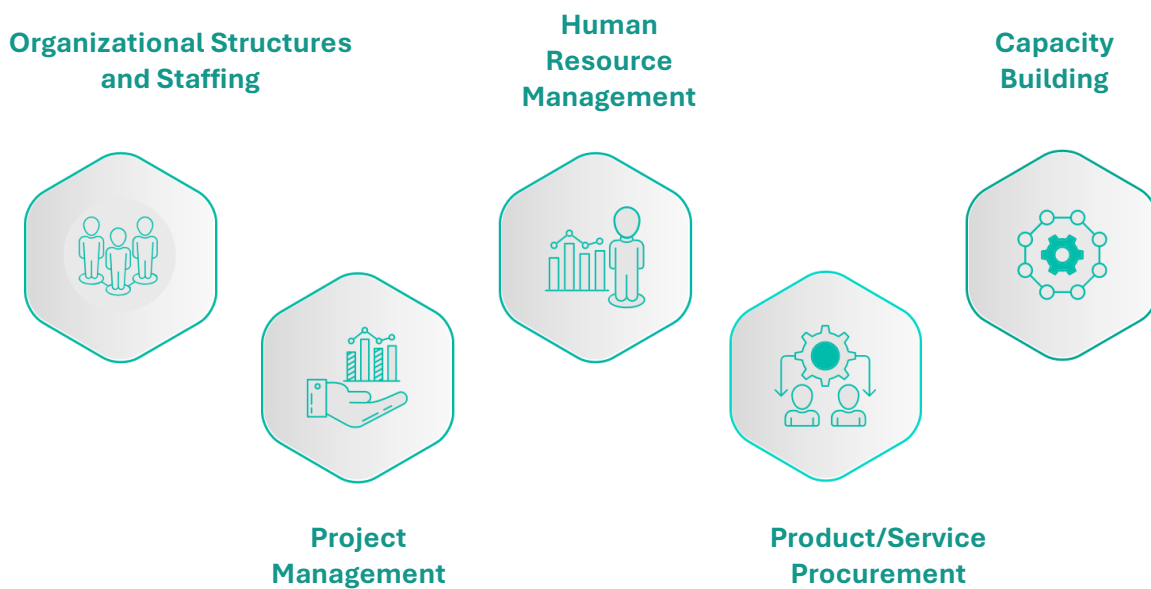
Education policies that should be reflected in EMIS design may include:

- Curriculum policy covering all levels of the schooling system.
- Student enrolments and admissions.
- Student pastoral and disciplinary policies.
- Examinations and their management and implementation.
- School infrastructure and facilities management.
- Textbook approval and provision.
- Teacher management policies (e.g. minimum qualifications, licensing/registration, tenure rules, professional development, disciplinary processes).
- Language policy.
- Intellectual property.

How these topics are tackled within the policy landscape differs across countries and for different contexts. In some instances, policymakers might develop a small number of

comprehensive policies covering multiple topics and in others, they might design a larger number of shorter and more specific policy documents. Regulatory instruments typically cover EMIS, School Management Information Systems (SMIS), Human Resource Information Systems (HRIS) and other systems infrastructures and their interoperability, digital security, data protection, and quality assurance. Guidelines may take the form of minimum standards developed to support system implementation.

The Organizational Layer



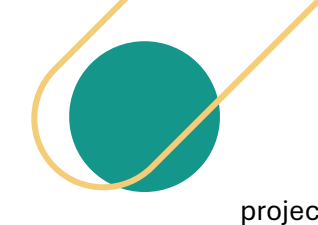
Organizational Structures and Staffing

An organization's structure and its teams, roles, and reporting lines are critical to enabling the attainment of its strategic goals. Human resourcing decisions determine who fills these roles and whether they come from inside or outside the organization. Staff have responsibilities aligned with their roles.

An effective organizational structure requires clarity on roles and responsibilities, the extent of collaboration between staff, and the underlying human resources (HR) management processes that provide support to operations and staff. These aspects are influenced by the organization's management culture. When functioning optimally, organizational and staffing structures promote collaboration and communication among individuals and organizational levels and facilitate the streamlining of operations. They also enhance productivity and engagement, foster a positive work environment, and ultimately contribute to achieving the organization's mission.

The following aspects of organizational structures and staffing facilitate effective EMIS implementation:

- **Specific roles and responsibilities represented in an organogram:** Effective EMIS implementation requires human resourcing at the national, provincial/district, and institutional levels. Staff roles and responsibilities should be represented in an organogram that clearly outlines an organizational structure that facilitates EMIS implementation.
- **Internal staffing:** At the national level, internal human resourcing could include staff with expertise in EMIS architecture (the design of systems that enable EMIS implementation), management capacity to oversee implementation, project managers to implement specific



projects, and monitoring and evaluation staff. At the provincial/district level, internal human resourcing could include human resource management (HRM) staff, ICT support and EMIS system and capacity trainers. At the institutional level, human resourcing includes administrators, data capturers and ICT support.

- **External staffing:** This will depend on the needs of the ecosystem within the country context. At the national and provincial/district levels, external human resourcing may include consultants, sub-contractors, and service providers contracted for specific responsibilities for which internal capacity is not available or feasible.



Human Resource Management (HRM)

HRM refers to the administration and management of staff within the EMIS unit. This would typically include a focus on recruiting and onboarding new staff, facilitating compensation and benefits, coordinating staff training and development, overseeing performance management processes, implementing staff retention strategies, ensuring staff safety and wellness, and ensuring good labour relations and compliance.

In recent years, the traditional administrative role of HR practitioners has transformed to make way for a more proactive role in talent management, partnering with other internal stakeholders to identify and meet contextual needs, and facilitating organizational development. The latter links closely to capacity building and involves identifying employee skill gaps, designing and delivering training programmes, and fostering continuous learning opportunities.

