

Strengthening national data systems

Context:

Efficient supply chain systems require high-integrity and timely data to inform decisions resulting in greater operational efficiencies, improved customer experience and mitigated risks¹.

Considering that an information system is defined as a group of components interacting to produce actionable evidence², the ongoing trend to solely invest in the acquisition of softwares is bound to provide limited to no results.

Among other examples, UNICEF recently observed the limited gains obtained through this software-focused approach when a country A solely invested in an e-platform to increase the visibility of its health products and equipments across the national supply chain.

Country A utilising a software-based approach to increase product visibility

Challenges:

1. Limited product and equipment visibility across all levels of the public supply chain.
2. Facility-level personnel reluctant to report the real situation if it showed low performance levels.
3. Unreliable paper-based information system and limited data integrity.

Approach:

1. Invest in technology-based solutions which included:
 - a. Development of an e-LMIS and mobile apps.
 - b. Nation-wide deployment plan focused solely on transitioning from paper to electronic solution.

Results:

1. Limited adoption levels caused by the low levels of computer literacy at the regional and health facility level.
2. Limited deployment and utilisation caused by the unstable electricity, internet and other required resources.
3. Limited government ownership caused by the lack of funds to ensure long-term sustainability.

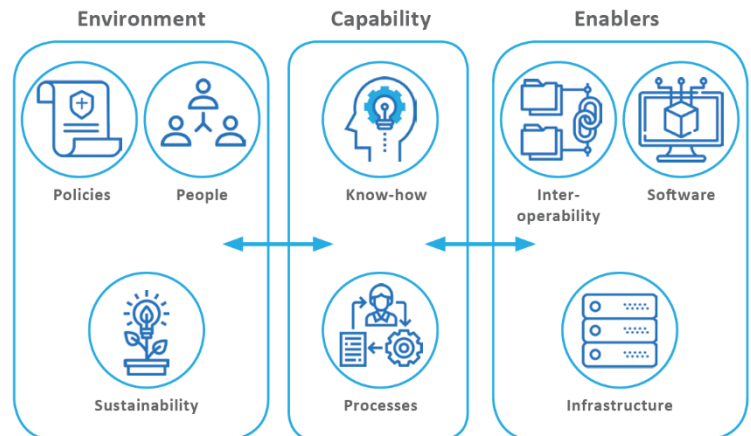
Lessons Learned:

1. A sole technology-focused solution will provide, at the most, limited and temporary gains.
2. Data integrity and availability are not dependent on the medium used to report data but are rooted in the processes which govern the generation, registration and reporting of data.

Technical Background:

Information systems are a dynamic ecosystem formed by multiple areas which continuously interact with each other to generate, transmit and transform data into information to guide strategic and tactical decisions.

UNICEF recommends placing all these areas into three main groups which form the basis for strengthening the information system in a structured manner.



The **environment** provides the foundation of any information system and includes all the policies, regulations, personnel and efforts to ensure long-term technical and financial sustainability.

The **capability** refers to the technical know-how and all the different processes related to the generation, reporting, transformation, mining and harnessing of data to transform it into actionable evidence.

¹ Md. Tahiduzzaman*1 et. al., "Big data and its impact on digitized supply chain management." *IJRDO-Journal of Business Management*, vol. 3, issue 9, Sept. 2017, pp 196-205

² Kroenke, David, et. al., "Experiencing Management Information System (MIS)", Pearson Australia, 2013, pp 9

Strengthening national data systems

The **enablers** include all the required infrastructure and technology-based solutions which will increase the efficiency of the information system.

To strengthen national systems aligned to this structure, UNICEF recommends a phased and process-based methodology which aims to ensure long-term financial and technical sustainability.

Analysis phase recommendations:

1. Map the national supply chain highlighting the flow of data and inventory across all levels and all involved stakeholders. This exercise also includes the data-related cycle times and amount of data forms in place. It is recommended to utilise the [Value Stream Mapping](#) technique.
2. Review the current status of all the components of the information system considering the following factors:
 - a. Assess the **policies** in place to understand if they are up to date and provide the adequate legal framework to ensure all data is owned, managed by the government with the required access authority levels;
 - b. Review the **people** working across [all levels of the public system](#), including their competencies, roles and responsibilities, and related HR structure.
 - c. Assess the long-term **sustainability** of the current system across two crucial areas. Financially to ensure the government can absorb all direct and indirect costs and technically independent to absorb the responsibility of hosting, managing and maintaining the information system with no external support.
 - d. Analyse the technical **know-how** to review the government's capacity to:
 - i. Define and manage the data architecture;
 - ii. Ensure and measure data quality and integrity. Note that these [two concepts are linked but different](#);
 - iii. Harness and exploit data to transform it into actionable evidence through data analytics;
 - iv. Align the indicators to real managerial and operational needs.
 - e. Review all in-place **processes** utilised across all levels of the system to generate, register, report and mine data to inform decisions considering the following parameters:
 - i. Reporting-related procedures;
 - ii. Frequency and quality of all field supervisions in place to assess the quality of data (*if applicable*);
 - iii. Storage conditions for both paper and electronic reports.
 - f. Assess the **interoperability** capacity across all electronic information systems in-place to exchange and interpret the shared data at the foundational, structural and or semantic level. For two systems to be interoperable, they must be able to transfer, relate and introduce data in such a way that the end-user can easily understand it.
 - g. Assess the capacity of the **software** to satisfy the requirements of the end-user from a developer and a business analyst angle. This approach includes understanding the technological characteristics of the software (*database, programming language, etc.*), *their* functional and non-functional features and alignment to government needs.

