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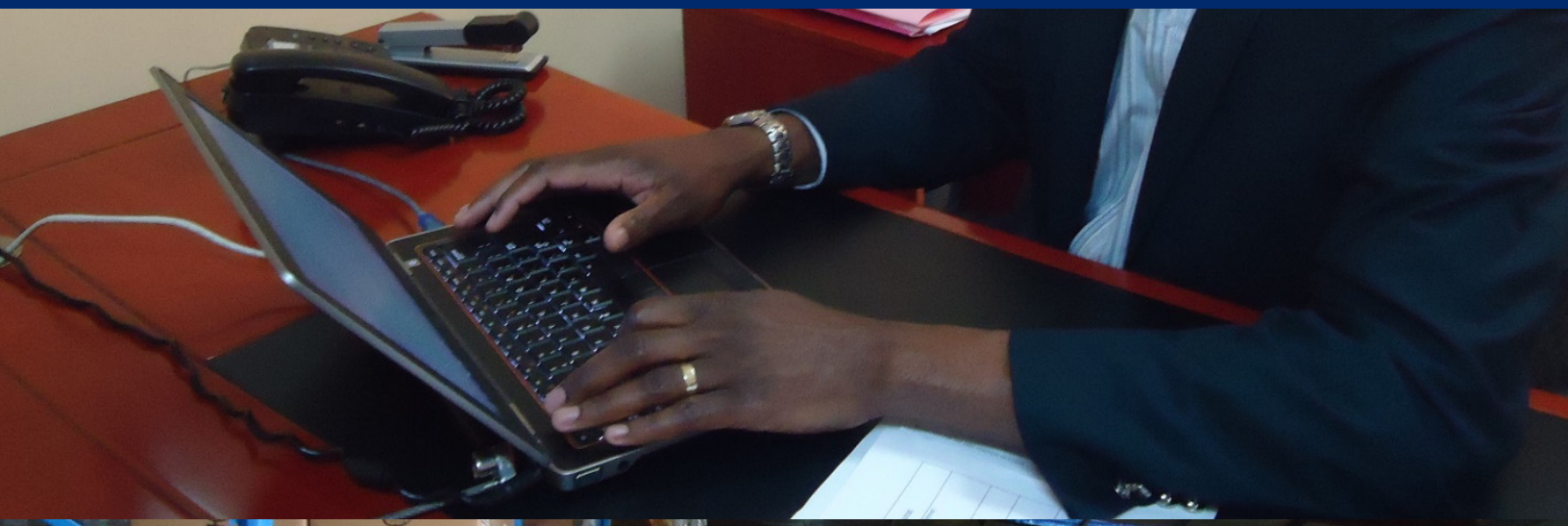
Malawi: Business Case for an Electronic Logistics Management Information System



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Malawi: Business Case for an Electronic Logistics Management Information System

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Abstract
In July 2013, the Ministry of Health (MOH), with technical assistance from the USAID | DELIVER PROJECT, Task Order 4 and Task Order 7, conducted a capability assessment of the Malawi public health supply chain system to support the implementation of an electronic logistics management information system (eLMIS) in the country.

The assessment documented challenges in human and infrastructural resources in Malawi, as well as how those gaps are being addressed to facilitate the proper operation and use of an eLMIS. This report includes the findings of this assessment, and presents a business case for implementing an eLMIS to replace the current reporting system in Malawi.

Cover photo note: Top: Staff person working at laptop in Malawi. Bottom: Health commodity warehouse in Malawi. 2013. USAID | DELIVER PROJECT.

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Acronyms

AMC	average monthly consumption
ARV	antiretroviral
CHAM	Christian Health Association of Malawi
CMED	Central Monitoring and Evaluation Division
CMS	Central Medical Stores
CMST	Central Medical Stores Trust
DHMT	District Health Management Team
DHO	District Health Office
DPT	District Pharmacy Technician
DSC	drug store clerk
eLMIS	electronic logistics management information system
EPI	Expanded Programme on Immunization
GOM	Government of Malawi
HMIS	health management information system
HR	human resource
HSA	Health Surveillance Assistant
HSSP	Health Sector Strategic Plan
HTSS	Health Technical Support Services
IMCI	Integrated Management of Childhood Illness
IT	information technology
I-TECH	International Training & Education Center for Health
LMIS	logistics management information system
MOH	Ministry of Health
MS	Microsoft
NMCP	National Malaria Control Program
NSSD	National Stock Status Database
PSC	parallel supply chain
RHCS	reproductive health commodity security

RMS	regional medical stores
SCMgr	Supply Chain Manager
SDLC	System Development Life Cycle
SSDI	Strengthening Service Delivery Integration
TB	tuberculosis
UNCoLSC	United Nations Commission on Life-Saving Commodities
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development

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Business Case Highlights

The public health supply chain in Malawi has suffered in recent years, in part because of the lack of accurate, timely logistics data from health facilities which is essential for making decisions about procurement and supply. This lack of data can be attributed to three types of challenges: (1) human resources, (2) infrastructure, and (3) technology. While efforts are currently underway to address the first two, the third continues to be a challenge. Human resource constraints are being addressed through training, supportive supervision, and advocacy for data use; while infrastructure challenges are addressed by providing reporting forms to facilities, and collecting forms from facilities and delivering them to the districts. Also, District Health Offices (DHOs) are provided with Internet modems and airtime where broadband Internet is not available at the district.

