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Education management information systems progress assessment tool

A methodological guide for educational transformation

Education 2030

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UNESCO, as the United Nations' specialized agency for education, is entrusted to lead and coordinate the Education 2030 Agenda, which is part of a global movement to eradicate poverty through 17 Sustainable Development Goals by 2030. Education, essential to achieve all of these goals, has its own dedicated Goal 4, which aims to ***"ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."*** The Education 2030 Framework for Action provides guidance for the implementation of this ambitious goal and commitments.

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Education 2030

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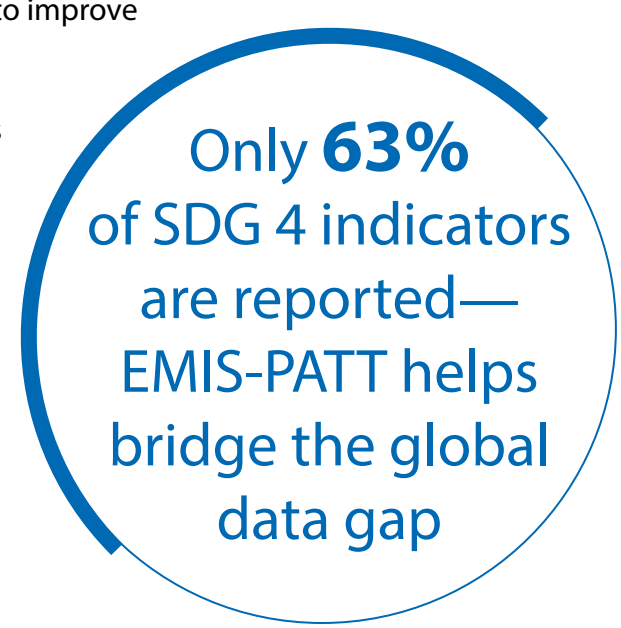
SHORT SUMMARY

Quality education for all learners begins with quality data

Today, millions of learners remain invisible in education statistics. One in three education ministries worldwide cannot accurately locate all schools, and over half still rely on paper-based data systems. These gaps in timely, accurate, and accessible data weaken policy relevance, hinder administrations' capacity to plan and monitor progress, and limit institutions' ability to manage teachers and resources to improve education outcomes and learning pathways.

Effective Education Management Information Systems (EMIS) provide a powerful leverage to enhance planning, management and learning.
A reliable EMIS enables education administrations to oversee schools, deploy teachers effectively, allocate resources, monitor performance, and address inequalities. Research estimates that every US$1 invested in education data systems yields a US$32 return in low- and middle-income countries, underlining the value of data-driven decision-making.



The EMIS Progress Assessment Tool for Transformation (EMIS-PATT), developed by UNESCO and its International Institute for Educational Planning, helps Member States diagnose EMIS, identify strengths and areas for improvement, and map trajectories for transformation. Using a systems approach, this practical tool shows how diverse EMIS components interact and guides the development of strategic and operational roadmaps for prioritized and targeted actions.

This methodological guide presents EMIS-PATT's scope, framework, and implementation. It demonstrates how this tool supports system strengthening for evidence-based decision-making in education.

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"Since wars begin in the minds of men and women, it is in the minds of men and women that the defences of peace must be constructed"

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Under the leadership of Borhene Chakroun, Director of Division of Policies and Lifelong Learning Systems and the supervision of Gwang Chol-Chang, Chief of Section of Education Policy, this methodological guide was primarily authored by Mathias Bouckaert, Pierre Chapelet, Hyok Il Kim and Safa Sahin, under the technical coordination of Pierre Chapelet.

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Acronyms and abbreviations

ADaMM	Administrative Data Maturity Model (UNICEF diagnostic and guidance framework)
AU	African Union
CESA	Continental Education Strategy for Africa
DQAF	Data Quality Assessment Framework
EFA	Education for All
EMIS	Education Management Information System
EMIS-PATT	EMIS Progress Assessment Tool for Transformation
GPE	Global Partnership for Education
GPSDD	Global Partnership for Sustainable Development Data
HR	Human Resources
IADB	Inter-American Development Bank
ICT	Information and Communication Technology
ITIL	Information Technology Infrastructure Library
KIX	Knowledge and Innovation Exchange
LAC	Latin America and the Caribbean
MoE	Ministry of Education
SADC	Southern African Development Community
SABER-EMIS	Systems Approach for Better Education Results - Education Management Information System
SDG	Sustainable Development Goals
SIA	Strategic Improvement Areas
SIGE	Système d'information pour la gestion de l'éducation (French name and acronym for EMIS)
SIGED	Sistema de Información para la Gestión Educativa (Spanish name and acronym for EMIS)
STEER	UNESCO System Transformation for Effective Education Reimagination
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO IIEP	UNESCO International Institute for Educational Planning
UIS	UNESCO Institute for Statistics

Purpose of the methodological guide

To support countries in strengthening data systems, enhancing the link between data, evidence and policymaking, and leveraging the potential of data in policy formulation and management, the UNESCO Section of Education Policy, in collaboration with UNESCO-IIEP, developed the *Education Management Information Systems Progress Assessment Tool for Education Transformation (EMIS-PATT)*.

EMIS-PATT is designed to support Member States in establishing reliable, integrated, and cohesive EMIS to develop evidence-based strategic planning and management capacities within national education administrations. It was developed to provide a hands-on solution for education systems to identify strengths, address gaps and map trajectories for improvement within their EMIS ecosystems. Using a systems approach, EMIS-PATT captures how diverse EMIS components and sub-structures interact, offering strategic and operational plans for prioritized and targeted actions.

This dedicated methodological guide has been developed to outline its scope, framework, methodology, and implementation modalities. Through this publication, UNESCO aims to equip education ministries with the tools and insights needed to strengthen institutional capacities, optimize education management processes, and ensure data-driven improvements advancing participation in quality education for all learners.

This publication is part of a series of modules under UNESCO's System Transformation for Effective Education Reimagination (STEER) concept and framework.

The STEER concept originates in the Transforming Education Summit's vision, which recognizes that education systems are no longer fit for purpose, makes a strong case for a new social contract for education, grounded in the two principles of ensuring the right to quality education throughout life and strengthening education as a common good, and calls for a whole-of-government effort necessitating a new eco-system for education, with a clear line of accountability between vision, commitments, resources, actions, and results.

The STEER framework builds on such an overarching vision of education transformation and consists of a series of modules covering key domains that can be leveraged for transforming education, allowing for joined-up, yet modular, implementation based on the country's specific context, needs and priorities.

Each module – or PATT – consists of three parts: (1) the conceptual framework that delineates the scope and structure of the education component (e.g., EMIS) to be assessed based on its level of progression towards education transformation, (2) the methodology and procedures for conducting the assessment, and (3) an assessment questionnaire to be filled out by the country together with the UNESCO team. PATT implementation results in the formulation of a roadmap to guide the country in its transformation journey. Each module employs a systemic approach to assess current performance and shortcomings in order to identify the gaps to overcome and priority actions to take.

I. The role and future of EMIS

Unleashing the power of data for informed decision-making in education

Since the World Conference on Education for All (EFA) in 1990 (Jomtien, Thailand) and the launch of the EFA initiative, the global education community has acknowledged the vital role of data and evidence in improving education systems. This recognition was amplified at the World Global Education Forum in 2000 (Dakar, Senegal), which underscored the necessity of establishing robust monitoring mechanisms to track progress and support the achievement of education goals.

The Education 2030 Framework for Action further reiterated the importance of national monitoring and evaluation systems by emphasizing their role in evidence-based decision-making and real-time assessments of education sector performance. Monitoring systems are considered critical for enhancing governance, optimizing resource allocation, and developing education policies to achieve better learning outcomes. Importantly, they enable education managers to monitor and evaluate progress in providing quality education, ensuring system-wide inclusion of marginalized populations and gender equality, advancing adult literacy, supporting skills development, expanding early childhood care and education, and responding to the impact of crises and conflicts on education.

Over the past decades, monitoring and evaluation frameworks have thus evolved into essential pillars of education management. At the operational level, they involve tracking school registration, student and teacher attendance, and staff deployment, among others, to assess performance and ensure accountability. At the strategic level, the systematic collection and analysis of education data—such as school locations, enrolment figures, teacher qualifications, and infrastructure—provide critical insights for policy development, resource distribution, and strategic planning.

These frameworks are inherently reliant on reliable and disaggregated data, which forms the foundation for assessing progress and addressing gaps in education outcomes. In line with the growing emphasis on monitoring and evaluating education outcomes, there has been an increasing recognition of the necessity for more disaggregated and real-time data to effectively manage education systems and achieve national and global educational goals, particularly Sustainable Development Goal (SDG) 4. Since the 1990s, the number of education policy documents mentioning data, statistics and information have increased by 13 times in high-income countries, 9 times in upper-middle-income countries and 5 times in and low- and lower-middle-income countries (Bromley et al., 2023).

Reliable data acts as a compass, guiding decision-makers for informing strategic and/or operational actions aimed at achieving educational objectives. It provides clear insights into the current state of education systems, helping policymakers and education leaders make informed decisions in areas such as resource allocation, system improvement, and accountability for outcomes. For ministries of education, the availability of accurate and timely data is indispensable, as data empowers the educational administration to plan, manage, and monitor education systems effectively. This, in turn, fosters the delivery of quality education services to all learners, ensuring an education system that is not only efficient but also effective, equitable and responsive to the needs of learners. Quality information is especially vital in resource-constrained contexts, where data can direct investments toward initiatives with the greatest need and impact.

However, despite progress in recent years, there are still major data gaps about education at national and international levels. The learning levels of over half a billion children are still unknown and the need for accurate and comprehensive education data has never been more urgent (UNESCO, 2024).

To address these data gaps, education stakeholders need to invest more and better in data and evidence, adopting a sector wide and lifelong learning approach, gathering data from early childhood to higher education, and in diverse learning environments, including workplaces, communities, and online platforms. As learning occurs in various contexts and settings and is influenced by a wide range of factors, there is a strong need for both intersectional,

interoperable and intersectoral approaches to data collection and data integration.

Effective information systems must be in place to harness this data and transform it into meaningful insights that can inform decision-making. This is where Education Management Information System (EMIS) comes into play (See box 1). EMIS functions as an information ecosystem powering education management and decision-making, fueled by reliable data. In essence, EMIS ensures that the right data is available at the right time, for the right user and to support the right educational decisions.

Box 1. UNESCO EMIS definition

EMIS is the coordinated network of individuals, organizations, institutions, technologies, processes and procedures, rules, and regulations, that produce the fit-for-purpose quality data needed for informing decision-making processes in operating an educational system.

The elements included in an EMIS focus on the needs of educational planners and managers, regardless of the educational sub-sector, programme orientations, system, or entity in which they work, at all administrative levels, to perform their responsibilities.

An EMIS materializes into interoperable datasets, for which there are distinct functionalities (or modules, or apps) for data collection, processing, management, storage, archiving, and extraction for analysis and dissemination to different types of audiences, including local and international stakeholders.

Typically, an EMIS has components referring to students, schools, human resources (teaching and non-teaching staff), infrastructure and material, and financial resources. The information managed by the EMIS can be quantitative or qualitative and combine various sources of input.

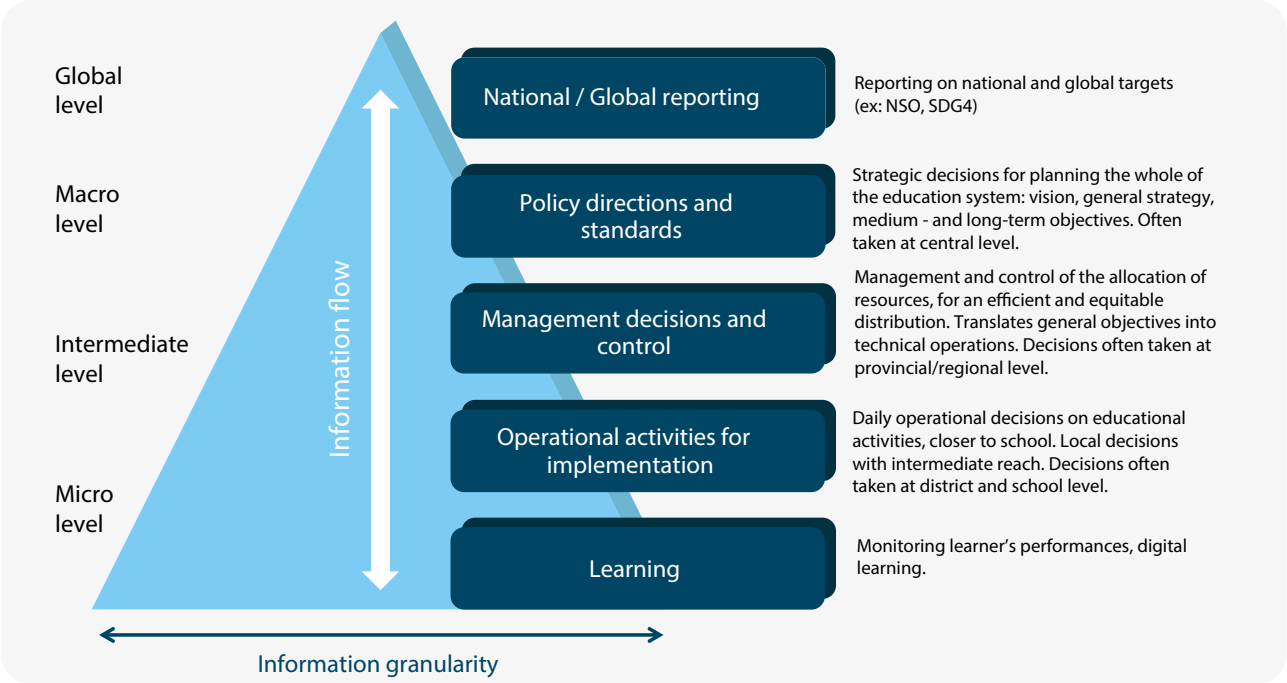
Accountable entities designated under well-defined institutional leadership are responsible to create, maintain, and update the EMIS by guaranteeing both the financial sustainability of the system and the continuous professional development of involved actors.

Good governance also implies leadership in sharing the strategic direction of the EMIS, as well as assessing the relevance of the data system, and ensuring data ethics.

Source: UNESCO - IIEP (2026)

EMIS is not merely a technical instrument for administrative data collection and reporting. It forms the backbone of an education system's decision-making apparatus, helping to bridge the gap between data and actionable insights. EMIS functions as a critical ecosystem for supporting policymaking, strategic planning, and operational implementation across the education sector. By providing timely access to high-quality, relevant data, it equips decision-makers, management and administrative personnel, and education professionals at all levels with the information necessary to fulfill their responsibilities and make informed decisions. It also supports learners in making choices for their learning pathways and engaging their schools, teachers and peers (see Figure 1).

Figure 1: Use of information by level of decision-making



Source: Adapted from Carrizo et al, 2003.

By linking data to education policy and planning, management and administration, EMIS serves as a critical enabler that supports education systems across all decision-making levels. As shown in figure 1, EMIS enables data-driven actions that range from monitoring learner progression at the micro level to guiding strategic policy and reporting at national and global levels. At the **micro (school) level**, EMIS provides granular data to support day-to-day administration, such as student attendance and teacher deployment—ensuring timely interventions and effective school operations. At the **intermediate (sub-national) level**, EMIS informs resource allocation, monitors programme implementation, and helps managers assess school infrastructure and learning quality to support equitable service delivery. Moving to the **macro (national) level**, EMIS contributes to setting and monitoring policy directions by revealing system trends and enabling forward-looking strategic planning. Finally, at the **global (international) level**, EMIS facilitates international reporting on education targets such as SDG 4, ensuring transparency and alignment with global development agendas.