To facilitate the ongoing implementation and management of an EMIS, it is important to strategically align HRM practices with broader organizational strategic goals and to implement HRM practices that support the capacitation of EMIS initiatives. HRM departments and personnel can support EMIS implementation by facilitating the recruitment of appropriate staff, while ensuring that organizational policies and practices enable staff development and capacity building for EMIS initiatives.

Investing in training and development is an important mechanism to ensure skill alignment between what staff can offer and what the organization needs. It is also an important contributor to staff wellbeing as it contributes to personal and professional development. When introducing new EMIS initiatives into an organization, it is likely that several staff members will have to take on additional responsibilities to support such initiatives. Organizations should ideally have a competency framework that identifies desirable skills and competencies they wish to develop in their staff. Competency frameworks are useful guides for HRM departments and personnel to identify which development opportunities need to be available to staff. This means that HRM policies need to support learning opportunities for staff to develop the skills and competencies required to do their jobs well.

Performance management processes are often used to identify training and development needs of staff members. This might include biannual or annual discussions between managers and staff to monitor progress and evaluate employees' work, attitude, efficiency, and effectiveness. This process enables one-on-one communication to set clear goals that align with the strategic goals of the organization.

Taken together, to support staff development and capacity building for EMIS initiatives, HRM departments and personnel can:

- Develop an organizational competency framework that identifies core competencies to guide development pathways.
- Design job profiles to include generic and specific competencies required for positions.
- Ensure that staff development policies are in place which enable staff development in required or desired competencies and skills that would support EMIS implementation.
- Implement a performance management system that will identify staff training needs and facilitate career progression.
- Oversee change management processes, particularly when introducing new EMIS initiatives.



Project Management

Project management refers to the planning, implementation, controlling, and monitoring of projects. A project is a unique venture undertaken in an organization to achieve one or more specific goals. It has a clear beginning and end and does not usually form part of normal business operations. Many projects are designed and carried out to solve specific problems or to introduce a change to a system or organization. Project management includes activities required to achieve the goal/s. and the coordination of project elements such as human resources, skills, tools, budgets, and timelines. Every project has a set of deliverables against which project progress can be measured and monitored and accompanying activities that will be carried out to achieve those deliverables using the available resources. An example of an education-related project is the installation of Internet infrastructure in schools to support the digitization of learning and teaching and/or real-time submission of data to an EMIS. Project managers are the people who manage projects. They need to balance (and often adjust) elements such as costs of materials or services, budget allocations, available human resources and capacity to complete the project, deadlines, and quality of work.

Project management is necessary throughout the EMIS ecosystem because many different types of projects support EMIS implementation. For example, the procurement of hardware for data collection in schools is a project that supports EMIS implementation. A change management process for introducing a new curriculum requires project management to ensure that teachers and school principals are trained in implementing the change and that the EMIS has the capacity to collect and process data related to the implementation of the new curriculum.

Project management processes include:

- Defining the problem or change for which a project is required.
- Defining the project scope and objectives.
- Establishing a project team with specific roles and responsibilities.
- Identifying stakeholders and their needs impacted/affected by the project result.
- Developing a project plan that includes deliverables, specific actions, timelines, budgets, resource allocations, communication strategies and processes, reporting processes and feedback mechanisms.
- Identifying risks to the project and ways to mitigate them.
- Assigning tasks and activities to project team members.
- Coordinating activities and managing resources.
- Tracking progress against the project plan.
- Adjusting budgets, resources, activities and timelines where necessary.
- Finalizing deliverables.
- Reviewing the project.

- Closing the project when the objectives have been met and ensuring the preparation of final reporting documentation.

Modern project management requires software application tools to enable successful project implementation. These include tools for project planning, communication and collaboration, task management, time tracking, resource management, and document management.

Project management methodologies and tools can vary in complexity, but their effectiveness depends on the skills of the people who need to work on the project, the available resources, and whether the tools or methodologies are fit-for-purpose in the context. Building users' capacity to understand the processes required and the tools to be used for implementing the project is critical to the success of the project management process. Proper training and support ensure that these tools are used effectively, ultimately contributing to the initiative's success.



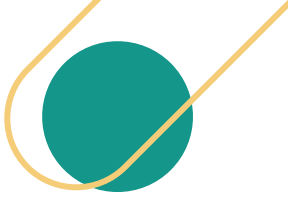
Product/Service Procurement

Procurement refers to the processes for sourcing and purchasing the necessary products and services to support EMIS implementation. It ensures that procurement of these products and services is conducted efficiently, cost-effectively, and transparently while adhering to relevant guidelines, regulations, quality standards, and policies. There are three widely recognized types of procurement. Direct procurement involves acquiring goods, services, or materials that are directly linked to the production of an organization's final product or service offering. Indirect procurement involves obtaining the necessary resources for the organization's day-to-day operations. Services procurement refers to the services an organization might need to support its operations.