While these interventions have yielded positive results—for example, reporting rates for malaria in May 2013 were 73 percent, up from 48 percent in January of the same year—challenges remain in getting logistics information from the districts to the central level. The Supply Chain Manager (SCMgr) software application, which is used to capture data from facilities and subsequently transmit it to the central level, is an outdated and difficult to use standalone application. Users at the district often cannot enter and transmit logistics data due to crashes, error messages, and many problems that are difficult to diagnose from the central level. These users, Pharmacy Technicians, who have little to no information technology experience, are understandably frustrated by problems with the application. Additionally, because the application is not networked, if the computer on which it is installed is down or does not have Internet access, transmitting data is almost impossible. Technical problems with SCMgr are considered the biggest obstacle to regular, timely reporting by the districts.

At the central level, maximum size limits on Microsoft (MS) Access databases make it impossible to store all historical data in one database. This means that the master databases of SCMgr and the National Stock Status Database (NSSD)—a separate MS Access application that was developed to produce national-level reports from logistics data—are divided into several smaller databases, each holding data from a different time period. The NSSD also takes a very long time to import data from SCMgr and to process monthly reports. The standalone nature of the master databases means that any computer crashes interrupt operations while the computers are being fixed. File corruption sometimes requires rebuilding the databases from scratch, resulting in a potential loss of data. It was also recently discovered that calculations for average monthly consumption in the NSSD are incorrect and cannot be used to create reports.

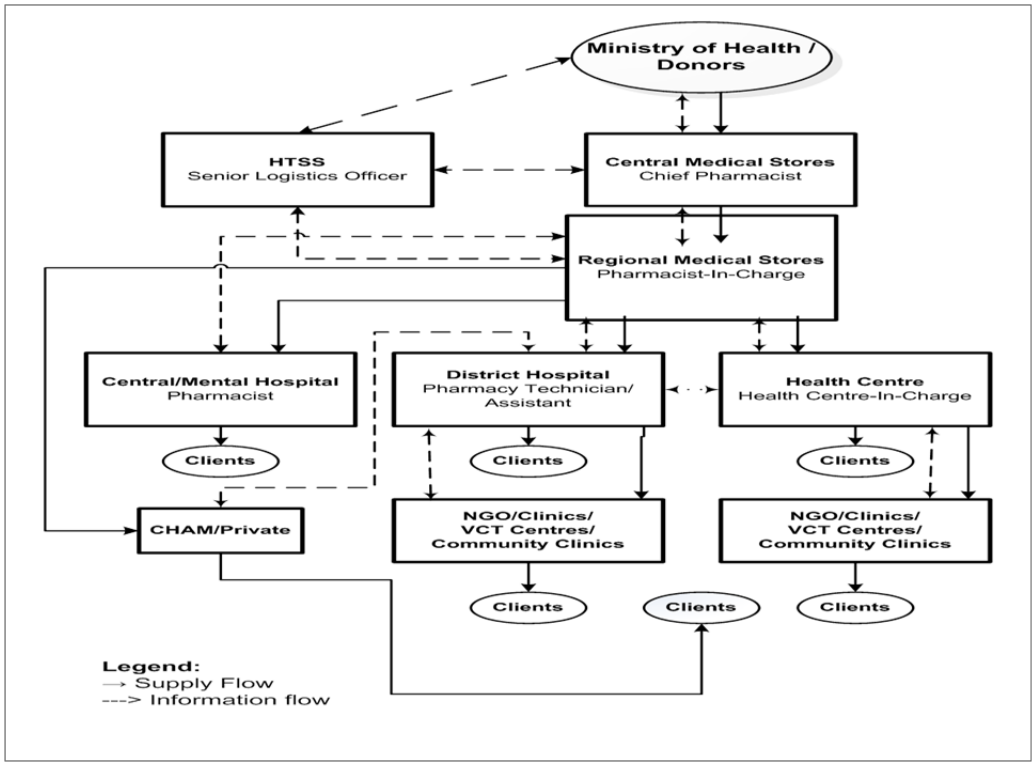
It is recommended that a robust, web-based electronic logistics management information system (eLMIS) be implemented to replace SCMgr and the NSSD. This eLMIS would function at the district, hospital, and central levels, and would enable the capture of facility logistics data at any computer with Internet access. Aggregated national-level reports would also be integrated with the system, allowing for real-time visibility into the public health supply chain for anyone with the appropriate infrastructure and access permissions. While implementing an eLMIS cannot, by itself, solve all the problems with the public health supply chain in Malawi, when it is combined with the other interventions already being used in the country, it will contribute to a healthy flow of logistics

information from facilities to the central level, providing decisionmakers with sufficient data from which to make procurement and supply decisions.

Background

The integrated health commodity supply chain in Malawi was designed in 2003, and assumed a central role for Central Medical Stores (CMS), which at the time was a unit under the Ministry of Health (MOH). The CMS was responsible for distributing products to three regional medical stores (RMSs) located in the Northern, Central, and Southern regions of the country. From the RMSs the products were delivered directly to health facilities, including facilities run by the Christian Health Association of Malawi (CHAM). Distribution was based on logistics management information system (LMIS) data submitted by health facilities to the district, where the District Pharmacy Technician (DPT) calculated requisitions for each facility and submitted them to the RMS once a month. The DPT was also responsible for capturing LMIS data in SCMgr and submitting it to the MOH HTSS unit. See figure 1 for a graphic illustration of the flow.