Strengthening national data systems

- h. Assess the **infrastructure** across all levels of the public system, including the capability of the server(s) to host the e-platform, the proportion of facilities with adequate access to computers and internet connection, as well as the capacity of the Government to maintain the equipment.
3. Understand and confirm the information collated from the previous two steps by interviewing staff at the central, regional and local levels. Consider the following parameters:
 - a. Understand the level of effort required to generate, register, report and transform data into evidence across all levels;
 - b. Confirm all functional and non-functional requirements, including those not part of the information system (e.g., reporting requirements);
 - c. Understand all supervisory-related processes and the metrics utilised across all levels to measure data quality and compliance to established procedures.
 4. **Quantify and monetise the characteristics and gaps** of the information system. Consider the need to provide evidence for all recommendations and develop a business case for Governments and donor partners to document and highlight the return of investment expected, establishing baseline and target values. These are critical advocacy strategies to secure external funding.

Strengthening phase recommendations:

1. **Develop context-driven work plans** considering:
 - a. That UNICEF strongly recommends assessing and enhancing all data-related processes before deploying software and technology;
 - b. The inclusion of a clear exit strategy and transition of the technical knowledge, roles and responsibilities to Government counterparts.
 - c. The potential existing and new investments of other donors across other health programmes. In these cases, it is recommended to study the feasibility of expanding and integrating the software functionally across two or more health programmes.
2. **Coordinate with all involved stakeholders**, especially donors, to align, when feasible, all investments in procuring and deploying software. Furthermore, implementing the steps from the analysis phase would greatly benefit multiple health programmes and provide financial savings associated with the enhancement of cross-cutting components such as policy, people, sustainability, processes and technical know-how.
3. It is of crucial importance to enhance the Government's capacity to implement **supply chain data analytics**. Especially the ability to link supply chain indicators with health outcomes to provide managers with a programme-wide overview upon which to base strategic and tactical decisions. (e.g. immunisation dashboard)

Strengthening national data systems

Country B utilising a process-based approach to increase product visibility

Challenges:

Inability of the National HIV Programme to fulfil international and donor-related reporting requirements. This was due to:

1. Limited visibility and understanding of the number of patients, treatment schemes and other relevant epidemiological information.
2. Limited adherence to established data registration protocols and tools resulting in poor data quality which affected upstream supply chain processes such as procurement and planning.

Approach:

3. development of a process-based strategy to measure and ensure data integrity, availability and timeliness.
4. Provision of continuous on-site support to improve data generation, registration and reporting processes.
5. Assessment of the level of data integrity and quality across all health facilities to track the progress achieved.

Results:

6. An increase of 72 percent in the data integrity, of 74 percent on timely reporting and 65 percent on completeness.
7. Continuous access to live high-integrity data which resulted in significant financial savings due to enhanced forecasting, planning and procurement processes.
8. Government absorbed all project personnel as part of the exit and sustainability strategy which was contingent on the success of the project.

3. Interventions should have identified a clear exit strategy and transition period of technical knowledge to Government staff.

Critical success factors:

1. Develop process-based solutions whereby the review and recommendations to enhance the enablers and the capabilities will inform the selection and deployment of the enablers (see adjacent case study example)
2. Governments benefit from an integrated programmatic information system that is capable of matching operational supply chain indicators with health outcomes.
3. Available funding sources include the Global Fund which [allocated up to 1%](#) of the [\\$3.1bn 2018 funding envelope](#) to enhance in-country data systems.

Contacts for support in UNICEF

UNICEF Supply Division
sc.strengthening@unicef.org

Health System Strengthening considerations:

When enhancing national information systems, consider the following recommended criteria:

1. Interventions should have at least one cross-cutting benefit that extends beyond a single health programme;
2. Interventions should produce permanent and sustainable results;