Product and service procurement for EMIS implementation may involve the following key aspects:

- **Procurement policies and procedures:** Developing and implementing procurement policies and procedures that align with organizational objectives, legal requirements, and procurement best practices. Policies should promote fair competition, ethical practices, transparency, and accountability.
- **Needs assessment and procurement method selection:** Identifying and evaluating the specific requirements for products and services essential to the EMIS ecosystem, such as hardware, software, EMIS hosting and development services, data transformation and warehousing services, training and capacity-building programmes, and technical support. Systems such as SMIS and HRIS may be hosted at each institution, in secure, privately owned data centres, within MoE data centres, cloud-based data centres, or through service provider Software-as-a-Service (SaaS) applications. The procurement method will depend on factors such as who the procuring entity is and what product or service is being procured.
- **Vendor selection:** Establishing criteria for vendor solicitation⁴ and evaluation and implementing a transparent and competitive procurement process to select the most suitable suppliers or service providers based on quality, cost, and other relevant factors. This phase might also include piloting solutions to gauge the feasibility of implementation and determine whether the product or service achieves the intended outcomes with the pilot group. In some contexts, for example, open-source EMIS applications with some capacity for

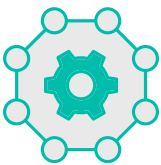
⁴ This refers to the process where a procuring entity invites suppliers, contractors, or service providers to submit bids or proposals. It includes issuing terms of reference or tender notices, as well as facilitating a competitive bidding process.



customization may be suitable, while in other contexts, custom EMIS applications may be developed for the system.

- **Contract negotiation, awarding, and management:** Negotiating and managing contracts with service providers, ensuring compliance with terms and conditions, and monitoring performance to ensure timely delivery and adherence to quality standards.
- **Supplier relationship management:** Cultivating and maintaining positive relationships with suppliers and service providers, fostering collaboration, and promoting continuous improvement in the procurement process.
- **Sustainable financing:** Establishing and maintaining sustainable financing models facilitate the allocation of financial resources necessary for acquiring and maintaining procured products and services over the long term.

The product/service procurement component relies on clear organizational structures and efficient project management processes. Adherence to relevant legislation, policies, and regulations ensures compliance with procurement guidelines, fair practices, and ethical standards (including data protection and privacy).

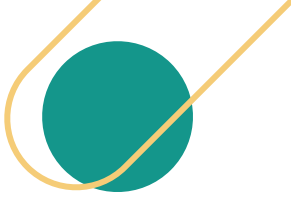


Capacity Building

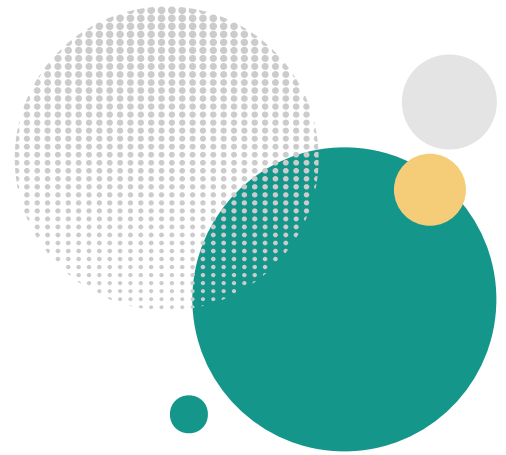
Capacity building is about enhancing the skills, knowledge, and behaviours of individuals and teams to perform the work required to achieve the objectives of the EMIS. It ensures that personnel are prepared and competent to manage their responsibilities effectively, enabling successful functioning and sustainability of the EMIS ecosystem.

This component includes a range of activities and strategies for the EMIS ecosystem to thrive. These may include:

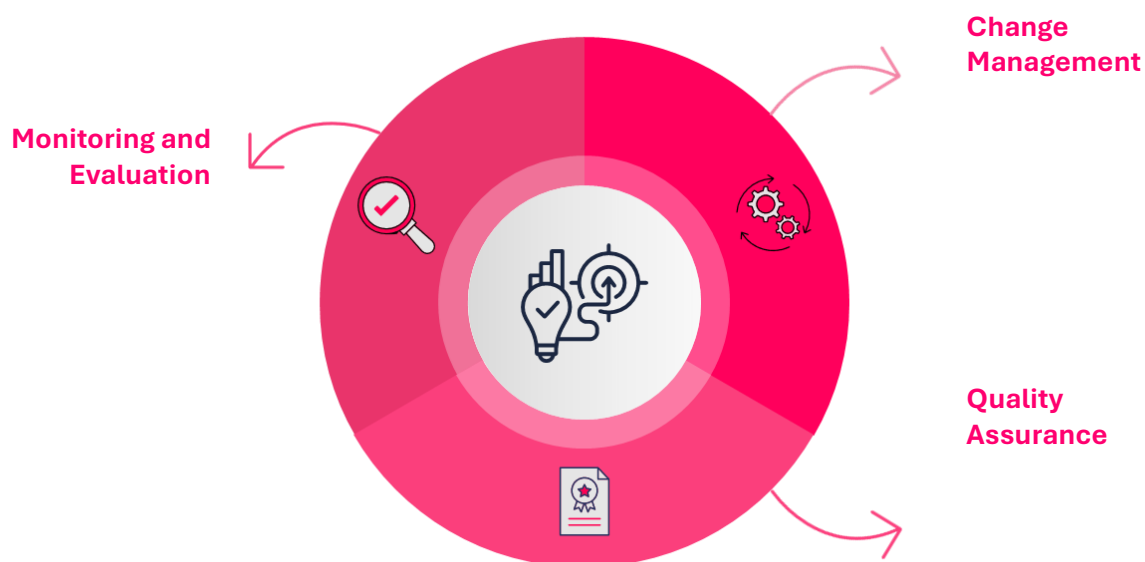
- **Competency framework development:** Establishing a competency framework that outlines the skills, knowledge, and behaviours required for all roles within the EMIS ecosystem. This serves as a guide for capacity-building efforts.
- **Skills and competency assessment:** Assessing staff skills and competencies in relation to the competency framework.
- **Skills and competency gap analysis:** Analysing and articulating the skills and competency gaps among EMIS staff, which will inform training needs and potential recruitment of new staff.
- **Training programmes and courses:** Based on skills and competency assessment and skills gap analysis, designing and delivering training programmes and courses tailored to specific roles and responsibilities, such as monitoring and evaluation, data management skills (for example, data collection, processing, analysis, reporting and dissemination), and ICT support.
- **Professional development opportunities:** Providing ongoing professional development opportunities for staff, such as on-the-job training, tutorials, online courses, workshops, webinars/seminars and leadership development programmes to facilitate continuous learning and skill enhancement.
- **Coaching and mentoring:** Implementing coaching and mentoring programmes that pair experienced professionals with staff who need guidance and skills development.
- **Communities of practice:** Fostering communities of practice that bring together individuals with shared interests and expertise, promoting knowledge exchange and collaborative learning.