Figure 1. System Design for Commodity and Information Flow



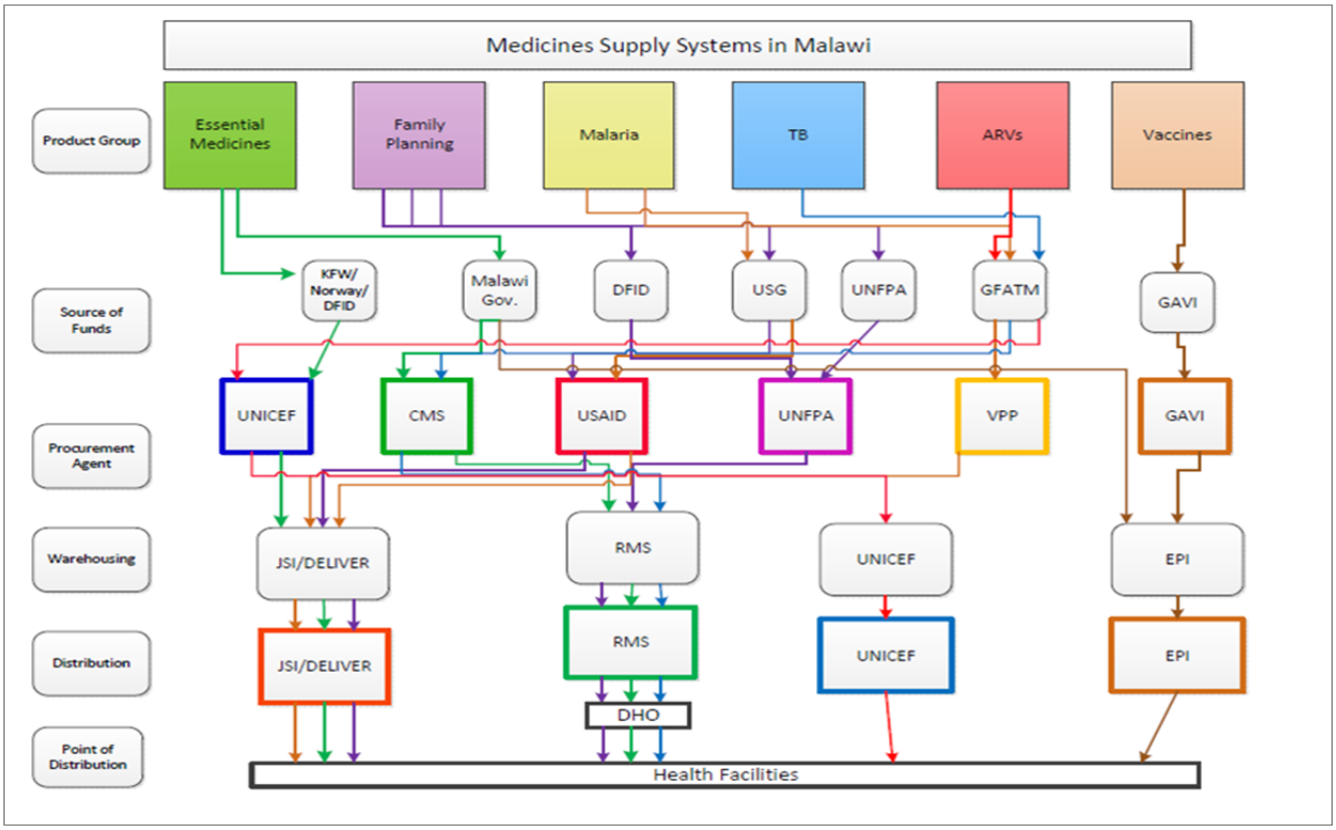
During the past few years, the LMIS for health commodities in Malawi has suffered due to economic and financial challenges facing the country. Challenges with the distribution of public health commodities led several donors and implementing partners to create parallel supply chains for storing and distributing commodities for their supported programs. In 2011, to improve performance, the CMS was removed from the MOH structure and was established as an

independent trust—the Central Medical Stores Trust (CMST). In January 2012, an essential medicines kits program was implemented as an emergency response to severe stockouts of essential medicines at health facilities and at the central level. The kits program, only intended to be temporary measure, is scheduled to end in September 2013.

Currently, four parallel supply chains for public health commodities are operating in Malawi (see figure 2):

1. The USAID | DELIVER PROJECT distributes malaria commodities, family planning products, and essential medicine kits.
2. The United Nations Children's Fund (UNICEF) distributes antiretroviral drugs (ARVs) and HIV test kits.
3. The Expanded Programme on Immunization (EPI) distributes vaccines.
4. The CMST distributes family planning commodities, tuberculosis (TB) drugs, and some essential medicines.

Figure 2. Public Health Supply Chains in Malawi



In February 2013, a team of consultants assessed the LMIS in Malawi and developed a set of recommendations for improvement. Among these, the team recommended replacing the existing technology solutions for reporting and storing LMIS data with an online electronic LMIS (eLMIS) that would be more robust and integrated than the current solutions. This assessment was followed up with a strategic planning and requirements gathering workshop in May 2013 where multiple stakeholders developed their vision and high-level requirements for the eLMIS. In July 2013, a

capability assessment was conducted to document current gaps in human and infrastructural resources in the country, and how these gaps will be addressed to facilitate the proper operation and use of the eLMIS. This document presents the findings of the capability assessment and a business case for the eLMIS.