EMIS underpins **education policy and planning** by delivering actionable data that informs policy formulation, strategic planning, and regulatory oversight. This ensures that policymakers can monitor implementation progress, assess the effectiveness of education policies, and make necessary adjustments throughout planning and implementation cycles. For example, EMIS provides student enrollment and demographic data, enabling governments to identify trends in school-age, and out-of-school, populations. By analyzing this information, policymakers can forecast changes in student population in specific regions and establish priorities accordingly. This evidence-based approach ensures that education infrastructure, teacher

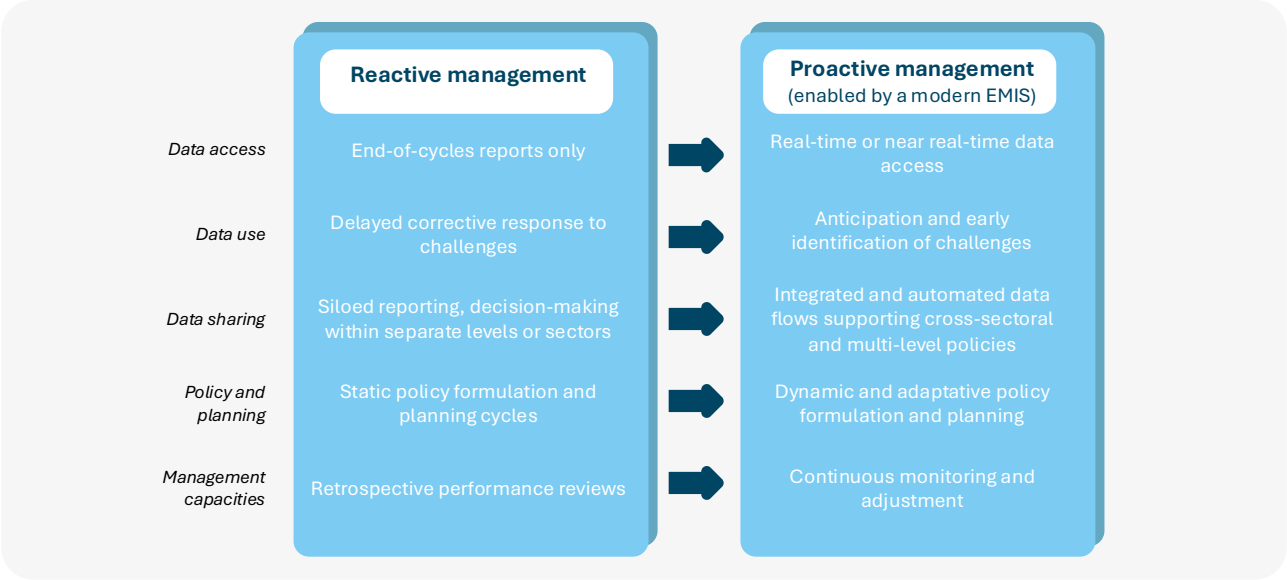
deployment, and learning materials are aligned with projected needs, promoting a more equitable and efficient education system.

EMIS plays a critical role in **education management** by supporting resource allocation, quality assurance, and performance monitoring. For instance, EMIS data on school infrastructure and material resources can help managers allocate resources where they are most needed, such as assigning additional teachers, supplying learning materials to schools that lack them, or identifying facilities in deteriorating conditions. Education managers can use EMIS to monitor and evaluate the effectiveness of operations and educational programmes. By analyzing student data and assessment results, managers can identify areas needing improvement, ensure that educational initiatives meet their programme objectives, and contribute to overall system functioning and improvement.

In terms of **education administration**, EMIS can ensure transactional functions and support daily operations by providing essential data and tools for administrators. Accurate student records—including enrollment, attendance, and academic performance—allow for real-time tracking, enabling early identification of students at risk of dropping out and supporting timely interventions. EMIS also streamlines human resource management, maintaining detailed records of teacher qualifications, assignments, and professional development activities. Ensuring that the right teachers are matched with the right positions improves educational outcomes and workforce efficiency. Additionally, EMIS enhances financial management by tracking school budgets and expenditures, ensuring transparent and efficient use of funds. Administrators can also use EMIS to monitor compliance with education policies and regulations, generating the necessary reports to demonstrate adherence to national standards.

Through a multi-level and multi-system integration, EMIS enables a shift from reactive to proactive management—moving ministries of education beyond reliance on annual reporting cycles toward more continuous, real-time engagement with data. This shift allows education administrations to anticipate system needs, adjust plans dynamically, and make timely decisions informed by ongoing insights rather than retrospective data. Proactive management enables ministries to identify inefficiencies, respond promptly to emerging trends, and align planning and resource allocation with evolving educational demands. EMIS, in this context, strengthens both governance and operational efficiency by embedding data use into everyday processes across all levels of the system. When fully integrated within national governance structures, EMIS supports not only routine administrative functions but also long-term strategic planning—covering the full policy and planning cycle, from analysis and design to implementation and monitoring. This contributes to improved system responsiveness, greater transparency and accountability, and ultimately leads to more effective education governance and decision-making that is conducive to improved learning outcomes.

Figure 2: EMIS-enabled shift from reactive to proactive management



Source: Author.

However, despite its importance, many countries still lack a robust EMIS and, as a result, **many ministries suffer from a lack of information about their education systems' inputs, throughputs and outputs**, leaving them to grapple with demands for information about learning outcomes and the effectiveness and efficiency of education policies and programmes. Fewer than half of Global Partnership for Education (GPE) partner developing countries have reliable education data systems: in 2018, only 42% had functioning learning assessment systems, and just 46% had quality data available to inform decision-making, based on country-reported data compiled by GPE (GPE, 2019). At the global level, 53% of countries still rely on paper-based education information systems, and 29% of education ministries are unable to precisely locate schools within their jurisdictions (UIS 2020). Because of these gaps in data systems, foundational learning and literacy data remain unavailable for 18% of the world's school-age population, a figure that rises to 50% in Sub-Saharan Africa (UIS 2021).

This situation shall be put in perspective with global studies showing that the value of investing in data systems is particularly evident in low- and middle-income countries, where 1 dollar invested in data systems is projected to generate 32 dollars return (GPSDD, 2023). This high return on investment underscores the transformative power of management systems built on reliable data, a recognition that has gained momentum internationally, as demonstrated by the UN's High Impact Initiative on the Power of Data[1] which not only acknowledges the crucial role of data systems but also aims to establish 50 national data partnerships by 2030.

Moreover, the COVID-19 has underscored the necessity for agile and real-time information systems able to adapt to shifting circumstances and to capture learning that can take place in various settings. In this regard, the potential of advanced education management information systems, capable of tracking each student's progress through the education system in real time, remains largely untapped.

The global demand for advanced EMIS as decision making tool is surging, as more countries strive to enhance their education systems' management and monitoring capabilities. However, transforming education management and EMIS requires not only substantial financial investment and political will but also technical capacity and effective regulatory and operational arrangements. In response, development partners and international organizations, including UNESCO, are frequently called upon to provide technical support and methodological guidance for EMIS enhancements.

The growing recognition of the strategic importance and far-reaching benefits of advanced EMIS has led both Member States and development partners to prioritize and repurpose investments in modernizing education management systems. These efforts are gradually transforming EMIS, enabling countries to adopt more integrated, real-time, data-driven approaches and digital solutions that lay the foundation for a new era of efficiency, responsiveness, and informed decision-making in education governance.

The transformational power of EMIS: global trends

EMIS have been evolving substantially over time. In addition to progress in the collection, availability and management of data, the integration of advanced technologies to enhance the multiple components of EMIS provide these tools with the capacity to drive broader transformation of education governance.

As education systems worldwide increasingly need granular, real-time data, EMIS can become crucial tools in enabling the transformation from traditional, reactive approaches to proactive, transactional and strategic decision-making. **Central to this transformation and evolution are two pivotal aspects: digitalization and interoperability**, which are revolutionizing how educational data is collected, processed, and utilized.

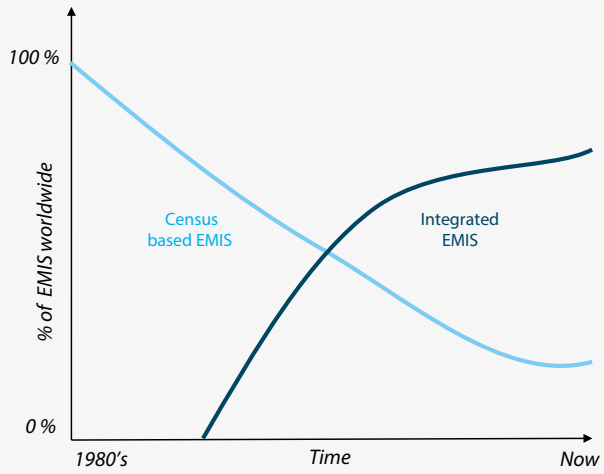
Digitalization drives the EMIS transformation from traditional, paper-based data collection to sophisticated digital systems, enhancing the accuracy, timeliness, and efficiency of the data production cycle. This transition enables real-time tracking of education data, providing key actionable insights to inform decision-making, and enhance the agility of educational management.

This **transformation towards digital systems**, when successfully implemented, has enabled more efficient data collection and data processing processes, as well as greater accuracy and timeliness of information to inform education management to support education practices

1 https://www.data4sdgs.org/blog/power-data-high-impact-initiative-launch

and learning outcomes. Traditional annual school censuses are being progressively complemented, and sometimes replaced, by systems operating based on real-time and individual-level data. While annual school censuses can only provide a snapshot of education systems at a particular point in time and using aggregate data at the level of classrooms or schools, more recent EMIS assign unique identifiers to teachers and students that, while ensuring confidentiality and data privacy, enable more accurate understanding of individuals and their progress throughout their educational journey. Furthermore, digitalization strengthens EMIS by enabling better integration of systems, facilitating real-time data exchange and coordinated applications for continuous monitoring and decision making. Overall, these trends reflect **a growing importance of real-time data-driven decision-making in education, supported by investment in the digitalization of data collection and processing, and the development of effective systems to manage and utilize this data** (see Figure 2 and Figure 3).

Figure 3: Evolution of EMIS over time



	Census based EMIS	Integrated EMIS
Data Frequency	Snapshots and time series	Snapshots and time series + Real-time
Data granularity	Aggregated	Aggregated + Disaggregated
Use cases	Strategic planning	Strategic planning + Operational management

Source: Author.

Globally, there are ongoing transformations to modernize information systems integrating new technologies. This comes from the need to go beyond traditional census and surveys and make use of new types and sources of data. New technologies like AI are revolutionizing the way to access, analyze and share data, with important implications for the future of knowledge, education and learning.

However, **the extent of digitalization varies significantly across regions**. A significant portion of countries still rely heavily on paper-based systems, which severely hamper their ability to implement real-time data tracking and informed decision-making. In **Sub-Saharan Africa**, this concerns 81% of countries, although 31% also use standalone electronic systems and 19% rely on online interfaces which are the most advanced digital systems.[2] In contrast, regions like **Central and Eastern Europe** have achieved complete digitalization, with 100% of countries utilizing online interfaces and none relying on paper-based data collection.

2 Countries can use different modes of data collection simultaneously, for example using paper-based forms in areas where access to the internet is limited, and online interfaces in areas with high connectivity.

Table 1: Mode of education data collection

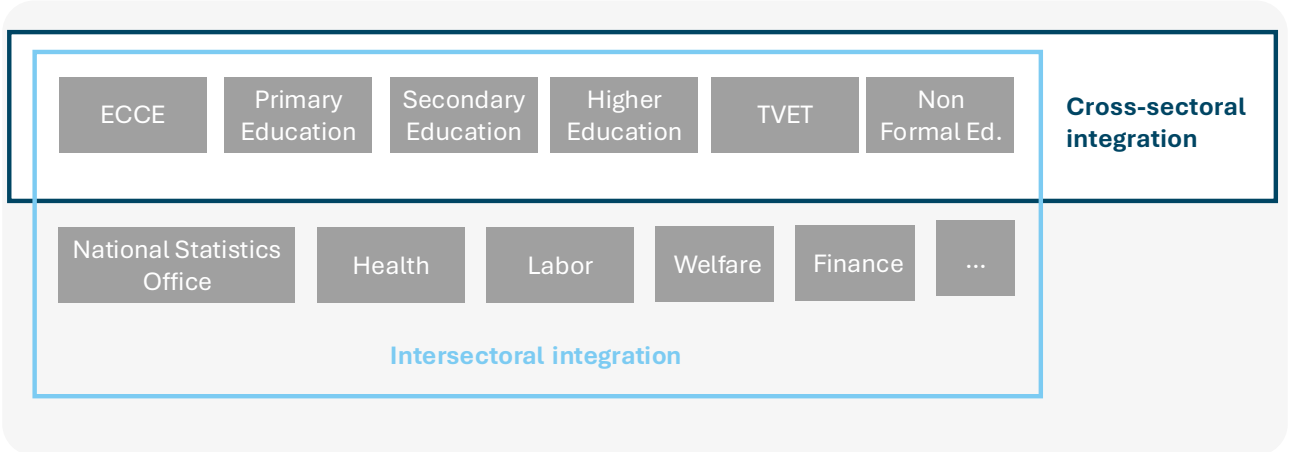
Regions	Paper (% of countries)	Standalone electronic mode (% of countries)	Online interface (% of countries)
Sub-Saharan Africa	81	31	19
Arab States	39	31	46
South and West Asia	33	22	78
Central Asia	33	33	67
East Asia	67	67	67
Pacific	75	75	25
Latin America and the Caribbean	42	38	71
Central and Eastern Europe	0	13	100
Average	53	36	51

Source: UIS, 2020a. p. 9. Available under CC-BY-SA 3.0 IGO

As digitalization advances, **interoperability** becomes a crucial factor in ensuring that digitalized systems are integrated into a broader and cohesive framework. Interoperability is another significant key driver of transformation in EMIS, enabling seamless data exchange between schools, ministries and other institutions related to education. By breaking down silos, it can support coordinated decision-making, improve service delivery, and enhance accountability across the education sector.

Interoperability can be fostered in two distinct ways: through cross-sectoral and inter-sectoral integration. Together, these support the holistic integration of national information systems, both across different sectors and within the multiple levels of education sector itself (see figure 4). **Cross-sectoral integration** involves creating a sector-wide EMIS architecture that encompasses all stages of lifelong learning, ensuring that data flows across early childhood education, primary and secondary education, higher education, and adult learning programmes. This approach requires consistent data management processes, ideally through unique identifiers and common data standards. In contrast, **intersectoral integration** facilitates coordinated policymaking across ministries and enhances data quality by enabling cross-validation between government databases and administrative levels, including in decentralized education systems. By connecting EMIS with other ministries and government agencies, such as health, labor, and social services, data —such as names and birthdates— can be retrieved directly, reducing discrepancies and eliminating manual entry errors. This ensures consistent, accurate data, which strengthens the reliability of educational statistics and improves overall data integrity and the accuracy needed for effective analysis and decision-making across educational and socio-economic sectors.

Figure 4: Cross-sectoral and intersectoral system integration



Source: Author.

A key enabler of both cross-sectoral and intersectoral integration is the implementation of **data standards** and **unique identifiers**.

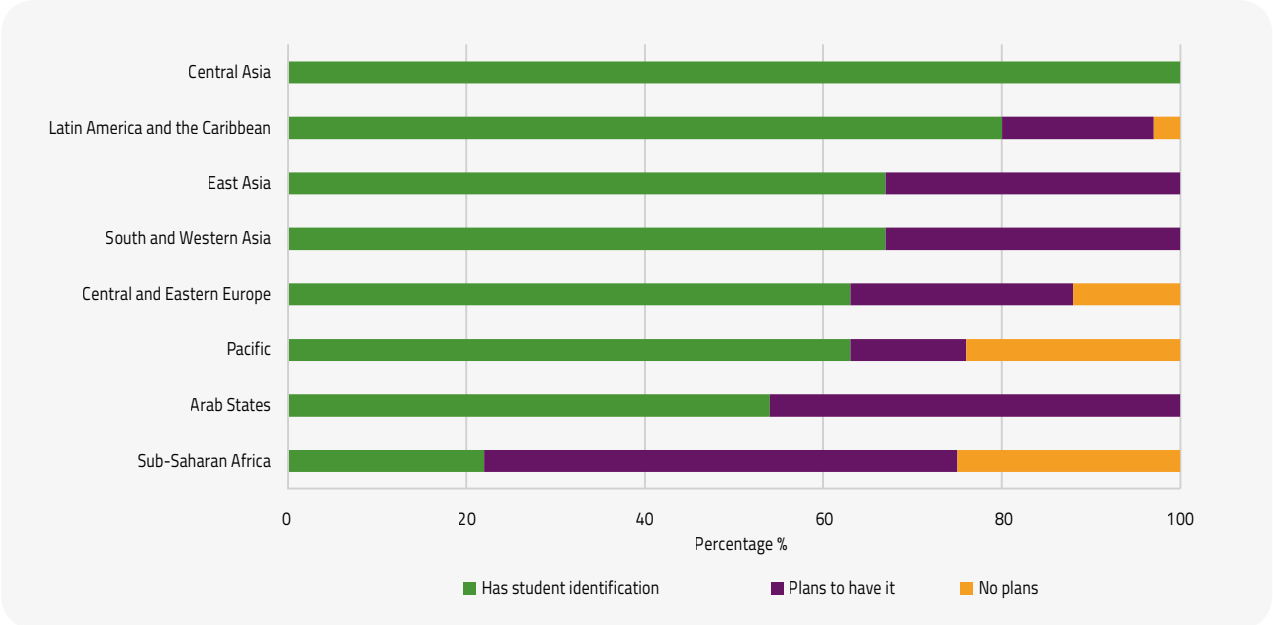
Data standards define how data is structured, enabling consistent interpretation and data exchange across systems. By establishing a set of common rules, data standards ensure that information entered into EMIS can be accurately stored, indexed, retrieved, and shared across various educational and governmental platforms. This consistency supports data interoperability, reliability, and long-term usability. Data standards in EMIS might specify:

- Field length (e.g., limiting a student's name to a certain number of characters)
- Data format (e.g., numerical for grades or textual for school names)
- Permissible values (e.g., gender options like male, female, or non-binary)
- Input order (e.g., entering dates as year-month-day)
- Standard codes (e.g., using standardized abbreviations for regions or programmes)

Beyond intersectoral and cross-sectoral integration, the establishment of data standards is key for inter-governmental interoperability. For example, European countries have collaborated on interoperability in higher education data management through projects such as EMREX, which supports data portability for student records under the Erasmus+ programme. This initiative facilitates the exchange of student information on enrollment, assessment, diplomas, and transcripts using common data standards, thereby enhancing the recognition of credits and previous studies across borders.