Capacity building is a cross-cutting component that intersects with multiple aspects of the EMIS ecosystem. It is closely aligned with organizational structures and staffing because capacity building is based on the specific responsibilities and skills required to implement the EMIS.



Supporting Processes



Quality Assurance

Quality assurance refers to systematic processes and procedures used to determine if a service or product meets its required quality standards. Quality assurance supports ongoing improvement in an organization.

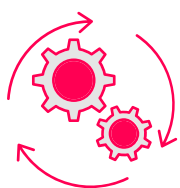
Good practices in quality assurance include:

- Commitment from senior leadership to support and implement quality assurance.
- Establishment of quality standards for all components and aspects of the education system and the EMIS ecosystem.
- Detailed planning for all components, processes and systems across the ecosystem, with measurable expectations that are aligned with the quality standards.
- Clear and detailed processes for managing documentation and reports related to the work of all components of the ecosystem.
- Clear processes and procedures for tracking and monitoring the different components of the ecosystem against the quality standards.
- Human resource capacity to carry out quality assurance processes.
- Training and capacity building, where necessary, to ensure that staff have the skills and knowledge to perform quality assurance activities.
- Financial and other resources allocated specifically to quality assurance activities.
- Clear communication and collaboration protocols and processes between components and among staff involved in quality assurance work.
- Procedures for collecting feedback from stakeholders.
- Regular audits and risk assessment of systems.
- Preventative and corrective actions to address problems that arise from quality monitoring.

Within the EMIS ecosystem, quality assurance processes may include:

- **Standards compliance across the ecosystem:** Ensuring that all components in the ecosystem comply with required quality standards, including those for ICT infrastructure, data privacy, cybersecurity, data validation, system interoperability, human resource management processes, staff training and professional development, data management processes, financial processes, project management, procurement processes, change management processes, communication with stakeholders, and decision-making and planning processes.
- **Quality assurance of capacity-building initiatives:** Ensuring that staff training and professional development initiatives for EMIS implementation achieve their intended outcomes and that staff have the skills and knowledge to perform their work.
- **Data management (collection, processing, analysis and reporting) review:** Ensuring the data collection tools and systems are simple to complete, capture the required data, and are updated as new data requirements arise; reviewing the quality and quantity of received instruments, continual improvements in data entry design, data entry processes, data cleaning efficiency and quality, data integration and transformation; reviewing and improving the identification and analysis of trends and indicators, improvements in the preparation of results, analytical reports, planning, projection, and simulation models; and reviewing and evaluating the accuracy and effectiveness of reports and dashboards, ensuring that they meet the information needs for strategic planning and decision-making at all levels of the education sector.
- **Publication and dissemination review:** Improving the delivery and availability of relevant information to all stakeholders of the EMIS ecosystem.
- **Usability testing:** Assessing how easily users can navigate through the tools and systems.
- **Technical testing:** Checking technical functionality to ensure EMIS systems operate smoothly across various locations, devices, and platforms.

Quality assurance practices and processes are essential in ensuring that all components of the EMIS ecosystem function efficiently and effectively according to defined quality standards. These processes facilitate accountability across the system and support continuous improvement in the education system.



Change Management

Change management is the systematic process of guiding education system stakeholders through the transitions or transformations necessary to achieve the vision of the education system supported through the implementation of EMIS.

Change is often disruptive to staff and internal processes. Even minor changes can have unintended consequences, and as change becomes larger and more complex, the risks increase. Change in EMIS is often widespread, affecting multiple levels of the education system through legislation and policy updates.

Change management approaches and models differ, and the type of approach taken depends greatly on the nature of the intended change and the context within which it is occurring. Yet, regardless of the nature or scope of the change, it will likely be disruptive to staff and internal processes alike. Even small changes can have unintended consequences and, as change becomes larger and more complex, the risks increase.

Key components of change management often include:

- **Planning:** Identifying the need for change, defining objectives, and developing a strategy for how the change will be implemented.

- **Communication:** Clearly and consistently sharing information about the change with all stakeholders to ensure they understand what is happening, why it is happening, and how it will impact them.
- **Training and support:** Providing the necessary training and resources to help individuals adapt to the change and perform their roles effectively in the new environment.
- **Implementation:** Executing the change according to the plan, which may involve new processes, systems, or behaviours.
- **M&E:** Assessing the progress of the change initiative, gathering feedback, and adjusting as needed to ensure the change is achieving the desired outcomes.
- **Reinforcement:** Ensuring that the change is sustained over time by embedding it into the organization's culture and practices.

Organizational change initiatives often fail because of a lack of commitment and buy-in from leaders and/or employees, a lack of strategic alignment between the organization's trajectory and proposed changes, a focus on systems over people, ignoring organizational culture change, and general inadequate planning of resource and capacity allocation. These reasons show that the key to successful change management are the people who will take ownership of, and drive, change. This might be leaders guiding employees through change in a top-down approach, or employees taking ownership of initiatives and driving change as part of a bottom-up approach.

Effective change management is thus essential to help minimize resistance, reduce disruptions, and increase the likelihood of a successful transition, ultimately leading to better outcomes for the organization and its stakeholders.