Assessment Methodology

The capability assessment primarily used qualitative interviews with key informants at the central-, district-, and facility level. At the central level, interviews were held with staff within CMST, as well as with staff in the following MOH units and departments: HTSS, information technology (IT), and the Central Monitoring and Evaluation Division (CMED). The team also visited four DHOs—Dowa, Kasungu, Lilongwe, and Ntchisi—where members of the District Health Management Team (DHMT) and the DPTs were interviewed. Site visits were made to eight health centers (two in each district), during which health center staff and associated community health workers—Health Surveillance Assistants (HSAs)—were interviewed. Additionally, DPTs from each of the districts were surveyed about computer and Internet accessibility at the district level, although the team did not visit each district.

Overall Supply Chain Interventions

Critical to the success of all supply chains is the availability and use of accurate, timely, and complete data for decisionmaking. Transmitting data from the approximately 650 health facilities in Malawi requires both human resource capacity and the appropriate infrastructure. To identify these reporting requirements, first the reporting process must be understood (see figure 3). Under the current reporting system, paper-based reports are filled out at health facilities and then transmitted to the district; there, the data are entered into the SCMgr software application before being transmitted to CMST and HTSS. Requisitions are submitted to CMST in a hard copy, while the LMIS reports in SCMgr are transmitted electronically to HTSS.

Figure 3. Flow of Information from Health Facilities

Human Resources

Accurate reporting of stock status relies on having sufficient staff trained to manage drug stores and to capture logistics data. This requires training staff, providing on-going support, and building the capacity of decisionmakers to use the data they receive. These three areas—(1) training, (2) supportive supervision, and (3) building data culture—are currently being addressed in Malawi. The result is an increased ability to capture and use logistics data, as shown by increased reporting rates for malaria commodities—from 48 percent in January 2013 to 73 percent in May 2013.

Training

The Government of Malawi (GOM) contributes at least 60 percent of healthcare service delivery in the country, while CHAM contributes about 37 percent and the private-for-profit sector less than 3 percent. The MOH, with support from the USAID | DELIVER PROJECT and other partners, has begun a series of interventions intended to increase the public-sector human resource capacity to maintain national reporting rates above 70 percent.

To ensure that health facility staff have the skills they need to monitor and report on stock levels, HSAs were trained in early 2012 as drug store clerks (DSCs). Training included how to maintain storage conditions, manage stock cards, conduct a physical inventory, and complete LMIS reports. Deployment of DSCs to health centers began in July 2012; by the time a refresher training was held in November 2012, HSAs had been placed as DSCs in approximately 65 percent of all health facilities, including a few CHAM facilities. However, most of the CHAM facilities would not allow DSCs to work in their pharmacies or drug stores on the basis that they already had a cadre working in this area—the Pharmacy Attendant. By January 2013, 100 percent of government facilities had a trained DSC in place.

To address logistics management in the public facilities that CHAM manages, the USAID | DELIVER PROJECT, on behalf of the MOH, trained pharmacy attendants at CHAM facilities in drug store management. With this additional trained staff, it is expected that 100 percent of the facilities will be equipped to provide on-time LMIS reports monthly.

While the two interventions above are temporary measures, a long-term solution to the human resource (HR) challenges at health facilities has been put in place. The MOH partnered with VillageReach and the Malawi College of Health Sciences to train more than 600 Pharmacy Assistants who would be placed at all health facilities in the country. The first group of 50 will complete training this year and100 more will be trained in 2014. The USAID | DELIVER PROJECT is supporting 20 of the first cohort and intends to support more in the second cohort.

Supportive Supervision

In addition to having trained staff in place to manage drug stores and reporting, plans are in place to provide on-going support for on-time reporting at the health facility– and district levels. To encourage timely reporting from health facilities, the USAID-funded Strengthening Service Delivery Integration (SSDI) project is operating in 15 districts, where project staff visit each health facility in the district. They print and deliver the paper LMIS forms needed for reporting and are also operationalizing the collection of reports from health facilities every month. This removes the submission burden from facilities that previously relied on ambulances or public transportation to transmit reports to the district, at intervals that may or may not align with the reporting schedule. Similarly, Riders for Health is currently active in seven districts in Malawi. Their staff are supporting timely reporting by distributing printed forms and collecting completed forms on motorbikes as part of their Sample Transport programme.[1]

Riders for Health

In Dowa, three Riders for Health, equipped with motorbikes, are able to visit each of the 22 health facilities in the district once a week, increasing on-time reporting from the health facilities.

At the district level, a variety of supportive supervision interventions are planned to increase the capacity of DPTs to manage the flow of data from health facilities to the central level. Quarterly

[1] http://www.riders.org/where-we-work/malawi

integrated supportive supervision and peer mentorship ensures that each health facility is visited approximately once a year. In the coming fiscal year—October 2013–September 2014—there are plans to visit each health facility more than once. During these visits, high-performing Pharmacy Technicians help train others in data entry and management techniques. Additionally, HTSS, with support from the USAID |DELIVER PROJECT, collect the SCMgr databases from each district once a quarter to ensure data is backed up centrally. This visit is another opportunity to mentor the DPT in reporting and data utilization.