Unique identifiers (UIDs) for students, teachers and schools are also crucial for achieving effective integration and interoperability of EMIS. These identifiers enable consistent and accurate data tracking across various education levels and programmes, facilitating seamless data flow and enhancing the overall functionality of the system. Despite the importance of unique identifiers for integration, there are notable disparities in the implementation of unique identifiers across regions (see Figure 5). Countries in **Central Asia** and **East Asia** show significant adoption, while **Sub-Saharan Africa** faces substantial challenges with many countries lacking these identifiers, which limits their capacity to collect and utilize essential data effectively. Regions such as **Latin America and the Caribbean**, **South and Western Asia**, and the **Arab States** present a mixed situation, where some countries have adopted identification systems, but others are still missing these.

Figure 5: Percentage of countries with unique student identifiers, by region, 2020



Source: UNESCO. 2023. Global Education Monitoring Report 2023, p. 114. Available under CC BY-SA 3.0 IGO

When deploying unique identifiers for learners and teachers, the education sector is confronted with choosing between use of education specific identifiers managed and issued by the Ministry of Education or its EMIS and used only for education sector purposes, or the use of National Unique Identifiers typically issued by civil registration, national ID authorities, or population registries, and used across sectors, including education. Another approach is the hybrid one relying on both types. The following table compares the advantages and disadvantages of education-specific, national, and hybrid learner identifiers, drawing on country experiences to illustrate practical implications for policy and system design (see Table 2).

Table 2: Education-specific versus National Unique Identifiers (UIDs)

Model	Advantages	Disadvantages	Country Examples
Education-Specific UID *Faster, controlled by MoE, but siloed.*	• **Sector autonomy:** Education authorities have full control on issuance and updates. No dependencies on other ministries. • **Independent implementation:** UIDs can be implemented without waiting for national UID systems to be fully mature (i.e., where a proportion of the population lacks national IDs, which is common in fragile or low-income settings) • **Privacy shielding:** Learners' data stay separate from broader government registries, limiting cross-sector tracking and associated data protection risks. • **Flexibility:** UID system can be designed based on sector-specific needs (e.g., coding by school or year of entry).	• **Duplication:** Risk of multiple identifiers per individual in different government registries and associated interoperability challenges. • **Weak interoperability:** Difficulties in linking education data with other sectors' registry systems (health, labor, social protection, etc.) allowing for integrated service delivery. • **Higher maintenance burden:** Education authorities, and other sectors, need to manage and bear the cost of UIDs issuance and update (e.g. following birth, transfers, migration).	Nepal, Timor-Leste
National UID *Stronger for long-term governance and interoperability, but depend on broader government capacity.*	• **Strong interoperability:** Allows seamless data exchange across government and sectors (e.g. civil registry, health, labor market, social protection, etc.). • **Efficiency:** Reduces duplication of efforts around UIDs issuance, verification and management, allowing sectors to focus on data use. • **Better tracking across life-course:** Enables longitudinal follow-up across all levels of education and into employment. • **Supports whole-of-government approaches:** Facilitates integrated service delivery (scholarships, disability allowances, secure digital credentials, etc.).	• **Sectoral dependency on central authorities:** Education sector depends on the coverage, accuracy, and responsiveness of the national UID system, which can lead to delayed implementation. • **Coverage gaps:** Possible exclusion of vulnerable groups in countries where many children are unregistered at birth or lack IDs (e.g., population from rural areas, low-income settings, refugees). • **Privacy & surveillance concerns:** Linking education data to national UIDs increases data centralization and the risk of potential misuse. • **Policy/legal constraints:** Requires cross-ministerial agreements on data sharing and defining authorization levels for data access.	Estonia, Mongolia, Singapore

Hybrid approach *For systems transitioning from using education-specific UIDs to national IDs. The Hybrid approach can also be a relevant means to secure individual data privacy and confidentiality.*	• **Inclusive:** When used as a transition approach, education assigns a temporary education UID at enrolment, later replaced or linked to the national UID once available. This allows ensuring no child is left behind while building interoperability. • **Sector Autonomy:** Education authorities can independently implement individual UIDs without having to wait for the national ID system to be fully operational and universal. • **Gradual interoperability:** Mitigates exclusion risk while preparing for future interoperability. • **Enhanced privacy and security:** The use of education UIDs in most operations reduces unnecessary exposure of national IDs. An internal match with national IDs can exist but be accessible only to a limited set of authorized users, providing a layer of protection against data misuse.	• **Complex Identity Management:** Technical difficulties and administrative burdens can arise from multiple processes such as building interoperability layers (APIs, matching algorithms, data cleansing), managing reconciliation of multiple UIDs, and keeping track of centralized UID issuance for new groups of learners. • **Transition Risks:** During the transition period, some learners' IDs and data may be lost if their education UID is not successfully linked to the national one (e.g. due to inconsistencies in linking the different IDs). • **Legal and Policy Ambiguity:** Ministries must define whether the education UID is temporary or permanent. Lack of clarity may result in stakeholders using both in parallel for years, undermining harmonization.	Kenya, Uganda, Maldives

Source: Author.

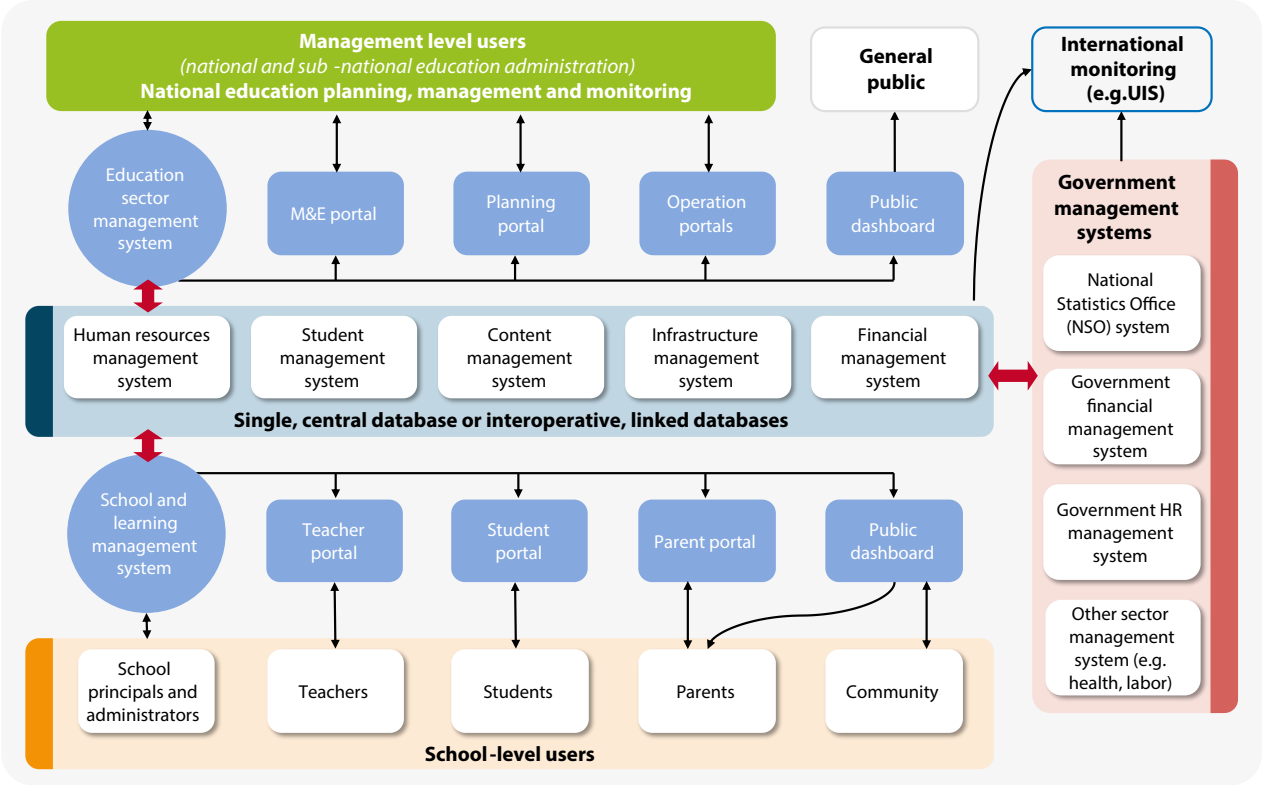
At the core of sector-wide integration is the establishment of centralized databases or networks of interoperable and connected databases, underpinned by unique identifiers for students, human resources and school infrastructures. These databases may consolidate information from various specialized management systems—including human resources, student management, content management, infrastructure, and financial management—allowing for streamlined data harmonization.

When combined with digitalization, integration and interoperability allow more accurate real-time data collection and more accessible data across multiple platforms. Accessibility enables continuous data sharing between different systems, allowing decision-makers to have up-to-date and comprehensive information for policy planning and programming. For instance, having real-time data on student performance, alongside infrastructure and resource availability, allows decision-makers to identify schools or regions where student outcomes are lagging. By cross-referencing this data with information on school infrastructure (e.g., classroom conditions, access to learning materials) and resource availability (e.g., teacher-student ratios, funding levels), decision-makers can pinpoint specific factors contributing to lower performance. This can then enable targeted interventions, such as reallocating resources to underperforming schools, hiring additional qualified teachers, or investing in infrastructure to improve learning environments. Real-time insights can also enable decision-makers to quickly identify emerging issues, such as declining student performance or resource shortages, and respond without delay. For example, if real-time data reveals a shortage of teachers in certain schools, authorities can immediately allocate additional teaching staff or necessary resources for hiring. Similarly, if student attendance drops, early interventions such as counseling or targeted support can be implemented. This timely action helps to prevent problems from escalating and ensures that interventions are tailored to the specific needs of schools.

Moreover, the integration of the EMIS with government management systems, such as the national statistics office system, government financial management system, and government HR management system, enhances coordination and coherence across different sectors. This interconnectedness allows for comprehensive

reporting and analysis. It also ensures that educational policies and initiatives are informed by data from multiple sectors and aligned with broader governmental and development goals, promoting coherence across sectors and levels of government (see Figure 6).

Figure 6: Example of an integrated sector-wide EMIS architecture

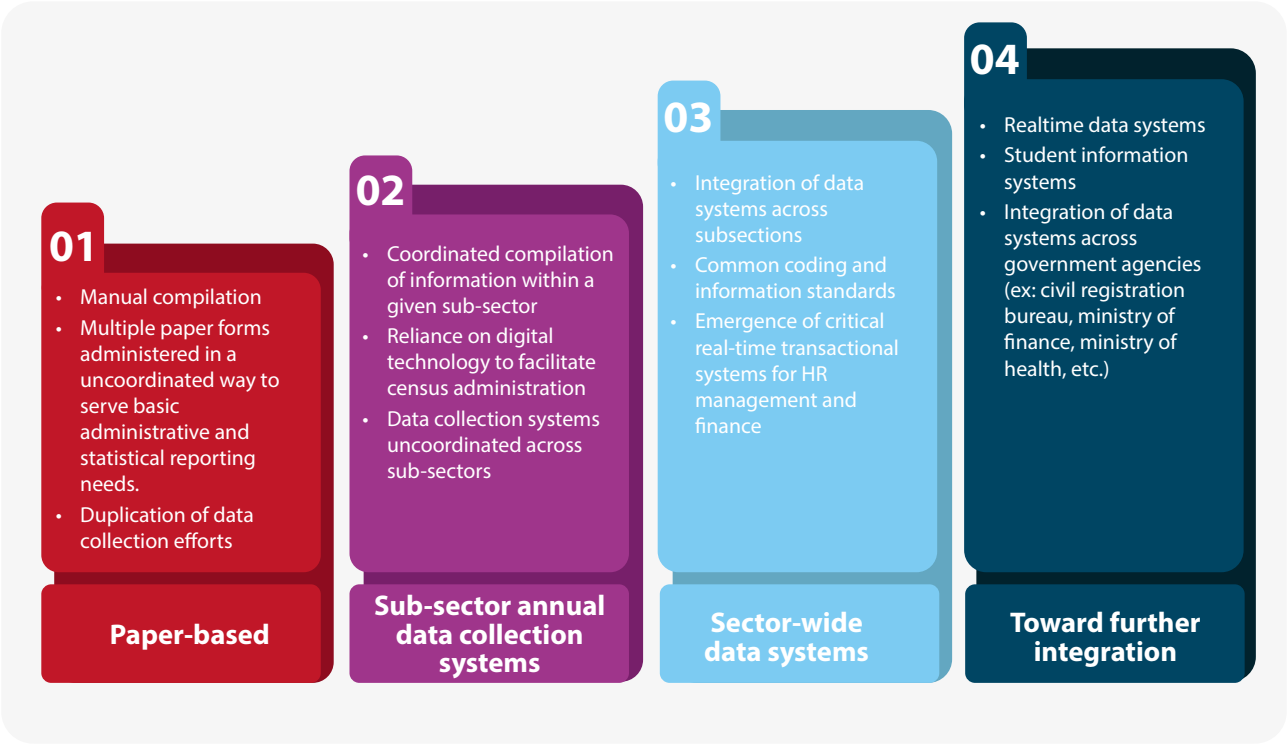


Source: Author.

Although the need for digitalized and integrated data systems for education management and planning has long been discussed, actions to meet this need have been slow. Globally, EMIS are at varying stages of development, ranging from paper-based setups to advanced integrated platforms (see Figure 7). In many countries, EMIS are still at an initial stage and play a purely monitoring and statistical role through the periodic collection and reporting of headcounts of students, teachers, infrastructures, and assets. This approach is often based on school census providing a yearly snapshot of the education system. At this stage, data collection is manual and used primarily for compliance, with minimal technological support.

As EMIS matures, systems begin to utilize digital technologies to collect and analyze data on instructional outcomes and administrative functions, fostering a culture of data-driven decision-making at both the local and central levels. In the most advanced systems, EMIS evolve into real-time, integrated platforms that connect various education and government sectors, offering a comprehensive and dynamic view of student progress and education system performance. For these systems, the information is captured and used in real time and at a much more granular level than with school censuses. This approach can provide timely insights for daily management and monitoring of ministry's operations at distinct levels of education administration. The transactional nature of such information systems helps to support and inform student learning and resource management.

Figure 7: Diversity of EMIS



Source: Author.

The UNESCO-GPE International Conference on EMIS, held in Paris in April 2018, highlighted the need for more comprehensive, adaptable, and context-sensitive approaches to EMIS diagnosis. The conference brought together a diverse array of stakeholders, including national governments, non-profit organizations, private enterprises, and international organizations, to discuss the challenges faced globally in deploying effective EMIS. A key takeaway from the discussions was the importance of strengthening national capacities in EMIS through systematic diagnosis, assessments, and continuous monitoring to enhance data-driven education management. Without these foundational elements, countries cannot effectively leverage data for informed decision-making, policy formulation, or the efficient management of education systems, ultimately hindering progress toward equitable and quality education for all.

Building on the momentum generated by this conference, UNESCO and its partners continued to emphasize the importance of strengthening EMIS globally. This commitment was crystallized in the publication "*The Role of Education Management Information Systems in Supporting Progress Towards SDG 4*" (UNESCO, 2020), which highlights key recommendations for enhancing EMIS capabilities. Among these recommendations were the need for countries to undertake EMIS diagnosis to better understand their system needs and bottlenecks. The publication also recommended adopting a holistic and sustainable approach to EMIS development, including through strategic plans that define common standards and anticipate development and operational costs.

This agenda was further reinforced at the UIS Conference on Education Data and Statistics held in 2024, which convened governments, development partners, and technical experts to take stock of global progress on education data. A dedicated session on Sound Data for Good Governance[3] underscored the critical role of robust EMIS in advancing SDG4 monitoring, strengthening national statistical systems, and ensuring that data governance frameworks support both equity and resilience in education systems. The discussions reaffirmed the need for adaptable diagnostic instruments to help countries identify weaknesses, set priorities, and implement reforms aligned with their policy contexts.

3 https://www.unesco.org/en/education-management/data-governance

In response to the increasing number of requests from different countries, UNESCO recognized the necessity of developing a diagnostic tool to address the diverse needs highlighted in the recommendations and emerging challenges. Thus, the EMIS Progress Assessment Tool for Education Transformation (EMIS-PATT) was developed by UNESCO headquarters in collaboration with UNESCO-IIEP and launched in 2023 as the first assessment tool under the organization-wide System Transformation for Effective Education, Training, and Lifelong Learning Reimagination (STEER) framework.

