CRITICAL SUCCESS FACTORS
FOR DEPLOYING DIGITAL LMIS

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Over the last decade, the technology environment in developing countries has changed significantly. Fiber optic and cellular networks are rapidly expanding in many low-income countries, offering new opportunities to strengthen and automate information systems throughout the health system.

Health system supply chains in many countries are leveraging this changed environment, with digital solutions that support reporting at different levels of the supply chain. Logistics management information systems (LMIS) at service delivery points (SDP) are largely on paper: service registers, tick sheets, stock keeping records, and monthly aggregate reports. At higher levels, paper-based aggregate reports have been replaced by electronic tools,[i] such as Excel® spreadsheets and, more recently, online information systems. Some country programs are using cellular SMS to report key data elements from the SDP.

Technology deployment in health supply chains and in health more generally has a checkered history, with both failures and successes offering valuable lessons for the future. Effective digital LMIS depend on the right combination of people, processes, and technology.[ii] Skilled people must record, analyze, manage, and use supply chain data at every level. The LMIS must enable efficient business processes—inventory management, reporting and ordering, etc.—and incorporate routine data management processes. And the LMIS must leverage appropriate technology that is feasible to deploy and sustain, and is embraced by users at each level.

The following critical success factors are informed by experience deploying digital LMIS, and are aligned with the Principles for Digital Development.[iii]

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VILLAGEREACH Starting at the Last Mile

1. **MAKE THE USER THE FOCUS.** Any system that generates large amounts of high-integrity data is still limited if the users lack capacity to use the information. Training is an essential element, but data overwhelm and analytical gaps among users can be mitigated by creating intelligent dashboards: event- or action-based, often graphically-driven, and user-specific. Different types of operational and management users will require very different data through their dashboards, depending on their responsibilities. System-generated push notifications can remind or alert users to key actions or problems. FLHWs may not need a dashboard so much as the data-driven SMS or email messages and reminders that guide care delivery and that motivate performance.[iv]
2. **GET THE RIGHT DATA.** Digital LMIS systems must collect the right data to operate supply chain systems effectively. These include consumption (or use), stock status, losses (e.g. expiry, damage), vaccine vial monitor and temperature data, as well as batch and expiry and transactions (issues, receipts, transfers) to ensure track and trace capability. An appropriate algorithm can be programed into a digital LMIS solution that uses a mixed method—a ratio between consumption and targets, adjusted for stock on hand and losses or adjustments—to suggest local replenishment quantities. LMIS software also requires the use of stockkeeping units (SKUs) instead of tablets or doses to manage inventory, and should support barcode capabilities to facilitate inventory management and inventory track and trace.
3. **MAKE THE BUSINESS CASE:** Implementing a digital LMIS, especially at a national scale, almost always requires significant resources. In order to generate support for this investment, it is important to identify the service or supply problems that the digital LMIS will address, quantify the extent of the problems using data wherever possible, provide a vision for the system (people, process technology, results) once it is implemented, identify metrics and measures of success that will be tracked as the system is rolled out, estimate the implementation and ongoing operating costs, and identify the champions and high level stakeholders who will sponsor the effort.
4. **OPTIMIZE, THEN AUTOMATE.** LMIS is the engine that drives the entire supply chain. Optimization starts with an assessment that should map all existing business processes in the supply chain to identify redundancies, dead-ends, and other signs of dysfunction. The assessment must be followed by participatory re-engineering to optimize as many of the business processes as possible before introducing automation.

MALAWI MADE DATA COLLECTION SIMPLE AT THE LAST KILOMETER

cStock is an SMS-based stock reporting and resupply system used by community health workers (CHW) in Malawi to manage 14 commodities for community case management. Only a few data points are collected due to the character constraints of SMS messaging and the small number of commodities managed by CHWs. Yet cStock has shown that many of the critical decisions about quantification, positioning stock, and restocking can be determined based on two data points—stock on hand and receipts—as long as they are tracked regularly and stored in an electronic system that can retrieve the data to understand and track patterns over time.[iv] In 2017, JSI supported the MOH in expanding cStock to include vaccines and related products to inform replenishment.

TANZANIA OPTIMIZED, THEN DIGITIZED TO IMPROVE DATA VISIBILITY AND USE

Prior to launching the eLMIS in Tanzania, the Ministry of Health and Social Welfare and Medical Stores Department (MSD) spent over a decade integrating and streamlining the supply chain for most health products. The design of the eLMIS was based on common business processes that had been optimized and reinforced through trainings and mentoring support at health facilities and districts, but performance was still an issue due in part to poor data visibility and use. In 2012-2013, the eLMIS was designed and developed, a national logistics a management unit (LMU) was established, with personnel distributed throughout MSD's 9 zones. In the first year of the eLMIS and LMU launch (2014-2015), stock out rates for all product goods dropped from 32% to 23%, with the frequency of stock-outs greater than 7 days dropping from 24% to 15%.[v]

5. **ESTABLISH EFFECTIVE GOVERNANCE.** Stakeholder buy-in is essential for technology deployments to work, and includes users, technology and subject matter experts, project managers, and high-level champions and funders to monitor milestones and to ensure adequate resources. A project charter[vii] is critical and must align with national eHealth strategies and data policies. The implementation strategy must engage users in determining requirements, plan for scale, and consider both deployment and ongoing support.
6. **CONSIDER AGILE DEVELOPMENT APPROACHES.** If software development is required to extend the software solution to support user needs, the agile software development[vi] approach provides a process for user engagement and incremental change that can prioritize and deliver features frequently to get user feedback. Agile development can deliver more of what users need, in less time, than traditional approaches. Donor and ministry stakeholders need to fully buy-in to the agile approach, and commit to making users available throughout the duration of the project.
7. **INTEGRATE.** Digital supply chain solutions operated within a broader eHealth ecosystem and must comply with evolving health enterprise architecture and data standards to enable interoperability[vii] in which data flow seamlessly from application to application. Integration can also improve the user experience by offering a single login to access all the data they require from any application.
8. **MANAGE CHANGE.** Technology should ease the burden on workers and help them perform better. Changing how people integrate new processes or technology into their jobs requires a sustained focus on supporting users and the organizations in which they work. This entails a communication and training strategy at every step; let people know change is coming, how they (or their work) will benefit, what their roles will be, when they will be trained, how they will be supported, how performance will be monitored. Committed champions at every level should be engaged in decision-making about the new system, and can be change agents among their peers. There must be local capacity to provide user support for help-desk and mentoring, to respond to user-driven change requests, and to enable continuous improvement. And the entire system must not remain static; processes and support must be put in place to enable continuous improvement and evolution based on changing circumstances, such as new product introductions, or new service delivery approaches.

9. **DETERMINE TOTAL COST OF OWNERSHIP.** The upfront costs of acquiring or developing a solution is relatively straightforward, but a TCO must also include any external services needed for project management, software configuration or customization, support for user testing, data migration, and change management[vii]. Annual operating costs over 3-5 years must include ongoing user and system support, hosting services, system administration including security and backup, upgrades, hardware and internet service provision for users, and periodic training for new users. The TCO is essential for sustainability, and should be used to mobilize resources for the upfront investments and to budget for ongoing support.

There are very few LMICs that have achieved true end-to-end visibility of their health supply chain, but more and more ministries of health recognize the critical need to have and use data to achieve universal health-related Sustainable Development Goals. A growing number of LMICs are navigating the complexities of deploying effective LMISs to meet the needs of next generation medicine and vaccine supply chains.[viii] Early adopters of information technology for supply chains offer valuable lessons for other countries as they begin their own journeys.

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