Building Data Culture

At the central level, there has also been a need to build capacity at HTSS to use data for decisionmaking. Data that is reported but not used discourages staff from reporting. To increase the data use culture at the central level, two staff were seconded to HTSS; with the support of the USAID | DELIVER PROJECT they have started to generate a Stock Status Report—an Excel-based performance report—for each of the program areas: HIV, family planning, malaria, Integrated Management of Childhood Illness (IMCI), United Nations Commission on Life-Saving Commodities (UNCoLSC), health management information system (HMIS) tracer commodities, and Health Sector Strategic Plan (HSSP) indicators. Introduced in May 2013, these reports show stock status at the facility level, by district and nationally, once a month. The reports have identified stock imbalances, and show that, in most of the programs, stock status across all facilities seems to be evenly distributed between overstocks, stocked-to-plan, and stockouts. They also help identify reporting issues that can be resolved with further training—for instance, when test kits were moved from the pharmacy to the lab, they were reported as stocked out at the pharmacy, even though they were still in stock at the facility.

In addition to the performance reports, the National Family Planning Stock Status Report was created to provide visibility into both CMST and the parallel supply chain (PSC) operated by the USAID | DELIVER PROJECT; because both receive, store, and distribute the same family planning commodities. As a result, it was agreed that the discussion of pipeline and distribution plans will be incorporated into a standing reproductive health commodity security (RHCS) meeting. Increased visibility can improve coordination, thereby ensuring that health facilities receive the commodities they require from both the PSC and the CMST. Plans are underway to create similar reports for malaria and HIV commodities.

Infrastructure

In addition to the staff time needed to complete each task, a variety of resources are required: adequate paper LMIS forms, transportation to ensure the forms arrive at the district on time, a functioning computer running SCMgr, and Internet access to transmit the reports to the central level. Table 1 below summarizes the infrastructural challenges to reporting regularly and on time.

Table 1. Infrastructural Challenges to Reporting

Reporting Need	Challenge	Solution	Solution in Place?
Monthly facility reporting	Health facility reporting requires paper forms, which must be provided by the DHO and are not produced in duplicate.	SSDI operates in 15 districts and has been assisting with printing of the LMIS forms when facilities run out (the MOH)/DHO is responsible for printing forms).	Yes, in 15 districts.
Transporting forms from health facilities to district	Facilities often rely on public transportation or ambulances going to the district to submit forms.	SSDI and Riders for Health help collect and transport the LMIS forms from health facilities to the district.	Yes, in 15 districts (SSDI), 7 districts (Riders for Health).
Entering health facility data into SCMgr	SCMgr, a standalone program, requires a dedicated computer. If the computer or program is down, entering district reports on time is difficult.	Ability to report from any computer in DHO with Internet access.	No, because SCMgr is a stand-alone application (cannot be networked).
	6 (out of 28) districts lack a dedicated computer at the pharmacy.	When SCMgr was first introduced for LMIS reporting, the USAID | DELIVER PROJECT and MSH provided computers (with the necessary software, including a licensed antivirus one-off starter pack) to all DHOs.	No, the DHO has the full responsibility for maintenance of computers and subsequent software licensing; several have not kept up with this.
Transmitting data to HTSS	Requires Internet access.	District access to the Internet. USAID | DELIVER PROJECT provides Internet modems and airtime to all DHOs.	Yes, in all districts.
	Each DHO is expected to have a minimum of two DPTs, but some have only one DPT.	Hire additional DPTs to fully staff each DHO.	MOH has a plan to hire more DPTs, but it is not always carried out aggressively. Lobbying for this continues.
	The DPTs in place have many other competing priorities.	MOH staff given airtime to call districts to remind about reporting.	Starting in August 2013.
Transmitting order to CMST	Orders must be submitted in hard copy to the warehouse—districts rely on ambulances or public transportation to submit orders.	Electronic submission of orders.	No. At this time, transition to electronic ordering is not proposed, due to signatory and technological constraints.

Business Case for an eLMIS in Malawi

Two critical assumptions underlie the development of an eLMIS in Malawi:

1. The country is moving away from the essential medicine kits program, which was an emergency intervention that began in January 2012. It was a push system and, by its nature, some commodities were overstocked and others were stocked out. With the kits program ending at the end of September 2013, there will be increased need for consumption data from health facilities so that adequate quantities of commodities can be procured and supplied, thereby reducing the stock imbalances during the kit program.
2. The ultimate goal is to integrate the program-run parallel supply chains so that health facilities will be served solely by CMST for all their health commodities. In the meantime, the eLMIS should give program managers access to consumption data for their commodities to enable them to make the best procurement and supply decisions.

As the country moves toward the increased use of logistics data for decisionmaking (interventions discussed in the Overall Supply Chain Interventions section above), it is more necessary than ever to have a reliable automated system for reporting and storing data.

Technical problems with SCMgr are considered to be the biggest obstacle to districts' regular reporting to the central level. It is reported that health facilities usually submit their paper-based LMIS reports to the district on time, but the districts cannot submit their reports to HTSS because of technical problems in turn, resulting in entire districts not reporting. This has a large impact on the nationwide reporting rate.

Example from Mangochi District

An MOH/HTSS official visiting Mangochi district in June 2013 found that the district had received 33 LMIS reports from health centers in May 2013 (70 percent); however, they only submitted information for three health centers that month (7 percent). This discrepancy was because the pharmacy technician entered the information from the health centers on two different days, connecting to a different SCMgr database on each day, and submitted the database with the smaller number of reports to HTSS in the mistaken belief that he was submitting all the information for the district. Because SCMgr is a stand-alone system on every computer, this problem was difficult to diagnose remotely; only during the visit from a central-level official did they learn what happened.