Monitoring and Evaluation (M&E)

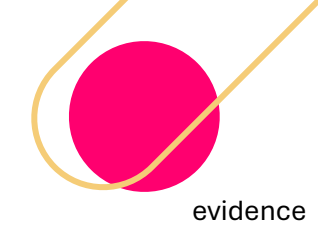
Monitoring is the systematic process of tracking whether an EMIS is being implemented as planned and if its strategic objectives are being achieved. Evaluation is an assessment of how well the EMIS strategic objectives have been met according to performance indicators.

Monitoring involves the collection of data throughout implementation to track progress towards defined objectives and to identify challenges in implementation. In this way, monitoring also supports both project management and quality assurance. A set of qualitative and/or quantitative indicators, aligned with EMIS objectives and intended results, typically guide what will be monitored. As far as possible, monitoring data collection should be integrated within EMIS implementation and project management processes and activities as seamlessly as possible.

The focus of evaluation is on assessing the effectiveness of EMIS implementation and identifying actions to inform improvements. Evaluation includes the assessment of changes that occur because of EMIS implementation. These changes may be positive or negative, direct or indirect, and intended or unintended. There are different evaluation methods and approaches that can be chosen depending on the organizational context.

M&E processes work together. Monitoring data is necessary, though not sufficient for conducting an evaluation and often additional evaluative research is undertaken. Learnings from evaluation research might also indicate that additional or different monitoring is needed.

The collection of reliable and valid M&E data provides information and insights that can be used to make decisions about EMIS implementation and the education system itself. Data and



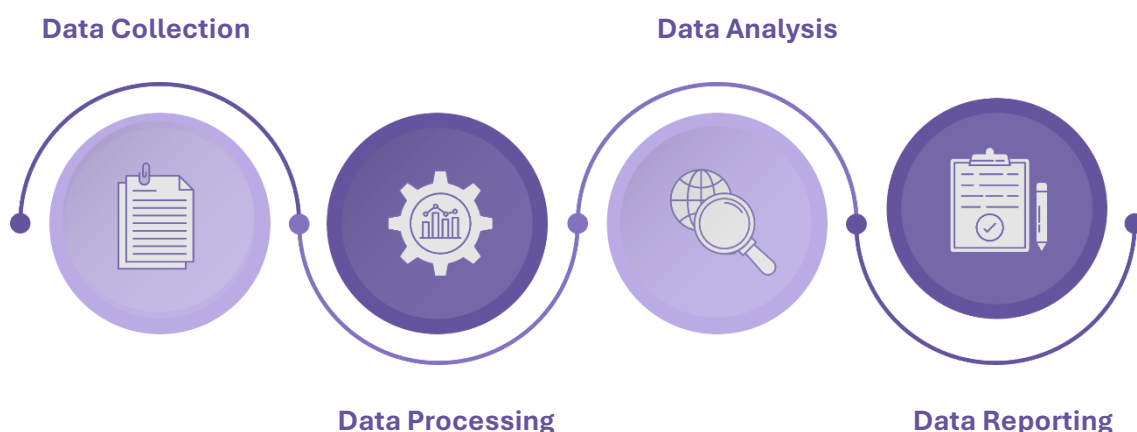
evidence can be used to identify strengths and weaknesses, propose solutions to identified challenges and then measure progress towards achieving defined objectives. In this way, M&E supports evidence-based decision-making and can help ensure the following:

- Optimal use of resources;
- Accountability;
- Data accuracy;
- Informed policymaking;
- Continuous improvement; and
- Sustainability.

To be effective as part of evidence-based decision-making, M&E data needs to be organized, shared, and used meaningfully within an organization. **Knowledge management** refers to the processes of storing, organizing, analysing, and sharing data in a format that is useful for the people within and around the organization. Depending on the size and structure of the organization, this may be done in various ways, ranging from a simple file sharing system to a purpose-built M&E platform.

Irrespective of how M&E data is stored and organized, it is critical that the approach is simple, intuitive, and ensures consistency and quality of data. The data should also be accessible to EMIS users and stakeholders so that it can inform their work on an ongoing basis. It is common to make use of a dashboard for team access to M&E data. The final step of a knowledge management system is the sharing of information, known as knowledge sharing (which is described in a separate component).

Core Implementation Components



Data Collection

Data collection is the process of designing, distributing, and collecting data through online applications and tools made available to schools, provincial/district offices, and central Ministry departments. Schools are the primary, but not only, producers of data about teachers, students, and school infrastructure and resources.

Data collection tools may include digital applications, forms and other data collection tools completed in real-time. Trained data capturers enter the data, which may be shared between multiple, interoperable systems.

Data collection involves the following key aspects:

- **Definition of master data sets:** Stakeholders need different types of data about teachers, students, and schools to support their decision-making and planning. Master data sets should be defined according to reporting, decision-making, and operational needs. Clear methodologies, tools, and processes should exist for creating and maintaining master data sets for the system.
- **Data collection tools and system design:** The design of digital applications, forms and other data collection tools requires careful consideration of the questions, layout, language, and proficiency of the tools' users. Data collection tools and systems should enable efficiency in data collection and minimize the potential for data entry errors.
- **Training and support:** Data capturers may require training on data collection tools to ensure that accurate and complete records are submitted without the need for additional follow-ups.
- **Availability of data collection tools:** Data collection tools are usually made available to schools, provincial/district offices and government implementation partners according to clear processes. Reporting intervals and deadlines are agreed upon and inform follow-up and accountability processes.
- **Data collection and follow-up:** Submissions are monitored during the data collection process, with completed submissions received and submitted for data processing. Where submissions have not been received after the deadline has passed, a follow-up request for submission is made. Non-actioned follow-ups are recorded in the collection report. Accountability measures should be in place to ensure compliance.