The development of the EMIS-PATT builds on, and complements, a legacy of other EMIS diagnostic and assessment instruments that have been designed and applied over the past two decades.[4] These tools differ widely in scope and orientation: some are **global** in reach while others are tailored to specific **regions**; some are primarily designed for **benchmarking** and international comparison, while others are more focused on identifying **areas for improvement**. Their conceptual foundations also vary, ranging from tools that address a **single dimension** of EMIS to more **holistic** frameworks that encompass multiple factors shaping EMIS governance, implementation, functionality, and use. Likewise, their sectoral coverage can be specifically **focused on education**, or broader, cutting across **several public sectors**. Methodologically, assessment approaches also differ between **open-ended** questionnaires, **binary** indicators and **multi-level maturity scales**. Finally, implementation modalities vary as some require close collaboration with **international experts** or **peer review** among countries, while others can be used as **self-assessment** tools.

Despite the progress made with EMIS diagnostic frameworks, their use has so far been relatively limited. According to a UNESCO-UIS study (2020), the Ed-DQAF was the most widely applied EMIS assessment in 2020, used by 28.2% of countries, while the World Bank's SABER-EMIS had been implemented in 13 countries by 2019 (GPE, 2019b). These figures suggest that much potential remains for countries to undertake EMIS diagnostics that can inform reform efforts and drive system transformation.

The EMIS-PATT was developed to address this gap and the need for diagnostic approaches that are both comprehensive and practical. It includes indicators built on **multi-scale progress levels** and can therefore be used not only for diagnosis but also for ongoing **management and monitoring**. The tool provides intermediary benchmarks to show where systems stand at different points in time, offers clear guidance on the steps needed to progress, and translates findings into priorities, strategies, and costed action plans. Its **holistic** perspective covers the full spectrum of EMIS, from governance and institutional processes to infrastructure, data collection, and data use. It was designed to be a light and adaptable tool, allowing for different modalities of application, from quick **self-assessments** to more **comprehensive analysis** undertaken with international experts. The tool is **globally applicable** yet adaptable to country contexts, and it is **tailored** specifically to the complexity of **EMIS**, offering a level of granularity that enables countries to target reforms with precision.

The following chapter presents the EMIS Progress Assessment Tool for Transformation (EMIS-PATT), outlining its conceptual foundation, diagnostic architecture, and the integrated framework that links assessment with strategic and operational planning. The implementation framework and application methodology are also described to provide Member States with practical guidance on leveraging EMIS-PATT both as a diagnostic instrument and as a vehicle for systemic reform to formulate coherent EMIS improvement strategies, strengthening institutional capacities, and aligning EMIS development with national education management priorities.

4 The most used diagnostic frameworks for EMIS include SABER-EMIS developed by the World Bank (Systems Approach for Better Education Results Education Management Information System, 2014); the AU Norms and Standards Framework for EMIS developed by the African Union (2021); the Education Management and Information Systems (SIGED) from the Inter-American Development Bank (2019), the AdAMM developed by UNICEF (Administrative Data Maturity Model, 2021), and the Ed-DQAF (Education Data Quality Assessment Framework), developed by the World Bank and the UNESCO Institute for Statistics in 2003 based on a tool initially developed by the IMF.

II. EMIS-PATT

As countries continue to confront complex and evolving challenges in managing education data systems, coupled with the growing demand for robust EMIS and the limited applicability or uptake of existing diagnostic tools, the need for a more integrated, adaptable, and actionable framework has become increasingly evident. In response to this need, UNESCO developed the EMIS-PATT, **a strategic planning framework** designed to support countries diagnose the maturity of their EMIS and initiate systematic reforms.

This need is rooted in the inherent complexity of education system management, which involves navigating multi-level governance structures, institutional arrangements, and dynamic data ecosystems. Education management frameworks involve a broad constellation of actors, processes, and tools that collectively support the functions of policy planning, implementation, monitoring, and evaluation. In this context, system thinking becomes essential, not only to understand how the various elements interact and influence one another, but also to ensure that education policy reforms are coherent across levels, scalable over time, and sustainable in practice.

Systems thinking approach is critical for the development and enhancement of EMIS, given that these are embedded within broader education governance environments and are shaped by a range of interdependent factors including legal mandates, institutional roles, available human resources, standards and policies, technological infrastructure, and operational processes. Without alignment across these components, EMIS risk becoming fragmented platforms that do not generate the integrated, timely, and actionable data required for effective planning and decision-making. System thinking enables a more holistic approach to EMIS design and assessment, uncovering interdependencies, identifying bottlenecks, and supporting coordinated improvements across the system.

EMIS-PATT incorporates a systems approach to assess EMIS maturity across a comprehensive set of interrelated dimensions and subdimensions. The tool goes beyond IT functionalities and services to encompass legal and policy frameworks, institutional mandates, accountability, organizational management capacities, and the use of data in education planning, monitoring, and evaluation. This approach enables countries to identify systemic constraints beyond infrastructure or digital service delivery. This includes outdated legislation, misaligned policy frameworks, gaps in institutional management, limited financial and human resources, and inadequate processes or insufficient capacities for data collection, validation, analysis, and use across multiple levels of education management.

By incorporating a systems approach, EMIS-PATT provides a holistic assessment of EMIS maturity, emphasizing that progress in one area is inherently linked to, and often contingent upon, advancements in others. It highlights how these dimensions—when viewed as interconnected components of a unified system—collectively influence the overall maturity, functionality, and fitness-for-purpose of EMIS in supporting effective education sector management.

Importantly, EMIS-PATT also serves as a powerful **tool for capacity development** within Ministries of Education. By engaging national stakeholders throughout the diagnostic process, the toolkit promotes institutional learning, cross-departmental dialogue, and greater ownership of EMIS reform agendas. It strengthens national capacities to critically assess EMIS functionality, interpret system performance data, and design evidence-informed improvements. Moreover, the structured reflection on institutional arrangements, workflows, and technical standards enhances not only individual competencies but also organizational capabilities, thereby contributing to a more professionalized, empowered, and accountable EMIS workforce. This approach supports long-term sustainability by embedding capacity development directly into the reform process.

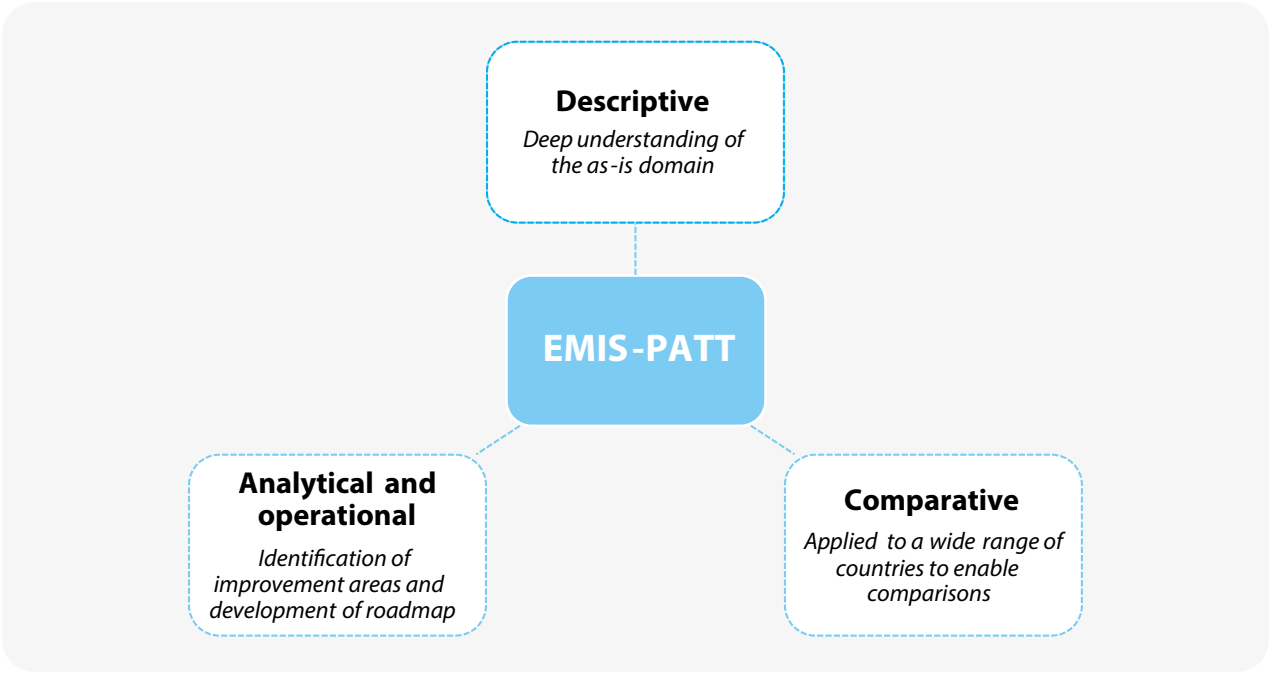
The insights generated through the diagnostic process offer policymakers an evidence base for prioritizing reforms and allocating resources to strengthen specific EMIS components, in alignment with national digital governance strategies and broader efforts to develop integrated public sector information systems. Building on this foundation, EMIS-PATT supports the development of integrated, coherent, and responsive EMIS by promoting alignment across legal, institutional, technical, and operational domains.

In this regard, beyond its diagnostic function, EMIS-PATT also serves as **a strategic policy formulation tool**. It supports the translation of assessment findings into sequenced, costed, and actionable reform plans, offering a realistic, context-specific roadmap to guide decision-making for EMIS enhancements to develop fit-for-purpose, sustainable, and future-ready education data systems aligned with long-term education governance objectives. By outlining practical pathways for EMIS improvement, the tool enables countries to improve the quality of education data management and promote greater policy coherence by better linking data and policy. Ultimately, EMIS-PATT is expected to enable countries to strategically strengthen their national EMIS, moving closer to the ideal of a smart system[5] that ensures efficient, transparent, and effective governance of the education sector.

In addition to guiding reforms, EMIS-PATT can be used as a **monitoring tool** to track progress in education system development over time and inform the prioritization of investments. When applied periodically, the toolkit allows Ministries of Education and their partners to assess how system maturity evolves, evaluate the effectiveness of past interventions, and adjust strategies based on emerging needs or shifting national priorities. This function makes EMIS-PATT particularly relevant for ongoing sector dialogue, results-based financing frameworks, and adaptive implementation processes where evidence-based reallocation of resources is essential for impact and sustainability.

The EMIS-PATT is designed to function as a **descriptive**, **analytical**, **operational**, and eventually **comparative tool** (see Figure 8). While these roles may appear distinct, they reflect progressive stages in the application of the tool. The descriptive function provides insights of the "as-is" situation, while the analytical and operational layers offer guidance on enhancing progress levels and facilitating the creation and implementation of roadmaps and action plans for improvement. As the model is implemented across various countries in diverse contexts and regions, the tool also allows conducting valid comparisons.

Figure 8: Features of the EMIS-PATT



Source: Author.

5 A smart system is one that incorporates functions of sensing, actuation, and control in order to describe and analyze a situation and make decisions based on available data in a predictive or adaptive manner. In the EMIS context, smart means a system that functions in the same way by contributing to smart actions toward student learning and system improvement.

Given its features, the tool offers several distinctive contributions to strengthening education management and information systems:

1. **Systemic and comprehensive assessment framework:** The tool evaluates EMIS holistically across critical dimensions—governance, management, technical architecture, and data processes—by examining not only IT infrastructure, but also the enabling environment necessary for system operation, institutional processes, human resource capacities, and the effective use of the EMIS for planning, monitoring, and decision-making. For each of these aspects, the tool provides stepwise progress levels that help countries understand both where they stand and the concrete steps needed to advance.
2. **Strategic and operational planning:** EMIS-PATT is not limited to diagnosis and compliance purposes but also aids in translating findings into strategic vision setting and operational planning. The tool facilitates the diagnosis of the current state of the system, the identification and strategic prioritization of improvement areas, and the development of strategic visions and operational plans for system transformation. This process results in a sequenced and costed reform roadmap, ensuring that proposed actions are both practical and trackable. The tool also provides a framework for monitoring progress toward EMIS reform objectives.
3. **Global applicability and benchmarking:** EMIS-PATT is developed as a universal framework designed for global application, enabling its use across diverse educational contexts. It allows for global benchmarking and scalability, supporting countries in assessing their systems against a common maturity framework while benefiting from comparative insights to inform national planning and reform processes.
4. **Lightweight and resource-efficiency:** The tool is structured to be administered directly by ministry officials, minimizing reliance on external technical assistance. It is designed to require limited resources, in terms of assessment time and personnel, while still enabling a comprehensive evaluation with the depth necessary to generate strategic insights for diagnosis and planning. At the same time, its participatory approach engages stakeholders through workshops and focus groups, helping to validate findings, strengthen capacities, and build ownership of the EMIS transformation agenda.
5. **Capacity development:** Grounded in the principle of country-led assessment, EMIS-PATT provides a user-friendly framework enabling Member States to conduct self-assessments using their own resources through defined processes. The tool supports the organization of national dialogues on education management, facilitates the formalization of institutional collaboration, and strengthens national capacities and awareness of the critical role of data and evidence in education planning, monitoring, and governance. Through the active engagement of national staff in the assessment and decision-making processes, EMIS-PATT acts as a catalyst for policy dialogue among key ministerial officials, ensuring coherence across sub-sectors, and promoting the formulation of aligned and context-specific policies to advance EMIS maturity and drive system-wide transformation.

Conceptual framework and diagnostic architecture of EMIS-PATT

Through its systems thinking approach, the EMIS-PATT analytical framework has been developed to capture the full complexity of EMIS, recognizing them as embedded components of broader institutional and governance ecosystems rather than solely technological platforms. Building on this understanding, the framework systematically assesses not only technological infrastructures but also institutional arrangements, legal and regulatory frameworks, organizational capacities, operational processes, financial sustainability, human resource development, the full data lifecycle and its use. Together, these dimensions are essential for the effective functioning, utilization, and long-term sustainability of EMIS.

The holistic perspective of EMIS-PATT acknowledges that the performance, sustainability and resilience of EMIS are intrinsically linked to the strength of the enabling environment in which they operate, and that technological solutions can only achieve their intended objectives when supported by coherent institutional mandates and policy frameworks.

In line with this approach, EMIS-PATT offers an integrated diagnostic model that evaluates both the

technical functionalities of EMIS and the systemic conditions underpinning their development, operation, and transformation. The tool is structured around four critical dimensions: **(I) governance, (II) management, (III) technical architecture, and (IV) data and information products** —which are further broken down into twelve subdimensions considered essential for the establishment, functionality, and sustainability of national EMIS (see Figure 9).

The rationale for the selection of these four dimensions is as follows:

- **EMIS governance**

The effective functioning and sustainability of EMIS require a supportive enabling environment that provides clear institutional legitimacy, strategic alignment, and integration within national digital and education governance frameworks. This environment must be anchored in coherent legal mandates and policy instruments that guide EMIS implementation and ensure alignment with broader public sector reforms. Moreover, EMIS must be structured to meet cross-sectoral information needs and embedded within mechanisms that enable coordination across ministries and agencies. The availability of adequate, planned, and earmarked financial resources—accompanied by transparent and accountable monitoring processes—is essential to ensure continuity, responsiveness, and long-term viability. In recognition of these foundational requirements, the policy and institutional ecosystem within which EMIS is developed and operated is framed as the **governance** dimension.

This dimension assesses the presence and coherence of legal, policy, and strategic frameworks that define the institutional positioning of EMIS; examines the degree of alignment with national digital strategies and education sector plans; and evaluates the existence and effectiveness of multisectoral collaboration and coordination arrangements. It also reviews whether financing for EMIS is predictable, adequate, formally allocated through budgetary processes, and subject to regular monitoring to ensure efficient resource utilization and sustainability of operations.

- **EMIS management**

Effective EMIS implementation requires clearly defined institutional arrangements and operational clarity across administrative levels. The ability to sustain system operations and drive transformation depends not only on legal mandates or infrastructure, but also on whether roles and responsibilities are explicitly assigned, coordination mechanisms are in place, and data-related processes are embedded in routine institutional practice. Ensuring that institutions responsible for EMIS are adequately staffed—with personnel who possess the necessary technical and analytical skills—and supported by continuous capacity development strategies is equally essential. The quality of management structures directly influences the efficiency, consistency, and long-term resilience of EMIS. Considering these prerequisites, the organizational, procedural, and human resource-related enablers of EMIS functionality are conceptualized as the **management** dimension.

