Health Information Systems Interoperability Maturity Toolkit

HEALTH INFORMATION SYSTEMS INTEROPERABILITY MATURITY MODEL						
Domain	**Subdomain**	**Level 1: Nascent** **The country lacks HIS capacity or does not follow processes systematically. HIS activities happen by chance or represent isolated, ad hoc efforts.**	**Level 2: Emerging** **The country has defined HIS processes and structures, but they are not systematically documented. No formal or ongoing monitoring or measurement protocol exists.**	**Level 3: Established** **The country has documented HIS processes and structures. The structures are functional. Metrics for performance monitoring, quality improvement, and evaluation are systematically used.**	**Level 4: Institutionalized** **Government and stakeholders use the national HIS systems and follow standard practices.**	**Level 5: Optimized** **The government and stakeholders routinely review interoperability activities and modify them to adapt to changing conditions.**
Leadership and governance	**Governance structure for HIS**	Evolving governing body for health information systems (HIS) is constituted on a case-by-case basis OR no governing body exists.	An HIS governing body is formally constituted and has a scope of work that includes the people responsible for data governance oversight. The governing body oversees interoperability directly or through a separate technical working group (TWG).	The HIS governing body conducts regular meetings with stakeholder participation.	The HIS governing body is government-led, consults with other ministries, and monitors implementation of HIS interoperability using a work plan. It mobilizes resources—financial, human resources (HR), and political—to accomplish its goals.	The HIS governing body is legally protected from interference or organizational changes. The HIS governing body and its TWGs are nationally recognized as the lead for HIS interoperability. The governing body works in liaison with other similar working groups regionally and/or around the world.
	Interoperability guidance documents[1]	HIS interoperability guidance documents are absent, and HIS interoperability is implemented on a case-by-case basis.	The governing body for HIS interoperability has drafted the necessary HIS interoperability guidance documents.	Interoperability guidance documents developed, tested, and adopted, and include reference terminologies and technical standards for data exchange.	The interoperability guidance documents are government-owned. They are consistently used and referenced in efforts to guide implementation of HIS interoperability.	Processes are in place to regularly monitor the implementation of the interoperability guidance documents. The interoperability guidance documents are regularly reviewed and updated based on lessons learned from implementation. These documents reflect international best practices.

[1] The approved documents (policies, strategies, and frameworks) that guide HIS and digital health/eHealth work in a country

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Leadership and governance	**Compliance with data exchange standards**	No structure, processes, and procedures (e.g., working groups, steering committees, or units) are in place to guide or enforce compliance with data exchange, messaging, and data security standards. No criteria for certification and compliance exist. No regulatory framework for compliance exists.	Structures (working groups, steering committees, or units) are in place to guide or enforce compliance.	The HIS has developed or adopted and implemented a regulatory framework for compliance.	The government enforces the regulatory framework for compliance. The subsystems in the national HIS are required to meet compliance and certification criteria.	Compliance with standards for data exchange, messaging, and security is regularly reviewed. The regulatory framework is reviewed and updated to reflect best practices for data exchange, messaging, and systems security.
	Data ethics	The country has no healthcare-specific data laws, regulatory frameworks, or ethics provisions to guide data security, privacy, and confidentiality.	The country has drafted laws, policies, or a regulatory framework for data security and privacy that address issues related to health data.	The country has an approved health data regulatory framework.	The health data security and privacy laws have been implemented, and there are guidelines on how to operationalize the laws in the HIS. HIS users have been sensitized on the data security and privacy laws. The government and stakeholders consistently enforce the data security and privacy laws.	The country has a recognized mechanism (e.g., committee or working group) for reviewing data ethics issues in the national HIS, and for updating policies, procedures, and laws, as needed. This mechanism reflects industry best practices.
	HIS interoperability monitoring and evaluation	No tracking, or ad hoc tracking, is done of HIS interoperability activities related to plans, resources, and budgets for the national HIS.	The methods and tools to report on HIS interoperability implementation are defined and documented.	HIS interoperability activities are regularly monitored and reviewed accordingly. Regular reports on HIS interoperability performance are generated and disseminated to stakeholders.	Mechanisms to track and measure performance of HIS interoperability work are government-approved and government-led.	Results from monitoring of HIS interoperability are used for planning. Decisions about future activities take this analysis into consideration.
	Business continuity	No government-approved business continuity plan (BCP) is in place at the national or subnational levels of the HIS.	The HIS has developed a BCP that outlines the processes needed to ensure continuity of critical business processes.	The BCP has been audited. Audit results show that at least 50% of the BCP has been implemented.	The BCP has been audited. Audit results show that at least 75% of the BCP has been implemented.	The BCP has been audited. Audit results show that all or most of the BCP has been implemented.