- **Decentralization:** EMIS platforms can comprise multilayered and distributed systems in various parts of the EMIS ecosystem (for example, payroll, finance, and school data collection platforms), with each layer sharing data and feeding the central EMIS.
- **Platform interoperability:** Each platform used to collect data must conform to adopted Data Exchange Standards.
- **Data privacy:** The EMIS collects data about individual teachers and students. Strict protocols and processes should exist to ensure data privacy.



Data Processing

Data processing involves organizing and transforming collected data from decentralized systems into a structured format for inclusion in EMIS master data sets. Data flows upwards from schools, departments in provinces or districts, and government implementation partners (where applicable), creating a combined national EMIS data set.

Data processing involves the following key aspects:

- **Data processing software design and selection:** Software applications and tools are designed and selected to convert collected data into compatible formats for entry into the EMIS master data set.
- **Real-time reporting:** Software applications and data processing tools have the functionality to generate real-time reports about education system performance.
- **Data cleaning:** This is the process of routinely checking for data entry or data import errors. Data entry is reviewed by proofreading and checking collected data. Preliminary analysis of captured data is performed on key indicators to identify outliers or obvious data capture errors when compared against previously captured (historical) data.
- **Data entry:** This is applicable only when physical data collection tools are still used (for example, paper-based surveys). After training, data capturers may need to perform manual data entry into the EMIS using software applications. When decentralized or digital systems submit their collected data, transformation tools import the transformed data into the EMIS.



Data Analysis

Data analysis, or data analytics, is the process of identifying and combining data stored in the EMIS to provide access to the education system's performance indicators. It is informed by and supports stakeholders' data reporting needs. More detailed operational information is typically required at the institutional level, while aggregated, summary information is needed at the national level.

Data analysis involves:

- **Specific purposes for analysis:** Data analytics may focus on four purposes – descriptive, causal, predictive, and prescriptive.
- **Performance indicators:** These are prepared to fulfil the reporting needs of stakeholders throughout the education system. Stakeholders use indicators and data reports to monitor and analyse education system performance. Performance indicators may include trend statistics to supplement analytical reports needed by planners and decision-makers, research results from specific investigations and interventions, and projections and simulation models that may be customized for specific planning purposes.

- **Software applications that enable data analysis:** Software designed or selected for data analysis should have the functionality for stakeholders to generate their own reports from the EMIS master data sets, based on their data needs.

Data Reporting

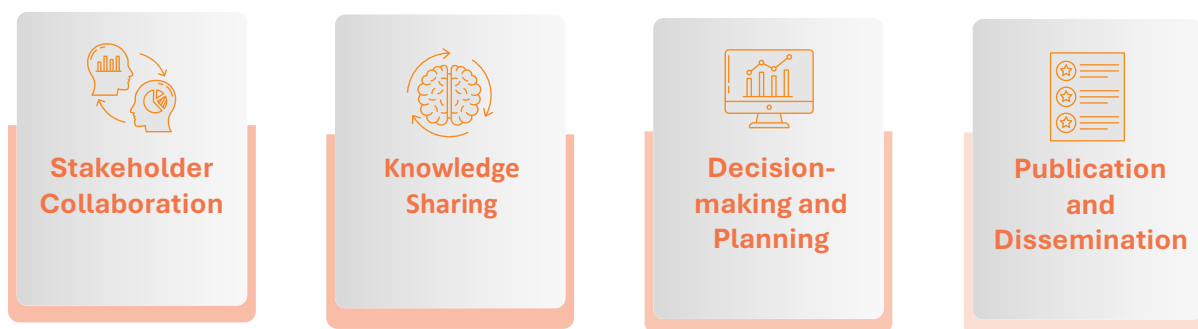


Data reporting involves presenting the indicators from data analysis in online dashboards, reports, and statistical abstracts to support strategic planning and management, governance and accountability, and monitoring and evaluation of the education system. Internal stakeholders' reporting needs are defined by their respective operational policies and guidelines. Data dashboards should align with these operational policies. The EMIS should align with and periodically be strengthened according to the evolving reporting needs of external and internal stakeholders.

Data reporting includes the following:

- **Operational policies and specification documents:** These are used to design and configure EMIS online dashboards and reports to meet the reporting needs of internal and external stakeholders and establish processes for reviewing EMIS reporting needs.
- **Alignment of data dashboards and reports with reporting purposes:** Data reports should match each reporting purpose, including monitoring, evaluation and strategic planning. They should be generated at regular intervals in the online data dashboards and be readily accessible to specific stakeholder types.
- **Types of reports:** Annual indicator reports assist in analysing education system performance across key indicators identified by planners and education policy. They are used to support governance, strategic planning, management and accountability in the education system. High-level summary reports provide an overview of indicators identified by senior decision-makers and policymakers to monitor high-priority interventions. Annual statistical abstracts prepared at regular intervals contain a summary of statistical tables and graphs for internal and external sharing with staff, government implementation partners, international organizations involved in education, educational researchers, and public users.

Outward Engagement and Knowledge Sharing



Stakeholder Collaboration



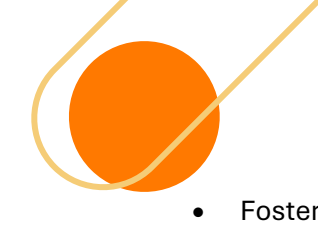
Stakeholder collaboration involves communicating and consulting with different types of stakeholders both within and beyond the EMIS ecosystem. Engagement with stakeholders ensures that diverse expertise, perspectives, and experiences are leveraged to achieve the collective success of EMIS implementation and sustainability.