This dimension assesses the clarity of institutional mandates and the extent to which organizational roles and functions for EMIS are defined and mapped across governance levels. It examines the presence and effectiveness of operational processes governing the data lifecycle—from collection and processing to validation, dissemination, and use—and considers whether institutional workflows are formalized and monitored. In addition, this dimension evaluates human resource planning, the adequacy of staffing levels, the qualifications and technical competencies of EMIS personnel, and the existence of structured training and professional development strategies aimed at sustaining institutional knowledge and improving system performance over time.

- **EMIS technical architecture**

The capacity of EMIS to deliver timely, accurate, and secure data is inherently dependent on the underlying technical architecture. As the operational foundation of the system, the technical infrastructure must be designed to support data management functions across all administrative levels, provide stable and scalable services, and ensure interoperability with other digital systems. The ability to integrate EMIS into national digital service platforms and public sector information systems requires not only technical adequacy, but also adherence to recognized standards, protocols, and security practices. Recognizing this foundational role, the digital infrastructure and service environment that enables EMIS functionality is captured within the **technical architecture** dimension.

This dimension assesses the availability, distribution, and adequacy of core infrastructure, including hardware, software, hosting environments, and connectivity across decentralized administrative units. It reviews the functionality and coverage of digital services developed to support EMIS operations, and evaluates the presence of IT standards, data exchange protocols, cybersecurity safeguards, and mechanisms for ensuring system scalability and continuity. The dimension also considers the degree to which EMIS architecture is interoperable with other sectoral or national information systems, and whether technical assets are inventoried, secured, maintained, and strategically expanded to support evolving system demands.

- **EMIS data and information products**

The primary function of EMIS is to generate and deliver data that is fit-for-purpose, supporting education policy planning, implementation, monitoring, and evaluation. The credibility and relevance of EMIS depend on the quality, completeness, and timeliness of the data it produces, as well as on the institutional capacity to transform raw data into actionable information for decision-making. Data must meet national and international reporting needs while also enabling real-time insights for education system performance management. Recognizing that data quality and use are the most visible indicators of EMIS effectiveness, the core operational and output capacities of the system are captured within the **data and information products** dimension.

This dimension assesses the scope and frequency of education data collection efforts; the methods and tools used to ensure data quality, including validation, verification, and metadata management; and the extent to which datasets are disaggregated, complete, and standardized. It further examines the generation and accessibility of data products, the integration of data use into planning and monitoring cycles, and the institutional practices that support a culture of evidence use. The dimension also considers whether data products are responsive to stakeholder needs at different governance levels and leveraged for planning and monitoring efforts.

Figure 9: The EMIS-PATT architecture (dimensions and sub-dimensions)

Source: Author.

The diagnostic framework of EMIS-PATT is designed with a multi-layered architecture to enable a detailed assessment of EMIS functionality and the responsiveness of data systems to education policy, planning, and management needs. Each of the four core dimensions—governance, management, technical architecture, and data and information products—is built on three subdimensions, capturing the essential thematic areas necessary for the system to operate effectively. These subdimensions are assessed through a set of indicative questions, each presented with five predefined progress levels that represent a progressive scale of development and performance.

A total of **147 diagnostic questions** are identified across the four dimensions: 26 under governance, 33 under management, 26 under technical architecture, and 62 under data and information products. Each question is directly linked to one subdimension and is designed to examine specific system characteristics, and responses are recorded by selecting the maturity level that most closely reflects the current condition of the system.

A progress level is determined for each subdimension by aggregating the scores of its respective questions, while maturity levels for broader dimensions are derived from the three subdimensions they comprise. This multi-level structure allows for analysis at both granular and aggregated levels, supporting informed decision-making on priority areas for reform and investment. All dimensions are accorded equal analytical weight, based on the principle that weaknesses in any one area can significantly hinder the ability of EMIS to function effectively and sustainably. The architecture reflects recognition that balanced development across institutional, technical, managerial, and data domains is essential to ensuring a responsive and fit-for-purpose education management information system for planning and management purposes.

Progress levels

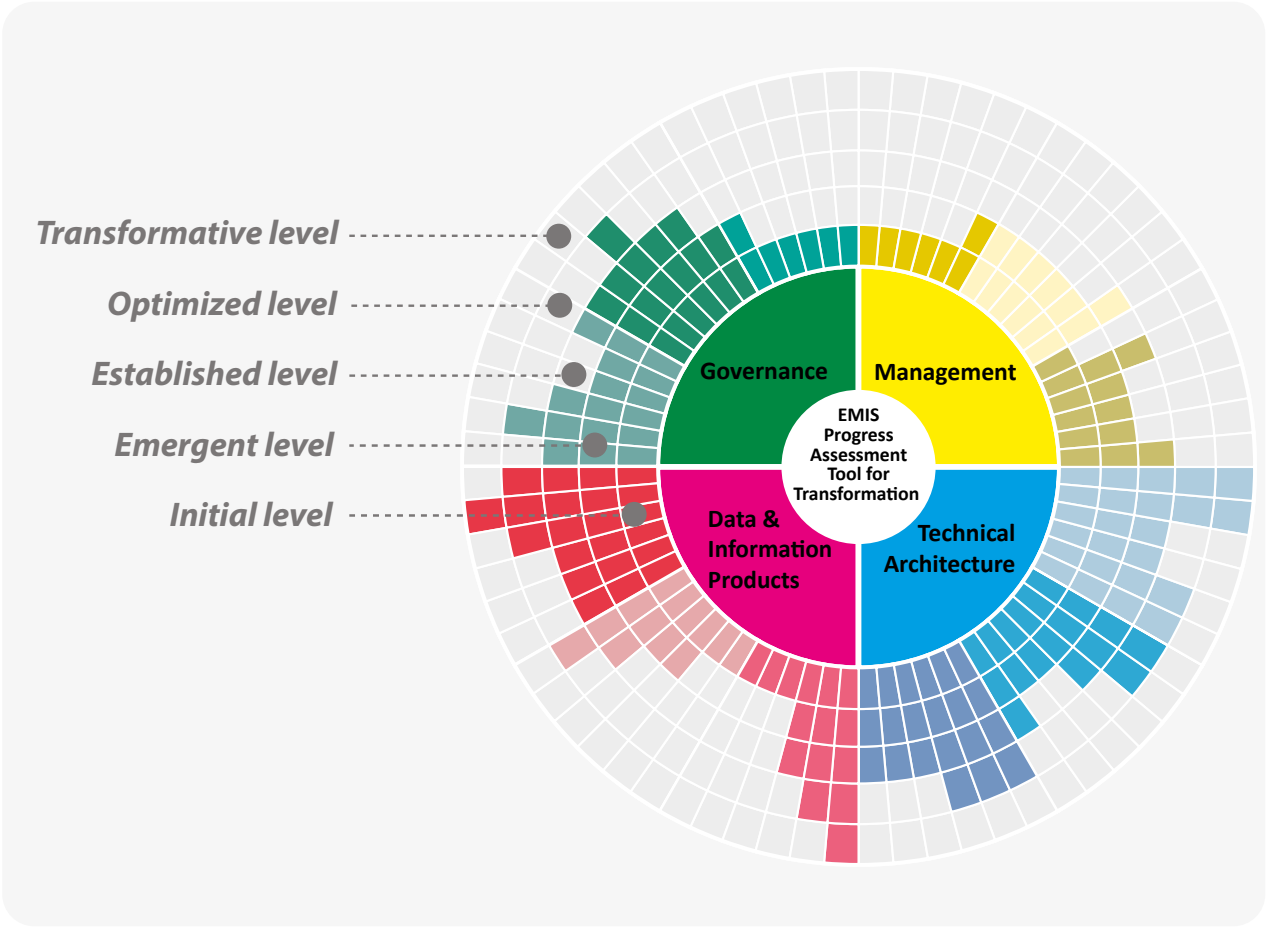
Within the EMIS-PATT framework, each diagnostic question is assessed according to **five defined levels of maturity**, which reflect the extent to which a specific feature, structure, or process has been developed and institutionalized for EMIS. These levels are calibrated to capture the continuum from minimal or non-existent functionality to highly adaptive and integrated practices. Maturity is assessed at the question level (Figure 10), aggregated at the subdimension level, and further synthesized to provide an overview of maturity at the dimension and system-wide levels. This multilayered framework, built around defined progress levels, enables countries to assess their current state for each indicative question and identify capacity gaps at disaggregated levels, as well as at the subdimension and dimension levels (Figure 10 and Figure 11). Each indicative question includes a description of the subsequent maturity level, allowing countries to identify the specific elements and conditions required to advance from one level of maturity to the next, and prioritize actions for system improvement.

The five levels of maturity are described as follows:

- The **Initial** level indicates that the assessed feature or element is either non-existent or present only in a rudimentary form. At this level, the foundational structures required for the relevant dimension or sub-dimension are largely absent, thereby hindering EMIS' capabilities and rendering the system minimal or non-functional. The feature or element is in its infancy and requires substantial foundational development to establish even basic functionality.
- The **Emergent** level denotes that there is initial evidence of development, with some features or elements in place. However, these remain in a formative stage. While certain structures or processes may exist, they are not yet operational, consistent, or reliable. The system has initiated efforts to address the requirements of the relevant dimension or sub-dimension, but considerable advancement is required to establish stability, reliability, and functionality. This level reflects preliminary progress that has not yet matured into an established or institutionalized component of the EMIS.
- The **Established** level reflects a stage where the assessed feature or element is functional and consistently applied across the relevant parts of the EMIS. The system meets routine operational needs, with key processes and mechanisms in place. Nonetheless, performance may be constrained by limited scalability, efficiency, or integration. Further enhancement is typically needed to ensure the system is sufficiently responsive to more complex educational management needs and can adapt to evolving demands or cross-sectoral requirements.

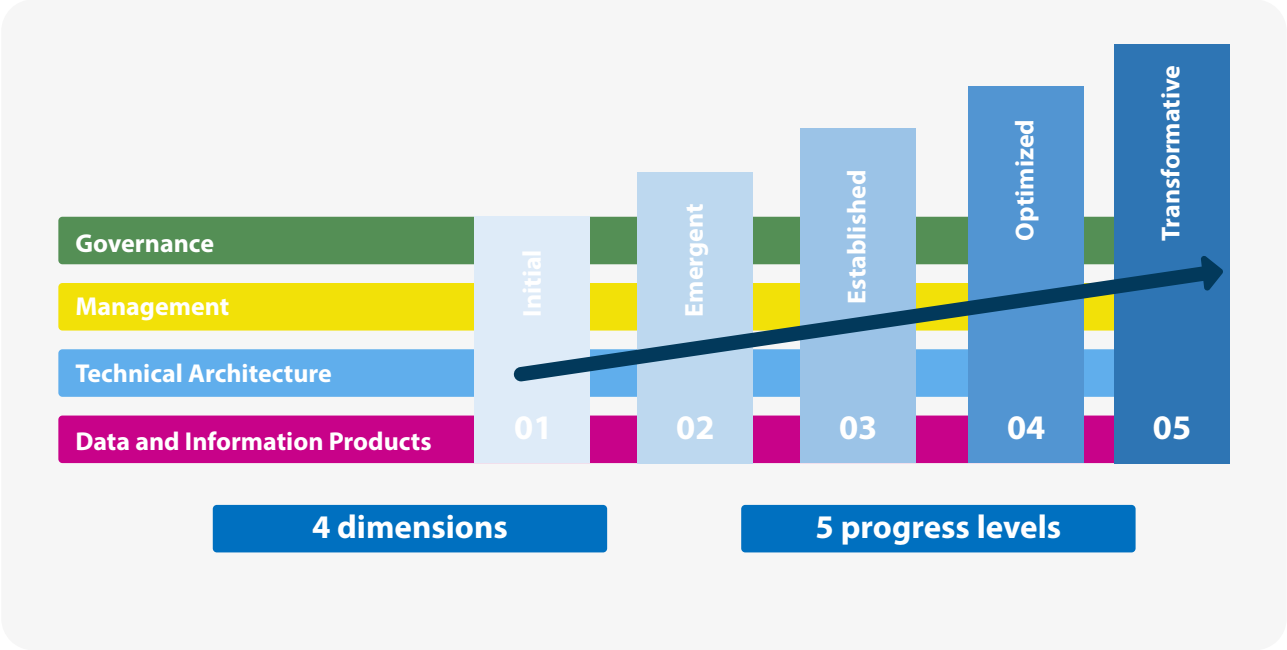
- The **Optimized** level represents a more advanced and consolidated stage of development. At this level, the assessed feature or element is not only operational but also embedded in institutional routines with a high degree of consistency and effectiveness. Mechanisms for review, refinement, and adaptation are in place, and practices are guided by formal standards, methodologies, or frameworks. The system performs reliably, efficiently, and at scale, with clear linkages to education policy, planning, and service delivery. While not necessarily innovative, operations at this level are structured to support continuous improvement and sustainability.
- The **Transformative** level is a state in which the assessed feature or element is fully institutionalized, forward-looking, and strategically aligned with broader national or sectoral reform agendas. The system is capable of leveraging innovation, cross-sectoral collaboration, and adaptive mechanisms to meet emerging challenges and opportunities. Practices at this level reflect strategic foresight, system-wide coordination, and a capacity for iterative learning contributing not only to system performance but also to the overall transformation of education governance and management.

Figure 10: EMIS-PATT progress levels (question-level)



Source: Author.

Figure 11: EMIS-PATT progress levels and pathway for transformation (dimension-level)



Source: Author.

Scoring and grading methodology

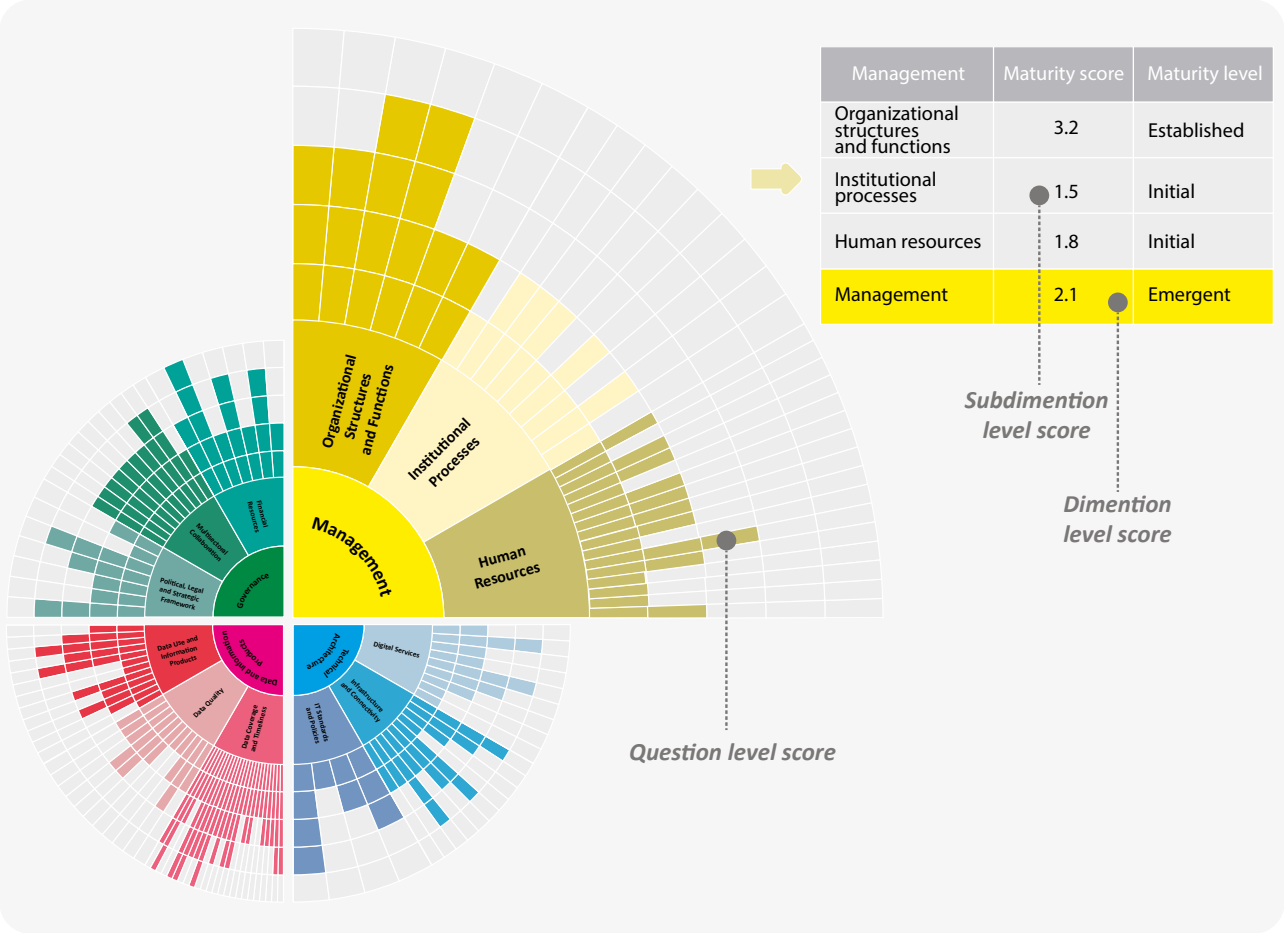
The scoring and grading methodology employed in EMIS-PATT is anchored in its systems thinking perspective, recognizing that EMIS maturity is contingent on the coherence and interdependence of institutional, technical, managerial, and data-related capacities. This systemic perspective is reflected in the diagnostic architecture, which treats each of the four dimensions as equally critical pillars for achieving a fully functional and resilient EMIS. Accordingly, the framework applies an equal weighting approach across dimensions, thereby avoiding hierarchical bias and ensuring that no dimension is over- or underrepresented in the overall assessment.