Common technical problems reported are—

- failure to create export files for transmission
- creation of export files that do not contain any data
- creation of unreadable temporary files which are sometimes submitted to HTSS in error
- requiring a password and error message that a parameter is missing, resulting in inability to open the database
- linking to the wrong database so that the user cannot see products, facilities, etc., to report on

- incompatibility issues with recent versions of Windows, including export files being saved in a hidden folder in Windows 7 and 8
- failure to count a facility as reporting, even when information for that facility has been entered
- periodic corruption of the central master SCMgr database, resulting in a need to rebuild it from scratch.

Because SCMgr is a stand-alone application, many of the problems above are difficult to diagnose and/or fix remotely from the central level, which is frustrating for users at the districts. Several of the above-mentioned problems can only be fixed by reinstalling the application, which often must be supported remotely via phone, and is often done incorrectly.

In addition to the technical problems with SCMgr, the National Stock Status Database (NSSD) also has some reported problems. Originally developed to produce national-level reports, the NSSD was intended to aggregate all stock status data in one place, including data from CMST. However, CMST data has not been included, so the NSSD currently contains exactly the same data as the central master SCMgr database. It is useful however, for producing customized reports, which SCMgr cannot do.

Problems with the NSSD include—

- the NSSD database is created monthly from the SCMgr master database. This takes more than one day to produce.
- in May 2013, calculations for average monthly consumption (AMC) were found to be incorrect in the NSSD, resulting in a loss of trust in NSSD hard-coded calculations and a movement toward creating reports manually.
- MS Access databases have a 2GB limit, so all historical data cannot be stored together. As a result, the data has been divided so everything before 2009 is stored in a separate database from data after 2009.
- NSSD only works on two computers. The computer that runs NSSD at HTSS crashes regularly.

Business Need

Persistent problems with reporting via SCMgr from districts impacts the national reporting rate and results in omission of health center data at the central level. As such, data visibility throughout the supply chain is insufficient. To improve the visibility and use of data for decisionmaking, it is recommended that a web-based electronic logistics management information system (eLMIS) be implemented in Malawi to manage reporting and analysis of public health logistics information. The eLMIS would replace the stand-alone, outdated SCMgr application. It would enable anyone with the appropriate permissions to access the system from any computer with Internet access, allowing data entry to be done even when the dedicated computer in the district pharmacy is down or is not connected to the Internet. The online nature of the system would also allow for real-time viewing of data in standard reports instead of waiting for information to be aggregated in SCMgr and the NSSD, and then for reports to be created from the data.

Cost/Benefit Analysis

The current alternatives are either to maintain the status quo or to implement an eLMIS (see table 2).

Table 2. Costs and Benefits of Maintaining Status Quo Versus Implementing an eLMIS

Costs	Benefits
Option 1: Maintain Status Quo	
▪ Potential loss of facility-level data due to problems experienced at the district ▪ Significant costs (time/money) of troubleshooting ▪ Frustration of users at the district, leading to decreased reporting ▪ Inability to store all historical data in one database ▪ Potential loss of data due to corruption of central master database ▪ Significant time costs of creating the monthly NSSD database.	▪ User familiarity ▪ Can be used offline for data entry.
Option 2: Implement eLMIS	
▪ High initial investment costs ▪ Significant change management and training required.	▪ Availability of reliable, real-time logistics data ▪ Integrated system—no need to create separate database for national-level reporting ▪ Time savings and less frustration due to user friendliness of system ▪ Ability to enter data from any computer with Internet access.

Financial Costs of the eLMIS

The preliminary budget for the eLMIS, presented in table 3, was developed with the understanding that the first version of the eLMIS will directly replace SCMgr and the NSSD and will be functional at the central-, district-, and hospital level. Data from health centers will continue to be reported on paper and entered into the system at the district. An expansion to facility-level data capture may be considered for future versions of the eLMIS, if funding is available. The budget also assumes the ability to customize existing software, such as the eLMIS currently in development for Tanzania and Zambia, or another existing product.

Table 3. Five-Year Total Cost of Ownership of eLMIS

Cost Category Descriptions		One-Time Costs + Year 1 Costs	Recurring Costs (Years 2–5)	Five-Year Total Cost of Ownership
1	Software	$70,600	$56,600	$127,200
2	Configuration/development	$238,000	$214,400	$452,400
3	Interfaces	$58,500	$18,000	$76,500
4	Hardware	$99,400	$186,500	$285,900
5	Network/communication	$67,400	$177,600	$245,000
6	Training	$204,600	$115,200	$319,800
7	Documentation	$16,000	$8,000	$24,000
8	Hosting	$14,400	$57,600	$72,000
9	Application support	$79,400	$58,800	$138,200
10	Technical assistance	$324,000	$121,500	$445,500
11	Staffing local	$117,000	$529,500	$646,500
Malawi eLMIS Total		**$1,289,300**	**$1,543,700**	**$2,833,000**