Stakeholder collaboration involves engaging with various stakeholder groups, such as:

- **Policymakers and government officials:** Collaborating with policymakers and government officials from different government agencies aligns EMIS initiatives with national legislation, policies, regulations, and strategic objectives and priorities for the EMIS, securing their support and provision of required resources.
- **Schools, universities, colleges, and teachers:** Working closely with schools, universities, colleges, and teachers to understand their needs, gather feedback, and ensure that the EMIS accurately collects and reports this information to the appropriate decision-makers.
- **Students and their communities:** Engaging with students, parents/caregivers, and local communities to understand their contexts, preferences, and unique requirements ensures that reported data can be used to guide inclusive and responsive education system interventions.
- **Technology providers and industry partners:** Collaborating with technology providers and other industry partners involved in EMIS implementation leverages their expertise, resources, and innovative solutions in support of EMIS initiatives.
- **Development partners:** Collaborating with development partners involved in EMIS funding and implementation facilitates their commitment to national priorities for EMIS implementation and consolidates their support and, where applicable, human and financial resource provision.
- **Civil society organizations and non-governmental organizations (NGOs):** Partnering with civil society organizations and NGOs working in education and related fields leverages their grassroots connections, local knowledge, advocacy efforts, research and data.

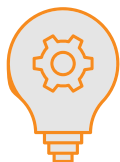
Effective stakeholder collaboration involves:

- Establishing communication channels and feedback mechanisms to facilitate dialogue and information sharing.
- Creating advisory groups or committees to engage stakeholders in decision-making processes and gather diverse perspectives.
- Organizing stakeholder workshops, focus group discussions, and consultations to gather input and feedback on EMIS integration and education system interventions implemented based on information reported by the EMIS.

- 
- Fostering a sense of ownership and shared responsibility among stakeholders to ensure long-term commitment and sustainability.

Effective stakeholder collaboration is crucial for ensuring the success of EMIS implementation. It informs and is informed by legislation, policies, and regulations, as stakeholder input and buy-in are essential for shaping and implementing relevant policies and guidelines.

Knowledge Sharing



Knowledge sharing involves the practices and activities through which different stakeholders exchange information and expertise within and beyond the EMIS ecosystem. It might involve sharing research findings, insights, best practices and experiences, enhancing collective understanding, and promoting collaboration.

These processes can enhance desired outcomes for EMIS implementation through shared learning. They can also support innovation and sustain up-to-date knowledge bases in educational and organizational settings, thereby promoting the continuous improvement of the EMIS.

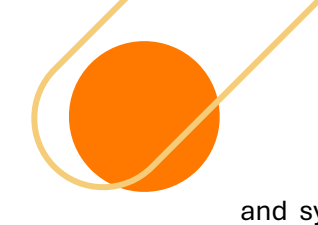
Types of knowledge

In the context of an EMIS ecosystem, knowledge can be broadly divided into explicit knowledge and tacit knowledge. Both are inherently valuable in enhancing and sustaining the EMIS ecosystem.

- **Explicit knowledge** can be formally documented and shared in different ways. Examples include reports, books, training programmes, conferences and webinars. Explicit knowledge often draws on research data, such as data collection as part of M&E processes.
- **Tacit knowledge** is less structured. It comes from on-the-job experience and might be more complex to articulate or express. Useful mechanisms to share this kind of knowledge are through mentorship and communities of practice.

Levels and approaches to knowledge sharing

- **International level:** Government decision-makers and stakeholder organizations such as major service providers or NGOs may collaborate by participating in EMIS forums to share knowledge about policy development, data privacy regulations, system architecture challenges, and solutions to problems they encounter in their national EMIS systems.
- **Regional level:** Governments can share knowledge and negotiate cost-effective, scaled solutions to meet the technical requirements of their EMIS systems, as well as share data sets on regional assessments and other common education-related topics. Regional knowledge sharing may take the form of online portals, symposiums or conferences, and forums established for sharing experiences, published research, and the results of systemic evaluation and findings. These forums enhance collective understanding and foster collaboration. They may even provide a basis for benchmarking best practices across systems.
- **National level:** Stakeholders in the EMIS ecosystem can participate in sharing explicit and tacit knowledge about EMIS data and analysis, as well as technical and operational aspects of EMIS management at different levels.
- **Communities of practice at all levels:** Tacit knowledge within an EMIS ecosystem or between regional and national stakeholders may be developed and shared through communities of practice that have access to specific channels through which they can share and discuss knowledge, experience, and data. Because EMIS evolves as education policies



and systems evolve, it becomes highly desirable for EMIS representatives to be able to discuss the implications of broader educational change (for example, curriculum models and assessment practices) for EMIS infrastructure and implementation.



Use of Data for Decision-Making and Planning

Data about education is crucial for decision-making at all levels of the EMIS ecosystem but particularly at the national level, where system planning occurs. In countries with a federal government structure, system planning also occurs at the state level. Data reports provided via online dashboards, high-level reports and abstracts enable decision-makers and planners to measure education system performance progress against strategic objectives.

Decision-making functions cyclically and reciprocally in the following ways:

- The strategic vision and objectives for the education system at the national level inform the types of data sets and reports that need to be made available in the EMIS.
- Comprehensive, accurate, and timely disseminated data sets are made available via online dashboards, high-level reports and abstracts.
- Decision-makers and planners use these reports to monitor education system performance against strategic objectives, becoming critical inputs for feedback.
- Feedback from the data allows decision-makers to measure the extent to which planning has been effective and operationalized across the education system.
- Feedback also informs further education decision-making and planning.
- Data and feedback support the evaluation of the EMIS itself and the effectiveness of the EMIS ecosystem.
- Data provides an accurate basis on which to identify challenges and problems in the system (for example, high student dropout rates or poor literacy outcomes) and the results of systemic or contextual interventions and change.
- Data ultimately also becomes a foundational input for evaluating and shaping legislation and policymaking, so that decision-makers and policymakers can maintain the conditions necessary to drive and shape quality education and improved learning outcomes.