At the subdimension level, scores are derived by calculating the arithmetic mean of the ratings assigned to each indicative question. The average score for the subdimension is then aggregated with those of the remaining subdimensions within the same dimension to generate the composite score for that dimension (Figure 12). Finally, the system-wide maturity level is calculated as the mean of the four dimensions' scores, offering a quantifiable representation of the overall capacity of the EMIS to support sector planning, management, and evidence-informed policy implementation.

Although the maturity scales are designed to be mutually exclusive, there may be instances where a system exhibits partial features of a higher level without fulfilling all requirements. In such cases, assessment teams are advised to assign the lower scale to maintain the analytical integrity of the maturity assessment.

This methodology will continue to evolve to incorporate refinements such as the identification of key "prerequisite" indicators, i.e., critical conditions that must be met before a system can advance to a higher maturity level. Future applications might also explore weighted scoring models at the subdimension level.

Figure 12: EMIS-PATT scoring methodology (question, subdimension and dimension-level)



Source: Author.
Note: Scores in figure are illustrative

Implementation framework and modalities

The EMIS-PATT is designed to accommodate a wide range of national contexts and planning objectives. Countries may apply the tool to conduct a diagnostic assessment of the current state of their EMIS, focusing on the identification of systemic constraints and improvement areas. They can also undertake a more comprehensive process that links the diagnostic results to strategic and operational planning for system enhancement.

Depending on specific country needs, EMIS-PATT may be used to inform national planning and funding processes; develop action plans for EMIS strengthening; align EMIS with broader education sector strategies and national data governance frameworks; improve coherence between national and subnational education information systems; monitor EMIS implementation progress; define short- and medium-term targets; and generate evidence to support policy development and decision-making related to EMIS reform and investment.

To accommodate this diversity of applications, EMIS-PATT provides three distinct implementation modalities: **Self-assessment**, **Fast-track evaluation** and **Comprehensive analysis** (see Table 3). All three modalities are country-driven and aligned with the principle of national ownership, though they differ in their expected outputs, resource requirements, assessment processes, scope of analysis, and the level and type of technical support from UNESCO.

Countries may refer to the criteria outlined in **Annex I** to identify the implementation modality most appropriate to their needs and context. This may help in structuring the assessment and planning process at the outset and in aligning expectations related to scope, timeline, and level of technical engagement. To support country-level decision-making and planning, the three implementation modalities are described below in detail.

Table 3: EMIS-PATT implementation modalities

Implementation modality	Self-assessment	Fast-track evaluation	Comprehensive analysis
Reporting type	None	Factsheet Report	Analytical Country Report
Duration	2 weeks or more	5 weeks	8 weeks
Role of implementing country	Independent use of the assessment	Leads the assessment	A joint iterative process involving both the country and UNESCO in assessment, ensuring a rigorous and in-depth analysis
Support from UNESCO	Addresses arising questions or requests for clarifications	Provides technical guidance to ensure quality assurance	
On-site mission of UNESCO experts	No	No	Yes
Main types of use	Identifying ways for improvement within national EMIS	Improving overview on the state of EMIS and identifying areas for system-wide improvement	Detailed understanding of the state of EMIS, prioritizing areas for improvement and formulating a clear roadmap for system transformation

Source: Author.

Implementation modality 1: Self-assessment and monitoring

This modality represents the independent application and use of the EMIS-PATT by countries. It may involve a rapid review of available data on the most critical elements of the EMIS, a focused assessment of specific dimensions or subdimensions, or a more in-depth internal evaluation conducted by dedicated staff or external consultants, possibly in collaboration with external organizations. Under this modality, UNESCO can provide support in addressing any arising questions or clarifications related to EMIS-PATT and its findings. While a basic self-assessment process is estimated to be completed within a two-week period, this can evolve depending on countries' preferences and level of engagement.

Unlike other modalities, the self-assessment does not necessarily result in a formal report. It is particularly suitable in contexts requiring urgent decision-making, such as in high-stakes environments with limited time and resources. It can also be useful for countries that aim for a customized application of the tool and prefer to keep the assessment internal, provided they have the necessary human resources and expertise to carry it out. The process does not involve any on-site missions from UNESCO experts.

Implementation modality 2: Fast-track evaluation

Designed to be completed within five weeks, this modality provides a high-level yet structured assessment, offering a broad understanding of the EMIS landscape within a limited timeframe. Led by the country with UNESCO providing technical support and quality assurance, the process is conducted primarily through online sessions facilitated by the UNESCO Technical Team.

The key output of this modality is a **Factsheet Report**, which presents a snapshot of EMIS maturity through visual data representations and narrative analysis (see Table 4). This concise yet informative document is designed for decision-makers requiring a broad contextual understanding of the EMIS's current state. The Fast-track Evaluation modality is particularly suited for situations requiring a structured assessment within a limited timeframe, providing quick, actionable insights without the extensive time commitment of a full-scale evaluation.

Implementation modality 3: Comprehensive analysis

This modality offers a detailed, in-depth assessment of the EMIS, conducted over an eight-week period. The process is characterized by a joint, iterative approach between the country and UNESCO, ensuring a rigorous and evidence-based examination of EMIS components. This assessment includes on-site missions, engagement with local stakeholders, and potential involvement of a dedicated UNESCO expert to conduct a thorough review of policies, governance structures, and operational mechanisms.

The key output of this modality is an **Analytical Country Report**, which provides a comprehensive and strategic evaluation of the EMIS, identifying strengths, gaps, and opportunities for reform (see Table 4). The report also includes tailored policy recommendations and an implementation roadmap to support long-term strategic planning and system transformation. Given its detailed and consultative nature, this modality is particularly suited for complex decision-making processes where stakeholders require a deep and actionable understanding of the EMIS to guide reforms and investment strategies.

Table 4: Key content areas of the Factsheet Report and the Analytical Country Report

FACTSHEET REPORT (following **Fast-Track Evaluation**) Indicative length: 20 to 30 pages	**ANALYTICAL COUNTRY REPORT** (following **Comprehensive Analysis**) Indicative length: 40 to 60 pages
General introduction to the EMIS-PATT as a tool to assess the maturity of EMIS	
Brief description of the assessment methodology in the country	Detailed description of the assessment methodology in the country
	Presentation of the national context, priorities, and EMIS
Synthesis of overall EMIS Maturity (assessment result overview)	
Description of assessment results at the dimension-level (four dimensions)	Description of assessment results at the dimension and subdimension-level (four dimensions, 12 subdimensions). Identification of Strategic Improvement Areas for each sub-dimension
Recommendations for strengthening national EMIS, for each dimension	Strategic plan for the EMIS transformation: - Prioritization of subdimensions based on alignment and expected impact - Prioritization of Strategic Improvement Areas based on anticipated timeframe for achieving goals and effect on system-wide improvement - Roadmap for implementation

Source: Author.

Although the three implementation modalities are envisioned to cater to varying needs and contexts, there is flexibility to adopt hybrid or tailored approaches depending on the specific requirements of each country. The EMIS-PATT framework allows for customization in response to particular challenges, timelines, or resource availability, to ensure that the assessment process can be adapted to provide the most relevant and practical solutions. As a global public good, the tool may also be independently used by ministries of education to conduct periodic self-assessments for internal purposes, enabling regular monitoring of EMIS capabilities and gaps to inform strategic planning and system management without requiring direct support from UNESCO.

Implementation process

To operationalize EMIS-PATT at the country level, each implementation modality is accompanied by a distinct process. Since the Self-Assessment modality is conducted independently and can be fully adapted by system evaluators, its implementation process is not discussed further in this document. However, Member States planning to undertake a self-assessment of their EMIS may draw on key considerations from the implementation processes of the Fast-track Evaluation and the Comprehensive Analysis.

Fast-track evaluation modality

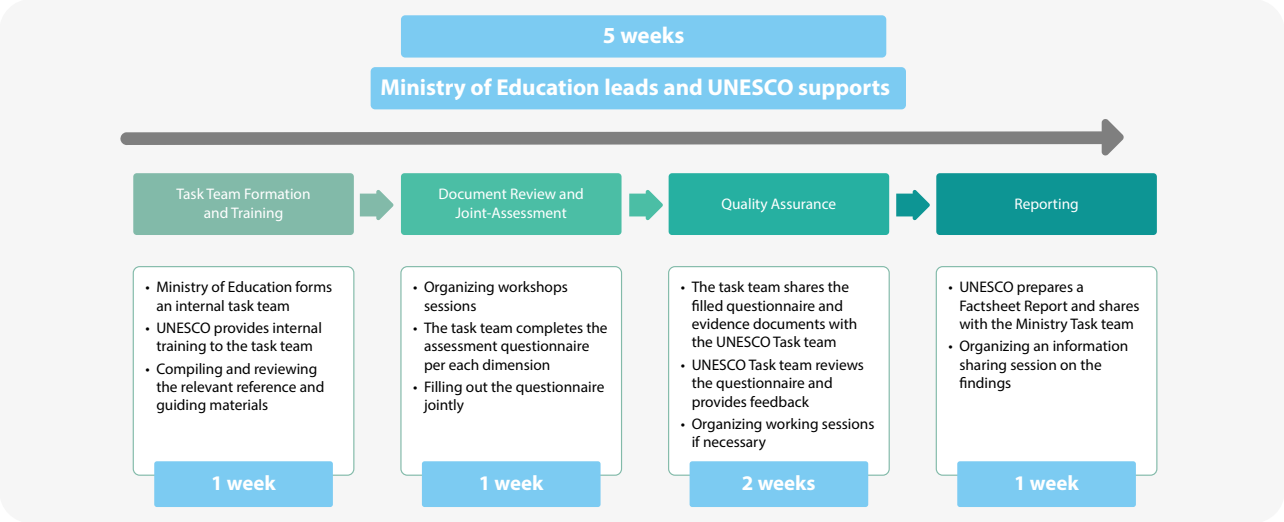
The **Fast-track Evaluation** modality is characterized by the leadership of the Ministry of Education, which takes charge of conducting the assessment, with UNESCO providing quality assurance and technical support. The key steps in the Fast-track Evaluation methodology are as follows (see Figure 13):

1. **Task Team Formation and Training:** The Ministry of Education forms an internal task team composed of key staff. This team is selected based on the profiles and responsibilities outlined in the guiding document provided by UNESCO.[6] UNESCO provides an initial training and capacity development to the Ministry of Education's Task Team to ensure they are familiar with the assessment process and the questionnaire. During this phase, UNESCO shares the necessary documents for the assessment, including the questionnaire and a list of relevant reference materials, along with guidelines for conducting the assessment. The Ministry of Education Task Team collects the necessary evidence documents based on the guidance[7] provided and shares the evidence documents with UNESCO.
2. **Document Review and Assessment:** The Ministry of Education Task Team reviews the relevant evidence documents and proceeds with the assessment, either independently or with technical support from UNESCO through online workshops. The Ministerial Task Team organizes dedicated internal workshops for each EMIS dimension, ensuring the participation of key staff as outlined in the implementation guidelines, with support from UNESCO. During each session, the Ministerial Task Team jointly completes the assessment questionnaire for the respective dimension.
3. **Quality Assurance and Feedback:** Once the assessment is completed, the Ministerial Task Team shares the filled questionnaire and supporting documents with UNESCO. Upon receiving the completed questionnaire and supporting documents from the Ministry, UNESCO reviews the materials to ensure compliance with quality assurance standards. If necessary, UNESCO organizes online working and feedback sessions with the Ministerial Task Team to discuss specific areas of the assessment and refine the grading where needed to support the alignment of the Ministry's self-assessment with quality standards, ensuring that all aspects of the EMIS are thoroughly evaluated.
4. **Reporting:** Once the quality assurance process is complete, UNESCO prepares a **Factsheet Report**, which provides a high-level summary of the key findings, including visual data representations and descriptive analysis. The draft report is first shared with the Ministry of Education for feedback and validation, after which it is finalized and presented to highlight key insights into the strengths and weaknesses of the national EMIS.

6 See Annex IV. Workshops and National Task Team Compositions

7 See Annex III. List of Reference Documents

Figure 13: Fast-track modality timeline



Source: Author.

Comprehensive analysis modality

The key distinction of the Comprehensive Analysis modality lies in the close involvement of the UNESCO Task Team throughout each stage of the assessment process. This includes a higher degree of technical engagement in evidence documents' review, facilitation of assessment workshops, validation of findings, and the development of strategic outputs. In this modality, the scope extends beyond diagnosing the current state of EMIS to include strategic and operational planning, thereby ensuring that diagnostic insights are translated into concrete, actionable steps for system transformation. The main steps in the Comprehensive Analysis methodology are outlined below:

1. **Task team composition and training:** The Ministry of Education forms an internal task team composed of key staff. This team is selected based on the profiles and responsibilities outlined in the guiding document provided by UNESCO.[8] The assessment process begins with a kick-off meeting between UNESCO and the Ministry of Education Task Team to establish the assessment's scope, goals, and timeline. UNESCO provides technical assistance from the outset, ensuring that the Ministry is equipped with the necessary tools and knowledge to conduct the assessment. Key documents, such as the questionnaire and evidence-gathering guidelines, are shared during this phase, along with direct technical support to address any immediate questions from the Ministry. During this phase, the Ministry collects relevant evidence documents,[9] shares with UNESCO and if necessary, UNESCO may request additional resources or documents to support the assessment.
2. **Document review and assessment:** Unlike the Fast-track modality, the Comprehensive Analysis involves more hands-on support from UNESCO during the self-assessment phase. While the Ministry Task Team is in the driver's seat, UNESCO provides ongoing technical assistance. After collecting the evidence documents, both the Ministry Task Team and UNESCO review the documents. Once reviewed, based on the specific needs of the country, online or onsite workshops are jointly organized by UNESCO and the Ministry to guide the completion of assessment. The Ministerial Task Team completes the questionnaire with the support of UNESCO. Each dimension of the assessment is reviewed and discussed in separate sessions to ensure thorough evaluation. During the assessment process, dedicated discussions are also held to identify and elaborate Strategic Improvement Areas (SIAs) based on the indicative questions defined under each subdimension, providing a foundation for subsequent planning and prioritization. The Ministry is responsible for ensuring the participation of key staff, as specified in the implementation guidelines, in each of these workshops.
3. **On-site mission and quality assurance:** A key feature of the Comprehensive Analysis modality is the on-site mission, during which UNESCO or a

8 See Annex IV. Workshops and National Task Team Compositions

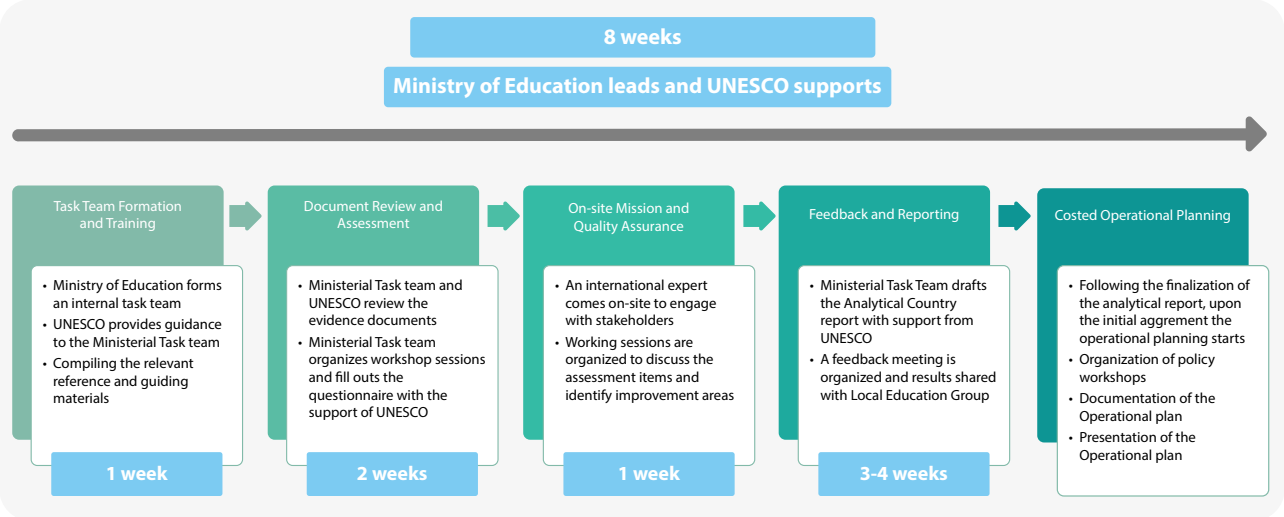
9 See Annex III. List of Reference Documents

designated expert undertakes an in-country visit to work directly with the Ministry. The mission includes engagement with national stakeholders, in-depth review of relevant documents, and the facilitation of in-person technical working sessions to gather additional data and contextual insights. Structured consultations are held with senior officials to understand the national vision for education management, complemented by key informant interviews to collect both qualitative and quantitative data. Depending on the country context, data collection activities may also include field visits to schools and education offices, discussions with focal points at national, regional or school levels involved in data collection, and organized consultations with other relevant ministries or agencies. The onsite data collection activities are designed to ensure that the information collected is contextually grounded, reliable, and reflective of the country's EMIS realities. Also, depending on the assessment plan, the on-site mission may be combined with the organization of diagnostic workshops.