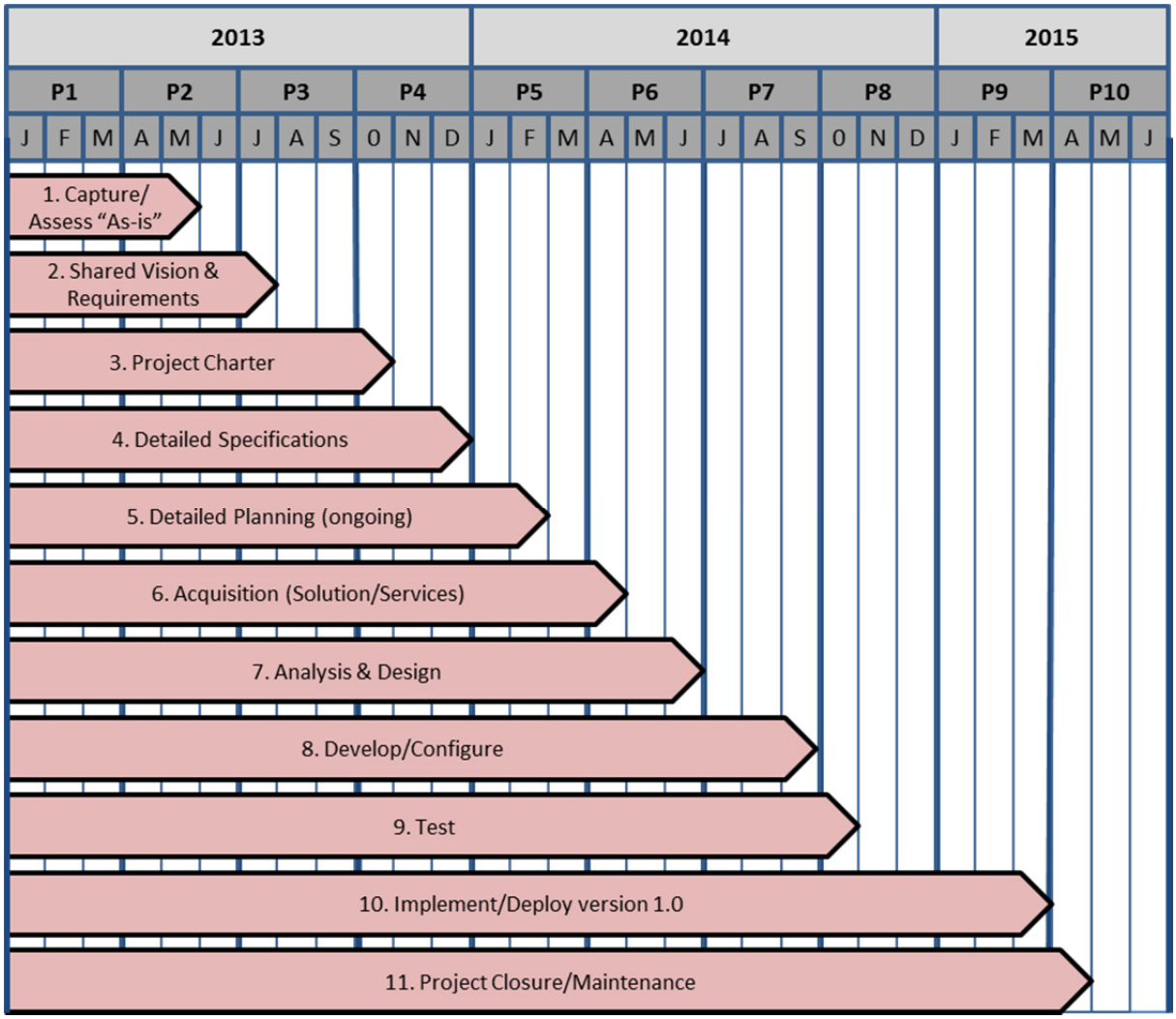
Necessary Human Resources for IT Support

The eLMIS will require system support in-country. CMED is currently implementing DHIS 2.0, which is a free, open-source, web-based system for the country's health management information system (HMIS) data collection. Similar to the LMIS data collection, HMIS data is collected on paper forms at the facility level and is computer-based at the district- and central levels. Originally developed by the University of Oslo, local developers in Lilongwe are customizing the system, maintaining the central server in Lilongwe and conducting trainings. Although the developers were recruited locally, they are financially supported by the International Training & Education Center for Health (I-TECH). While the IT component at MOH is weak, there is a long-term vision to strengthen IT capabilities within CMED, from which the eLMIS would possibly benefit. Maintenance of computers at the districts and within central MOH would also be necessary for eLMIS operation. Current IT support within the MOH includes three technical staff and two data entry clerks at the central level, who serve the MOH headquarters, satellite offices, and districts. Despite having only a few personnel, historically, issues have been handled in-house without outsourcing. District DHOs have IT posts, but many remain unfilled. The central department recruits and deploys IT staff. It is anticipated the open posts will soon be filled. In the meantime, it may be necessary to outsource the maintenance and support of DHO computers to a private organization.

Implementation Timeline and Governance

The following timeline (figure 4) is envisioned for the eLMIS project:

Figure 4. Planned Timeline for the Electronic Logistics Management Information System Project



Steps 1 and 2 are complete, while the Project Charter (step 3) is being developed. The target start date for development is July 2014, and the end goal for full deployment to all districts and hospitals in Malawi is March 2015.