Publication and Dissemination

Publication and dissemination involve compiling and making education system performance reports and information available through various channels to its intended internal and external audiences.

Publication and dissemination of key education information from the EMIS involves:

- **Internal audiences:** Internal audiences for education reports and information may include EMIS unit staff, educational system planners, national and provincial/district decision-makers, teachers, students, school principals and administrators, MoE training and development coordinators, quality assurance unit staff, and curriculum developers.
- **External audiences:** External audiences for education reports and information may include parents/caregivers/guardians, civil society, the media, government agencies and departments involved in education or youth services (for example, Ministries of Finance and Health), educational researchers, development partners, universities and research organizations, non-governmental organizations involved in education-related initiatives such as literacy development and feeding schemes, private sector organizations and employers



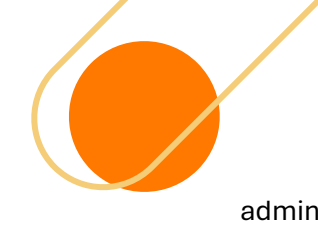
with an interest in the education system, advocacy groups involved in issues such as gender equity and inclusion of children with disabilities, and educational technology providers.

- **Channels for disseminating information:** Information can be shared with these audiences via different types of channels. These channels include online platforms, portals and dashboards with the functionality for stakeholders to query datasets and request their own reports, newsletters and information alerts disseminated by email, short message service (SMS) alerts, presentations made at briefings, conferences and community meetings, broadcast media (suitable for rural populations who may have more ready access to radios and television than the Internet), mobile applications linked to the MoE website, and social media platforms and channels.
- **Communication strategies and protocols for engaging audiences:** Dissemination of education system information via channels such as social media or platforms that allow users to engage by leaving comments or asking questions provides an opportunity to involve stakeholders in gathering feedback about the system. Strategies and protocols should be set up to manage and monitor this type of engagement.

Impediments to Sustainability

Many organizations responsible for implementing an EMIS face significant challenges in ensuring effective and sustainable implementation. Key challenges are:

- 1) **Policy and regulatory gaps:** The absence of comprehensive policy frameworks, regulatory mechanisms, and guiding principles at the national and organizational levels pose a significant challenge to sustainable EMIS implementation. Without clear policies and regulations in place, there is a lack of strategic direction, accountability, and alignment across various stakeholders, hindering effective adoption of EMIS for educational improvement.
- 2) **Organizational capacity deficiencies:** Many government agencies and education institutions lack the necessary organizational structures, HR policies, and clearly defined job roles to support successful, sustainable implementation of EdTech initiatives. Inadequate alignment of skills and competences among personnel, coupled with insufficient targeted and continuous capacity building programmes for stakeholders at all levels, further exacerbate this challenge, limiting the ability to effectively leverage and sustain such initiatives.
- 3) **Resource constraints:** Implementation and long-term sustainability of EMIS require financial resources, technical expertise, and robust infrastructure. However, many organizations face insufficient funding allocations, a lack of specialized knowledge, and inadequate infrastructure to support the development, deployment, and maintenance of EMIS systems. Sustainability planning that considers ongoing resource needs and identifies potential funding sources is crucial to tackle this impediment.
- 4) **Infrastructure and technology gaps:** Inadequate ICT infrastructure and limited connectivity pose significant barriers to the effective implementation of EMIS. Reliable and robust ICT infrastructure, including hardware, software, hosting capacity, and high-speed Internet connectivity, is essential for ensuring EMIS implementation.
- 5) **Lack of stakeholder collaboration and buy-in:** Successful EMIS implementation requires collaboration and buy-in from various stakeholders, including policymakers, educational



administrators, teachers, and commercial partners, amongst others. Failure to cultivate effective communication, establish shared goals, and align efforts among these diverse stakeholders can lead to fragmented efforts, resistance to change, and can ultimately hinder sustainable EMIS implementation.

- 6) **Resistance to change:** Introducing new technologies, systems and ways of managing data may induce resistance in some stakeholders who are accustomed to traditional data collection and processing systems. This resistance can stem from a lack of understanding, fear of change, or insufficient training and support.
- 7) **Lack of evaluation and feedback mechanisms:** Some EMIS initiatives do not incorporate robust evaluation and feedback mechanisms, making it challenging to assess their effectiveness, identify areas for improvement, and make data-driven decisions to ensure long-term sustainability.

Conclusion

The framework provided in this concept note offers a point of departure for government agencies in solving EMIS ecosystem sustainability challenges. Informed by good practice from high-functioning EMIS, the EMIS ecosystem highlights the significance of each component, while demonstrating that they are interrelated and, in many cases, interdependent. Only by recognizing and harnessing this will it be possible to create a conducive environment for effective and sustainable EMIS implementation.

By creating an enabling environment through targeted interventions that focus on one or more components of this ecosystem, governments can hopefully enhance their ability to implement EMIS effectively, ensuring accurate, real-time data availability for informed decision-making, and enabling improved performance across the entire education system.

The EMIS Knowledge Hub emishub.org provides access to comprehensive resources, best practices, and tools tailored for every stage of EMIS development and operations.

→ Click [here](#) to complete a survey to evaluate your organization's readiness to sustain EMIS implementation and thus determine where to focus effort to strengthen that readiness.

→ Take the [IDB's Diagnostic Assessment Survey](#) to assess your organization's EMIS implementation using universal EMIS principles and a comprehensive framework outlining the enabling factors for a high-functioning EMIS.