4. **Reporting and feedback:** Following the on-site mission and completion of the quality assurance process, UNESCO organizes a writing workshop with the Ministerial Task Team to frame the vision for the future of the EMIS and co-create the first draft of the **Analytical Country Report**. Following the workshop, the full draft report is finalized by the Ministerial Task Team with support of UNESCO. This report presents a detailed, evidence-based assessment of the EMIS, drawing on both the questionnaire results and the findings of the on-site mission. It provides descriptive and analytical insights into the system's maturity at both the dimension and subdimension levels. Unlike the Factsheet Report, the Analytical Country Report goes further by outlining strategic pathways for EMIS transformation and offering targeted recommendations for system enhancement, including the identification of Strategic Improvement Areas (SIAs) at the subdimension level. These SIAs serve as the foundation for strategic and operational planning and are prioritized using the policy prioritization framework.[10] The draft report is then shared with the Ministry senior management for feedback and validation, after which it is finalized and formally endorsed by the Ministry and shared with the Local Education Group to communicate key findings on EMIS strengths, weaknesses, and strategic priorities for transforming EMIS.

5. **Costed operational planning:** Following the finalization of the Analytical Country Report, the Comprehensive Analysis modality may include the development of a **Costed Operational Plan** for EMIS transformation, subject to country demand and contextual priorities. **This optional step** translates the SIAs into a sequenced set of programmatic activities, accompanied by indicative costing and resource requirements. It can also incorporate a monitoring framework to support implementation tracking.

Figure 14: Comprehensive analysis modality timeline



Source: Author.

10 See Box 2. and Annex V. for Policy Prioritization Framework

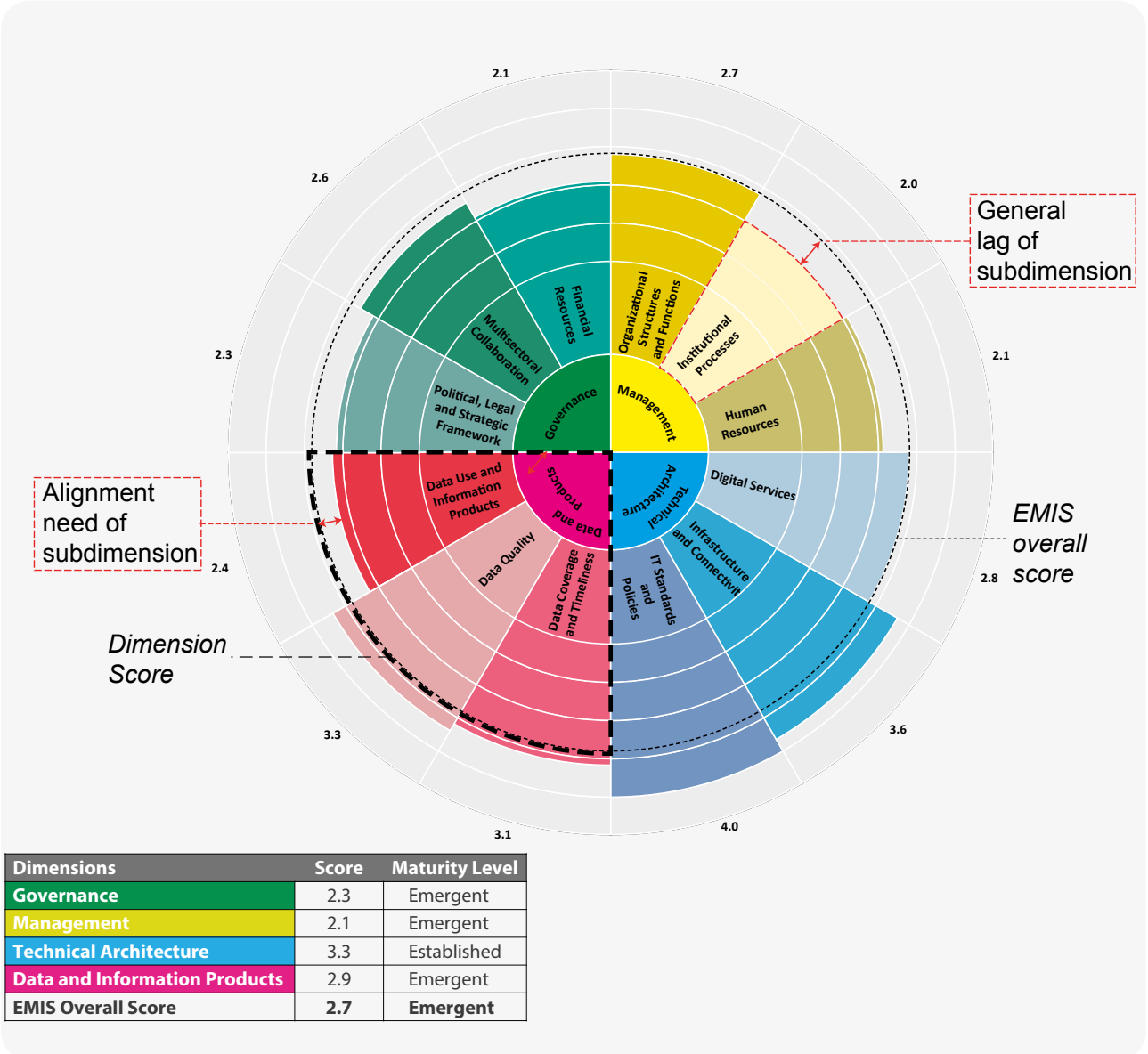
Linking diagnostic assessment with strategic and operational planning

The **framework for policy prioritization** for EMIS transformation guides the development of reform roadmaps and costed action plans based on the EMIS-PATT assessment. It follows four key steps, combining systematic, evidence-based analysis with consultative and participatory dialogue.

The process moves through increasing levels of detail: it begins with a comparative analysis of dimensions and sub-dimensions to identify strategic improvement areas, proceeds to prioritizing these areas to generate a reform roadmap, and concludes with integrating cost considerations to produce concrete, resource-aligned action plans.

The first step is a systematic and structured evaluation that analyzes two fundamental aspects related to the score of each subdimension within the EMIS: their degree of **alignment** with other subdimensions in the same dimension, and their **general lag** with respect to the overall score of the EMIS on EMIS-PATT (see Figure 15). This dual assessment allows for categorizing subdimensions into distinct priority levels.

Figure 15: Subdimensions' degree of alignment and general lag in EMIS-PATT diagnosis results



Dimensions	Score	Maturity Level
Governance	2.3	Emergent
Management	2.1	Emergent
Technical Architecture	3.3	Established
Data and Information Products	2.9	Emergent
EMIS Overall Score	**2.7**	**Emergent**

Source: Author.
Note: Scores in figure are illustrative

The methodology for prioritizing subdimensions is designed to systematically locate pivotal directions to foster alignment and advance towards higher maturity level of the EMIS. This process is a foundational step in developing the EMIS transformation strategy as it enables the identification of key areas requiring priority intervention: the Strategic Improvement Areas (SIAs).

The second step focuses on identifying and prioritizing SIAs. For each priority subdimension, consultations and discussions are held with relevant EMIS staff to identify SIAs. These can be identified for each assessment item, considering the concrete steps needed to reach the next maturity level based on the assessment descriptors outlined in the EMIS-PATT.

Following their identification, SIAs are then prioritized to ensure that subsequent actions are not only structured and systematic but also calibrated to take into account the specific context, existing capabilities, and the anticipated trajectory of EMIS transformation in the country. In this process, SIAs are organized according to their subdimension's assigned priority and evaluated based on two critical dimensions: **timeframe**, the estimated time for achieving goals, and the **expected impact** of related interventions for EMIS transformation.

Building on this collaborative exercise, **the third step** consists in ordering SIAs within prioritized subdimensions following a structured process. SIAs are grouped into five distinct strategic levels – Top, High, Medium, Low, and Lowest. This process gives rise to an "ideal" roadmap for reform implementation, i.e. setting priorities and ordering interventions considering all desirable actions, irrespective of budget.

The fourth step confronts the "ideal" roadmap for implementation with the financial and resource dimension of EMIS transformation. Through a consultative and participatory process, it estimates the costs of each intervention on SIAs. Considering priorities established in previous steps along with available and mobilizable resources, it establishes final priorities for EMIS transformation. This process results into a costed action plan based on nuanced planning and resource allocation, ensuring that the most critical areas receive immediate attention while allowing for the strategic sequencing of longer-term projects.

The objective of this methodology which combines structured processes with collaborative dialogue is twofold: to systematically prioritize subdimensions that are underdeveloped and to strategically sequence improvement areas. This ensures that EMIS transformation reforms are relevant, effective, sustainable, and fully aligned with national contexts and educational objectives.

The methodology and scales used for the prioritization of subdimensions and SIAs in steps 1 and 3 are further described below.

Subdimensions prioritization scales

This section provides further methodological details on the implementation of the first step of the policy prioritization framework. This structured prioritization process is built around two key criteria: degree of alignment and general lag.

a. Alignment scale

STEP 1 - Alignment calibration

For each of the four EMIS-PATT dimensions proceed as follows:

- If the difference between the highest and lowest subdimension scores within the same dimension is less than 0.25 points, the alignment categorization starts at "Low Need for Alignment."
- If the difference between the highest and lowest subdimension scores within the same dimension is between 0.25 and 0.49 points, the alignment categorization starts at "Moderate Need for Alignment."
- If the difference between the highest and lowest subdimension scores within the same dimension is 0.5 points or more, the alignment categorization starts at "Strong Need for Alignment."

STEP 2 - Alignment categorization

1. Identify the highest, middle, and lowest subdimension scores within each dimension.
2. Determine the highest and lowest subdimension scores within each dimension. Calculate the score difference between the highest and lowest subdimensions within the same dimension, and also the difference between the middle subdimension and both the highest and lowest subdimensions.

    a. If the difference between the highest and lowest subdimensions is less than 0.25 points, put all subdimensions (lowest, middle, and highest) into the "Low Need for Alignment" category.

b. If the difference is between 0.25 and 0.49 points, put the lowest subdimension into the moderate alignment category while the highest subdimension into the alignment is "Low Need for Alignment" category. The middle subdimension is categorized as:

   I. "Moderate Need for Alignment" if its score is less than the dimension average.

   II. "Low Need for Alignment" if its score is equal to or greater than the dimension average.

c. If the difference is equal or more than 0.5 points, put the lowest dimension into the "Strong Need for Alignment" category, and the highest subdimension into the "Low Need for Alignment" category. The middle subdimension is categorized as:

   I. "Moderate Need for Alignment" if its score is less than or equal to the dimension average.

   II. "Low Need for Alignment" if its score is greater than the dimension average.

b. General lag scale

STEP 1 - Lag calibration

1. Calculate the score for each subdimension and the Overall EMIS Score.
2. Calculate the difference between each subdimension score and the Overall EMIS Score.

STEP 2 - Lag categorization

1. Order the subdimensions based on their score difference with the Overall EMIS Score, from lowest (negative) difference to highest (positive).
2. Classify subdimensions into 3 groups:

   a. Low score: subdimensions with a lower score than the Overall EMIS Score and a difference of at least 0.25 points.
   If no subdimension's score is lower than the Overall EMIS score by at least 0.25 points, calculate the 33rd percentile of all subdimension scores. All subdimensions falling below the 33rd percentile should then be categorized as "Low score".

   b. Average score: subdimensions with scores close to the Overall EMIS Score, i.e., the absolute difference from the Overall EMIS score is less than 0.25 points.
   If the score for all subdimensions is close to the Overall EMIS Score (plus or minus 0.25 points), calculate the 33rd and 66th percentiles of all subdimension scores. Subdimensions with scores between these two percentiles should then be categorized as "Average score".

   c. High score: subdimensions with a higher score than the Overall EMIS Score and a difference of at least 0.25 points.
   If no subdimension's score is higher than the Overall EMIS score by at least 0.25 points, calculate the 66th percentile of all subdimension scores. All subdimensions with a score above the 66th percentile should then be categorized as "High score".

c. Prioritization matrix

Based on the degree of alignment (a.) and general lag (b.) scales, place the subdimensions in this matrix table:

Table 5: Prioritization matrix for the subdimensions

	Strong Need for Alignment	Moderate Need for Alignment	Low Need for Alignment
Low score	Top Priority	High Priority	Medium Priority
Average score	High Priority	Medium Priority	Low Priority
High score	Medium Priority	Low Priority	Lowest Priority

Source: Author.

SIAs prioritization scales

This section provides further details on the methodology of the third step of the policy prioritization framework for the selection and classification of Strategic Improvement Areas (SIAs). This consultative and participatory prioritization process revolves around two key criteria: the timeframe of interventions and their expected impact.

a. Timeframe scales

- **Short-term (0-1 year):** Relates to interventions that can be realized within a one-year interval, these entail initiatives targeted at immediate operational enhancement and expedited execution, which are essential for initiating progressive momentum towards strategic objectives.
- **Medium-term (1-3 years):** Relates to intervention duration ranging from one to three years, often related to significant organizational developments. They represent a crucial transitional phase for connecting short-term actions with the long-term strategic vision.
- **Long-term (>3 years):** Relates to intervention requiring three years or more to be implemented and meet their objectives. They involve far-reaching, transformative changes that align with the strategic vision and necessitate a sustained and phased approach.

b. Expected impact scales

- **Critical impact:** Regards interventions on SIAs that are critical, sometimes foundational, and address the most pressing needs within the system. They are characterized by an imperative for swift action and the allocation of dedicated resources due to their key impact on EMIS strategic development and operationalization.
- **Moderate impact:** Interventions that contribute substantively to the strategic trajectory and long-term transformation and effectiveness of the EMIS, but they are not critical to EMIS development, nor conditions for the implementation of subsequent key interventions. They require strategic planning and timely execution.
- **Marginal impact:** Interventions that can incrementally contribute to the EMIS development but are not immediately essential and are expected to have a marginal effect on the EMIS' strategic outcomes. Their execution can be modulated according to the organization's operational capacity and strategic adjustments.

Based on the timeframe and the expected impact of interventions on the SIAs, categorize the SIAs in the priority matrix for SIAs (see Table 6 and Table 7).

Table 6: Priority matrix for strategic improvement areas

	Critical impact	Moderate impact	Marginal impact
Short-term	Top Strategic Level (1)	High Strategic Level (2c)	Medium Strategic Level (3c)
Medium-term	High Strategic Level (2b)	Medium Strategic Level (3b)	Low Strategic Level (4b)
Long-term	Medium Strategic Level (3a)	Low Strategic Level (4a)	Lowest Strategic Level (5)

Source: Author.

Numeric figures from 1 to 5 denote priority levels in a strategic context, with 1 representing the highest priority and 5 indicating the lowest priority. Additionally, letters (a, b, c) are utilized to designate time horizons within each priority level, when there are multiple categories of strategic levels. Specifically, 'a' signifies long-term, 'b' denotes medium-term, and 'c' represents short-term timeframes.

Table 7: Priority matrix for strategic improvement areas with definitions

	Critical impact	Moderate impact	Marginal impact
Short Term	**Top Strategic Level (1)** Objectives to be achieved within one year; imperative for addressing immediate and critical needs necessitating prompt action and resource allocation.	**High Strategic Level (2c)** Objectives to be achieved within one year; important for long-term success but not immediately critical, should be strategically sequenced to follow high-priority actions.	**Medium Strategic Level (3c)** Objectives to be achieved within one year; with minimal strategic impact, contingent upon resource availability.
Medium Term	**High Strategic Level (2b)** Objectives to be completed within 1-3 years; substantial changes or developments crucial for strategic bridging of short-term actions with the long-term strategic vision.	**Medium Strategic Level (3b)** Objectives to be completed within 1-3 years; of moderate importance, essential for long-term success, to follow high-priority actions, ensuring steady progress towards goals.	**Lower Strategic Level (4b)** Objectives to be completed within 1-3 years; beneficial for incremental progress, less critical, and can be adjusted based on organizational capacity and strategic shifts.
Long Term	**Medium Strategic Level (3a)** Objectives set for a period exceeding three years; comprehensive, transformative changes aligned with strategic vision, requiring sustained effort and phased execution.	**Lower Strategic Level (4a)** Objectives set for a period between 1-3 years; contributing to sustained organizational growth, to be sequenced after high-priority goals.	**Lowest Strategic Level (5)** Objectives set for a period exceeding three years; incremental improvements or enhancements that are of benefit as resources allow and adjusted based on strategic shifts.