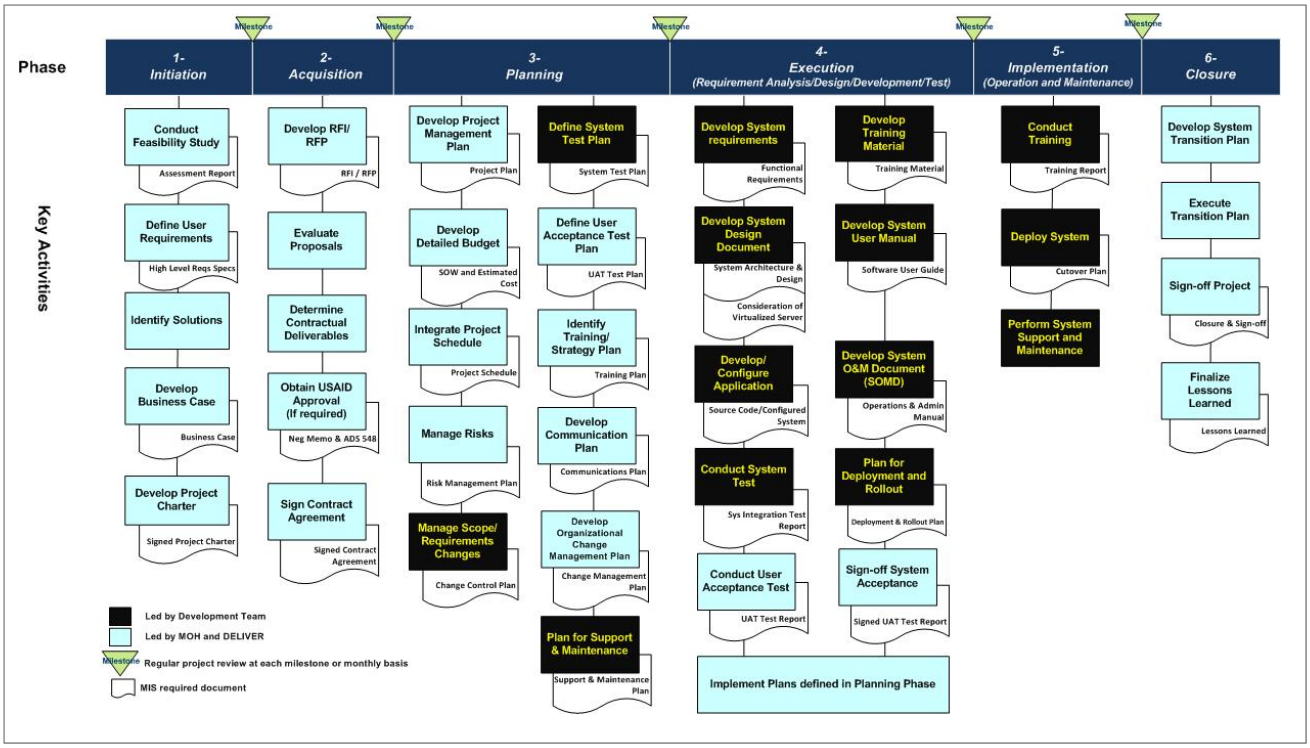
A project manager will be in charge of the project, supported by a country steering committee and a team of technical staff. The steering committee will provide project oversight by resolving issues raised by the project manager, approving project phases and major scope changes, managing risks, and monitoring the quality of the project. The committee will include representatives from several key stakeholders—

- Director, MOH/HTSS
- Supply Chain Advisor, USAID Malawi
- Country Director, USAID | DELIVER PROJECT
- Deputy Director, CMED
- Program Manager, National Malaria Control Program (NMCP)
- Permanent Secretary, E-Government
- Representative, United Nations agencies.

Task teams, comprising members of each stakeholder institution, will be created for each phase of the project in order to complete the required deliverables for a given phase, and to report to the project manager on the project's progress. The USAID | DELIVER PROJECT will also provide technical staff to work with the task teams and offer strategic guidance and routine technical support, as needed.

Planning and management of the project will be framed by the System Development Life Cycle (SDLC). The project management and SDLC framework and corresponding documentation are illustrated in figure 5.

Figure 5. Project Management and System Development Life Cycle Framework



Conclusion

For any supply chain to function effectively, it must have accurate, complete, and timely data available. In Malawi, the lack of data has led to stock imbalances and mistrust in the supply chain for public-health commodities. Ensuring accurate reporting requires trained staff and appropriate infrastructure. Training HSAs and pharmacy attendants to manage drug stores and to report on inventory is the first of many steps in developing HR capacity. On-going efforts to provide supportive supervision will help further develop the inventory management skills and continue to improve data quality. Additionally, efforts are underway to improve how the collected data is used for decisionmaking. To improve how logistics information is transferred from the health facilities to the district, two partner organizations are helping to collect reports in more than 15 districts every month; they also deliver them to the district within the defined reporting deadlines. At the district, those without broadband Internet access are given Internet modems and airtime with which to electronically transmit their LMIS data to the central level.

While these measures have been taken to overcome the human resource barriers to reporting and infrastructure, technology issues persist in the current system. Reliance on the stand alone SCMgr application to transmit facility LMIS reports from the district to the central level has reduced data visibility at the central level. An eLMIS will not solve all the challenges facing the public health supply chain in Malawi, but it will complement the existing and planned efforts to build supply chain capacity and use of data for decisionmaking.

References

Wright, Christopher, David Papworth, and Mattias Wiklund. 2013. *Assessment of the Integrated Logistics Management Information System in Malawi: Review of the Processes and Software Tools.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 4 and Task Order 7.

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