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Leadership and governance	**Financial management**	No clear plan exists for financial management of HIS, including interoperability activities.	High-level financial management structures, including budgets, are developed for the national HIS, including interoperability in the country based on HIS work plans.	Detailed financial management structures, including budgets for HIS interoperability at the national and subnational levels, are developed based on the HIS work plan. HIS expenditures are monitored against HIS budgets.	The HIS budget is part of the Ministry of Health's budgeting process. Financial audit processes are in place and are carried out regularly to promote accountability in HIS spending.	An established, long-term HIS financial management system is owned, reviewed, tracked, and updated by the government, and is supported by stakeholders.
	Financial resource mobilization	There is no documented plan for financial resources for HIS strengthening, including HIS interoperability.	Financial resources for HIS strengthening, including HIS interoperability, are mostly donor driven.	A costed work plan at national and subnational levels is in place that covers both the information and communications technology (ICT) infrastructure (network, hardware, and software), and personnel for HIS needed for HIS strengthening, including HIS interoperability. At a minimum, this work plan identifies the activities, timeframe, costs, and sources of funding for HIS interoperability.	Government and implementing partners have sufficient funding to implement the costed work plan. The government owns the costed work plan.	A government-owned, costed, long-term work plan (five years or more) is in place to support ICT and human resources for HIS strengthening, including HIS interoperability. A mechanism is in place to regularly review and update the work plan.
Human resources	**Human resources policy**	There is no human resources (HR) policy that recognizes HIS-related cadres. Distribution of HIS human resources is ad hoc.	A national needs assessment has been completed showing the number of staff and types of skills needed to support HIS, including digital HIS and interoperability. HIS-related cadre roles and responsibilities are mapped to the government's workforce and schemes of work.	An HR policy and/or strategic plan exists that identifies the HIS, digital HIS, and interoperability skills and functions needed to support the national HIS and its digital HIS and interoperability.	Implementation plans are in place for growing a cadre of staff at national and subnational levels for digital HIS and interoperability.	A long-term plan is in place to grow and sustain staff with the skills needed to sustain HIS and digital HIS and interoperability. Performance management systems are in place to monitor growth and sustainability of the HIS workforce.

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Human resources	**Human resources capacity (skills and numbers)**	The country has no dedicated cadre of staff for maintaining the digital HIS and interoperability. Responsibility for the HIS is added to existing positions.	The country depends on technical assistance from external stakeholders to support the national and subnational digital HIS and interoperability.	The country has a growing staff with skills in governance and leadership, data collection, data management, data sources, health information technology (IT), and managing information products. The staff are sufficient in numbers and skills at the national level, but inadequate at subnational levels.	The country has staff in sufficient numbers with relevant skills to support the digital HIS and interoperability at national and subnational levels.	The country has a sufficient and sustainable number of staff with an appropriate mix of skill sets to support the digital HIS and interoperability at national and subnational levels, and the interoperability of key systems. A human resources for health strategic plan is in place to continuously upgrade staff skills to reflect international best practices in digital HIS and interoperability, preferably with locally generated funds.
	Human resource capacity development	The country has no national training programs to build human resource capacity on digital HIS, including interoperability.	A nationally recognized pre-service training curriculum exists that outlines needed competencies for human resources for digital HIS and the interoperability of the HIS.	A plan exists for in-service training of HIS staff to build skills around digital HIS and interoperability based on a nationally or internationally recognized HIS curriculum.	The country has the capacity to train enough staff to support digital HIS and interoperability, through in-country pre-service and in-service training institutions or partnerships with other training institutions. Government and stakeholders provide sustainable resources for health ministry staff to receive training on HIS, including digital HIS and interoperability.	Opportunities and incentives are in place for continuing education in digital HIS and interoperability for HIS-related cadre staff, to keep them up-to-date as the HIS field evolves.

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Technology	**National HIS enterprise architecture**	A national HIS enterprise architecture document defining technology requirements and data exchange formats for interoperability does not exist OR there is a draft document, but it has not been validated or shared with the country's HIS community.	A validated national HIS enterprise architecture exists that defines technology requirements and exchange formats for interoperability. It is validated, but not widely shared or systematically applied by the HIS community. Point to point data exchange between some HIS applications exists, but there is no systematic implementation of the agreed-upon architecture.	Foundational tools and rules for HIS interoperability exist. They include a health information management system for routine and surveillance data, and core authoritative registries (Facility Registry, Metadata Dictionary, Master Patient index, and Health Worker registry). The Interoperability Service Layer (ISL) for the HIS is operational and provides core functions, such as data authentication, translation, and interpretation.	The government owns, enforces, and leads implementation of the national HIS enterprise architecture, including the ISL and core authoritative registries (Facility Registry, Metadata Dictionary, Master Patient index, and Health Worker registry).	The national HIS enterprise architecture and its ISL are fully implemented using industry standards. The ISL provides core data exchange functions and is periodically reviewed and updated to meet the changing country data needs. There is continuous learning, innovation, and quality control in the work on HIS interoperability.
	Technical standards[2]	No defined technical standards exist for use in the country's HIS data exchange. Applications are hosted by the providers without any control from the government or Ministry of Health.	An HIS ICT infrastructure assessment has been conducted and the needs for a coherent HIS ICT infrastructure architecture have been documented. The country has adopted or developed technical standards for health data exchange, messaging, and security.	An interoperability lab exists for new partners to test technical standards or for onboarding new HIS subsystems, and a certification mechanism exists for new HIS subsystems to be integrated in the national HIS.	Technical standards for national data exchange have been published and disseminated in the country under the government's leadership. The ISL is orchestrating data exchange between existing HIS applications hosted by the integrated ICT infrastructure supporting the national HIS.	A routine review of standards and requirements compliance is conducted to ensure continuous integration of the various subsystems.