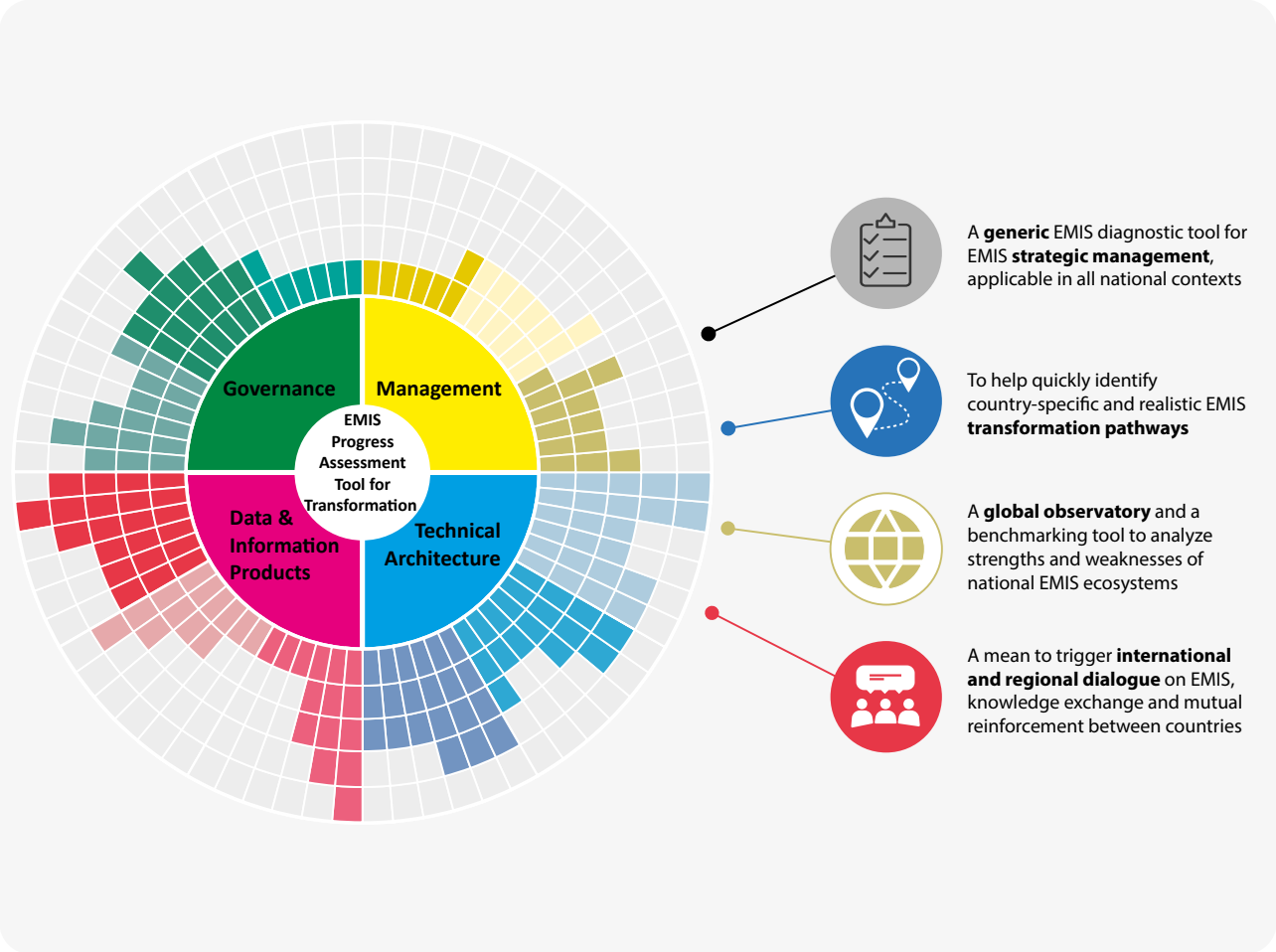
Source: Author.

Once the two matrices are completed, interventions for the transformation of EMIS can be grouped into general categories based on the priority level of each subdimension and tagged according to SIA's prioritization framework. This process provides education planners and other key EMIS stakeholders with a concrete, comprehensive roadmap. It highlights not only the most urgent interventions but also the trade-offs that may be required between competing priorities. These insights pave the way for the final step of the policy prioritization framework: integrating cost and resource considerations, determining final priorities, and developing a clear, detailed, and costed action plan.

Strengthening EMIS through regional cooperation and global benchmarking

UNESCO's EMIS diagnostic tool is designed to enhance national education management capacities not only through diagnostic assessments, reporting, and targeted capacity development, but also by fostering a common ground for discussion and promoting regional and global exchanges aimed at EMIS transformation. The initiative moves beyond national assessments by creating opportunities at regional and global level for countries to engage in shared learning, policy dialogues, and collaborative efforts to address common challenges, exchange best practices, and explore innovative solutions for EMIS development. Hence, alongside national-level assessments, there is a broader emphasis on regional cooperation and global benchmarking (see Figure 16).

Figure 16: EMIS-PATT building blocks for EMIS transformation, from assessment to global benchmarking



Source: Author.

The process begins at the national level, where countries undergo diagnostic evaluations to assess their EMIS maturity, capacity, and limitations. These national assessments and findings documented in country-specific reports form the foundation for broader regional cooperation and dialogue. At the regional level, the assessment findings serve as a basis for policy dialogues, workshops, and collaborative exchanges between countries. These interactions offer an enabling environment where countries can share insights, address common challenges, and develop joint solutions to overcome EMIS barriers.

Regional dialogues can be organized to address system-wide challenges or either to focus on specific dimensions of the assessment, such as governance, management, technical architecture, infrastructure, and data collection and utilization. Countries with similar challenges or development stages can collaborate and delve into targeted conversations that are highly relevant to their contexts, thus making regional cooperation more relevant and impactful. By participating in these exchanges, countries can pool their expertise and access innovative solutions that have been successfully implemented in other countries. This peer-to-peer learning process aims to strengthen the collective capacity of participating countries and accelerates the adoption of effective EMIS practices. In this regard, **UNESCO's Regional and Field Offices (and their partners and networks)** will be leveraged in supporting the organization of regional dialogues and workshops under the revitalized UNESCO EMIS International Community of Practice.[11]

Building on regional cooperation, the vision of the project extends globally through the establishment

11 The UNESCO EMIS International Community of Practice connects policymakers and experts from Ministries of Education – including planning officers, IT directors, senior data specialists, and other relevant EMIS personnel – in a global network of practitioners to facilitate knowledge exchange, peer learning, capacity development and collaborative initiatives. For more information, visit https://www.unesco.org/en/education-management/emis-community.

of an online platform for global benchmarking and the creation of a global observatory. This platform is intended to offer a comprehensive view of EMIS progress across countries, enabling access to data on the progress of EMIS in different regions. The aim is not to foster competition but to build a shared knowledge base that facilitates global cooperation and learning. Through global benchmarking, countries can compare their progress with international standards, drawing from the experiences of others to inform their own EMIS strategies and decisions. This benchmarking process can also be used to track national progress toward global transformation goals and provide data for research on EMIS development trends at the international level.

In this way, UNESCO's EMIS diagnostic tool serves not only as an assessment mechanism but also as a driver for collaboration, learning, and innovation at regional and global levels. By promoting discussion, fostering regional cooperation, and enabling global benchmarking, the tool supports countries in strengthening their EMIS systems while contributing to a global movement toward more effective, data-driven education management. This integrated approach aims to empower countries to make informed decisions, align their EMIS initiatives with global trends, and work collectively toward transforming education management systems worldwide for better education governance relying on sound data.

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Annex I. EMIS-PATT modalities and needs checklist

Country Needs	Recommended EMIS-PATT Options
1. To develop or update a strategic framework and action plan for EMIS and system improvement.	Recommended: Comprehensive Analysis
2. To develop an action plan to align the national EMIS with international standards and best practices.	Recommended: Comprehensive Analysis
3. To develop an action plan to align national and sub-national data systems.	Recommended: Comprehensive Analysis
4. To monitor the progress of EMIS projects implemented at national level.	Recommended: Fast-Track Evaluation Possible: Fast-Track Evaluation, Comprehensive Analysis, Self-assessment
5. To prepare a document for a grant application and funding cycle linked to data system strengthening.	Recommended: Comprehensive Analysis Possible: Comprehensive Analysis, Fast-Track Evaluation
6. To identify realistic short- and medium-term targets for EMIS enhancement.	Recommended: Comprehensive Analysis Possible: Comprehensive Analysis, Fast-Track Evaluation
7. To provide insights to decision-makers for development of high-level strategies and policies for education governance improvement.	Recommended: Fast-Track Evaluation Possible: Fast-Track Evaluation, Comprehensive Analysis

Annex II. List of reference documents

The national team is requested to provide the UNESCO assessment team with soft copies of the following documents ahead of the working sessions. This will enable the UNESCO team to gain a deeper understanding of the EMIS context in preparation for the working sessions, and these documents will serve as valuable evidence for assessing the maturity level. The national task team could provide any additional pertinent documents if deemed necessary.

Documents		
EMIS-PATT dimension	**Document**	**Availability Yes/No**
1. Governance	**1.1** National E-governance Policy Document(s)	
	1.2 Education Sector Plan	
	1.3 National Education Policy and Legislation (Education Law)	
	1.4 EMIS Strategic Plan	
	1.5 EMIS Operational Plan	
	1.6 National law that outlines which institution is responsible for collecting, processing, and disseminating education statistics	
	1.7 Law (or a regulation) that outlines the end-use of EMIS data	
	1.8 Strategic framework and action plan for crisis-sensitive planning that ensures and emergency-preparedness and resilience in contingencies	
	1.9 Formal arrangements with other public sector stakeholders for bi-directional information sharing and coordination. (Ministries, CSOs, and IOs)	
	1.10 National education budget, annual public education spending and dedicated budget on EMIS	
	1.11 Dedicated budget for EMIS staff recruitment & trainings	
	1.12 Ratio of international funding to national funding (the average of last five years) for EMIS projects	

2. Management	**2.1** Organizational structure (organigram) for the National education authority **2.2** EMIS department/agency/national working group legal and operational mandate **2.3** Document on roles and responsibilities of EMIS actors **2.4** Organizational structure within the education administration for crisis-sensitive planning, including roles and responsibilities during crises **2.5** EMIS Operational Manual (details the processes and systems) **2.6** Document on metadata management practices and data nomenclature **2.7** Document(s) on processes for data collection (data entry and validation) within the EMIS **2.8** Document(s) on data exchange protocols that allow for the flow of data within the EMIS **2.9** Document(s) on assessing and data quality check processes **2.10** Any relevant regular satisfaction feedback survey of people involved in the EMIS data lifecycle such as User Satisfaction Survey **2.11** HR strategy and management for EMIS purposes **2.12** Curriculum for training EMIS staff (data collection, database management, data analysis, data dissemination) **2.13** Competency Framework for EMIS staff	
3. Technical Architecture	**3.1** EMIS architecture document (system architecture, data collections instruments, services provided) **3.2** IT standards and policies for EMIS (Security, business continuity, asset management) **3.3** IT equipment inventory	
4. Data and Information Products	**4.1** EMIS architecture document (methodology, data collection instruments, report, indicators generated, data visualisation, data nomenclature, data dictionary) **4.2** Annual School Census Questionnaire(s) for all levels of education **4.3** Statistical yearbooks (for last 5 years) **4.4** Link to data dissemination platform	
5. Others	**5.1** EMIS evaluations (or other relevant research reports)	

Annex III. Workshops and national task team compositions

Process overview

The assessment unfolds through a series of structured sessions:

1. **Kick-off meeting:** This inaugural plenary convenes the UNESCO Task Team with the Ministry of Education Task Team to outline the assessment's scope and establish the foundational framework for the upcoming sessions.
2. **Working session on governance:** The session is designed to dissect the policy, legal, and financial facets of EMIS, ensuring a comprehensive understanding of the governance structure in place in relation to other ministries and relevant entities.
3. **Working session on management:** The session is designed for an analytical dive into the management practices, human resources, and capacity development strategies that underpin the effective operation of EMIS.
4. **Working session on technical architecture:** The session is designed as a technical exploration into the IT infrastructure, evaluating the robustness of the IT systems that support EMIS functionalities.
5. **Working session on data and information services:** The session is designed to review the levels of data coverage, disaggregation, quality, collection methodologies, and the overall cycle of information within the EMIS in decision making and data dissemination strategies.
6. **Feedback meeting:** A reflective session where the UNESCO Task Team and the Ministry of Education EMIS Project Manager meet to review findings, discuss insights, and chart the path forward.

Suggested task team composition for Ministry of Education

National Task Team Member	Responsibilities
Chair of the EMIS-PATT Task Team It is recommended to assign this role to the Permanent Secretary or to the Director in charge of strategic planning or data systems	• Oversees the entire EMIS assessment process. • Coordinates between the different stakeholders and sessions. • Ensures the objectives and timelines are met.
Senior Policy Advisor (Governance Expert)	• Advises on policy, legal frameworks, and strategic plans on EMIS. • Brings expertise on governance dimension regarding political, legal and strategic frameworks, multi-sectoral collaboration on EMIS.
Specialist on Education Finance	• Advises on budgeting, financial resources dedicated to education and EMIS, and resource planning for EMIS.
Legal Advisor	• Provides expertise on the legal implications and requirements of EMIS operations. • Advises on compliance with national and international regulations. • Could be from another ministry.
Education Statistics Expert(s)	• Specialized in data educational statistics collection, management and storage and provides insights into institutional processes and data management practices.
Human Resources Specialist	• Provides insights into the human resource strategy, capacity and organizational structure. • Advises on change and staff management.

Training and Capacity Development Coordinator	• Responsible for identifying training needs and organizing capacity-building initiatives. • Advises on capacity development and training needs.
IT Systems Architect and Manager(s)	• Expert in IT infrastructure relevant to EMIS, including software and hardware solutions; advises on technical standards, digital services, and connectivity.
Education Data Quality Specialist	• Specialized on educational data accuracy, validation, and verification; advises data collection methodologies and end-use mechanisms.
Focal Point (s) for Education Strategic Planning and M&E Units	• Provides insights on operational utilization of EMIS data for strategic decision-making, and monitoring & evaluation. • Advises areas for improvement within the educational system, guiding strategic planning towards enhancing efficiency and effectiveness.
Focal Point for Data Dissemination	• Provides insights on dissemination of EMIS data to stakeholders, data dissemination strategy and modalities.

Note: It is recommended to consider inclusion of a regional representation in the National Task Team.

Task team participation by session for EMIS-PATT assessment

Assessment Process	Profiles
Kick-off Meeting	• UNESCO EMIS-PATT Assessment Task Team • Ministry of Education Task Team
1. Working Session on Governance	• EMIS Manager • Focal Point for Education Strategic Planning Unit • Senior Policy Advisor • Legal Advisor • Specialist on Education Finance
2. Working Session on Management	• EMIS Manager • Education Statistics Expert(s) • Human Resources Specialist on EMIS • Training and Capacity Development Coordinator
3. Working Session on Technical Architecture	• EMIS Manager • IT Systems Architect for EMIS • Data Quality Specialist for EMIS
4. Working Session on Data and Information Services	• EMIS Manager • Focal Point for Education Strategic Planning Unit • Education Statistics Expert(s) and staff responsible for collecting, analyzing and disseminating data • Data Quality Specialist • Focal Point from the M&E Department
Feedback Meeting	• UNESCO EMIS-PATT Assessment Task Team • EMIS Manager

unesco
United Nations
Educational, Scientific
and Cultural Organization

Education management information systems progress assessment tool

A methodological guide for educational transformation

The Education Management Information Systems – Progress Assessment Tool for Transformation (EMIS-PATT) is a diagnostic and planning tool developed by UNESCO to help countries assess the maturity of their EMIS, identify priority areas for improvement, and define trajectories for transformation. It supports ministries of education in strengthening their capacity to generate timely, accurate, and relevant data for evidence-based planning, monitoring, and management of education systems, ultimately contributing to better learning outcomes and more equitable education opportunities.

This methodological guide presents EMIS-PATT's rationale, scope, conceptual framework, and implementation approach. It also aims to provide ministries of education and their partners with a practical guide to strengthen institutional capacity, improve education management processes, and advance data-driven decision-making in support of SDG 4 and quality education for all learners.

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4 QUALITY EDUCATION

Sustainable Development Goals