[2] Including standards for data exchange, transmission, messaging, security, privacy, and hardware

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Technology	**Data management**[3]	No national document for data management procedures exists for the national HIS.	Electronic data management procedures for the HIS are clearly developed and documented in a nationally recognized document.	A roadmap is in place to migrate data collection and reporting from a paper system to an electronic system, complete with necessary data security safeguards. A documented mechanism is in place for maintaining data quality throughout the data supply chain.	National electronic data management processes are published and disseminated for the HIS. A standard operating procedure and/or data use plan is in place to facilitate data use by the country and its stakeholders. A data warehouse, integrating data from all HIS subsystems and allowing for data triangulation and quality control, is fully functional and in use.	Data access and use are constantly monitored, and data management systems are updated accordingly. Electronic data transmission is the default method to move data among information systems. Dashboards displaying information from multiple sources are available to decision makers.
	HIS subsystems	The country's HIS mainly consists of stand-alone program-specific subsystems working in silos, and addressing only the basic information needs (routine HIS, surveillance system, and human resources). Program-specific parallel systems exist.	HIS data exchange is mainly facilitated by a single subsystem directly linked to other subsystems to enable basic data exchange.	Guidelines for compliance with technical standards for HIS subsystem interoperability with the national HIS have been disseminated. An increasing number of HIS subsystems are web-based and integrated with the ISL following the national standards requirements.	The government requires all HIS subsystems to comply with the country's interoperability plan, including use of technical standards.	Most HIS subsystems are exchanging data electronically, according to industry standards/best practices.
	Operations and maintenance (for computer technology)	Operations and maintenance services for electronic systems are ad hoc or non-existent.	Maintenance for network and hardware is a mix of reactive and evolving preventive procedures.	The country is receiving technical support to build a strong in-country capacity for computer technology maintenance. Standard operating procedures exist that detail protocols for routine network and hardware maintenance.	The country has the capacity for strong in-country technical maintenance. Computer operations and maintenance services are part of the HIS plan or the country's strategic plan for health. A disaster recovery plan for digital HIS is in place, and it meets best practices.	The operations and maintenance services plan is continuously reviewed and adapted to evolving HIS interoperability requirements, and follows industry-based standards. Regular simulations are undertaken to increase the ability of technology staff to respond to a disaster.

[3] Procedures on how data are captured, stored, analyzed, transmitted, and packaged for use across the data supply chain

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Technology	**Communication network: local area network (LAN) and wide area network (WAN)**	The country has no reliable network connection to support a national HIS.	An ICT infrastructure assessment has been conducted to determine LAN and WAN requirements for the country's HIS. The country is using mainly unreliable wireless (2G, 3G or 4G) modems to connect to the HIS services.	A national implementation plan to meet the LAN and WAN requirements in the country exists. A national network maintenance plan exists to ensure high uptime, including procedures to recover from network failure. The country has started to implement a technical solution to ensure permanent connectivity to the HIS services.	All national offices and at least 50% of the subnational offices of the Ministry of Health and health service providers have a strong and reliable network connection to the various HIS network services. An HIS-dedicated ICT and network support team is in place.	All or almost (>75%) all the Ministry of Health's national and subnational offices and health service providers have a reliable and robust network connection. A team dedicated to support connectivity exists and has adequate financial, human, and technology resources. Industry-based standards are followed.
	Hardware	The country has limited/ inadequate hardware (servers, user computers, printers, and supportive accessories) to support a national HIS.	An ICT infrastructure assessment has been done to identify the hardware required at national and subnational levels. Less than 50% of the Ministry of Health's national and subnational offices have the required hardware (computers, printers, connecting devices, etc.).	50% or more of the Ministry of Health's national and subnational offices have the required hardware, including back-up hardware.	Seventy-five percent (75%) of the Ministry of Health's national and subnational offices have the required hardware. There is a back-up and recovery plan for the national HIS.	The hardware meets national and/or international specifications, and a long-term plan (five years or more) is in place that details how to keep hardware up-to-date.