

HMIS-LMIS Integration

Generalized Use Cases
based on Assessments
in Three Countries

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Executive Summary

Growing interest in integration of logistics management information system (LMIS) and health management information system (HMIS) data to improve supply chain performance and service delivery led [VillageReach](#), funded by [Systems for Improved Access to Pharmaceuticals and Services](#) (SIAPS), to conduct an assessment of HMIS-LMIS integration use cases in three countries. The assessment aimed to identify use cases – the potential scenarios in which integration could have benefit– in several countries and ascertain if generalizable, globally applicable use cases for HMIS-LMIS integration exist. This report documents results of the HMIS-LMIS integration assessments in Uganda, Malawi, and Zambia.

VillageReach selected Uganda, Malawi, and Zambia for assessments due to their implementations of District Health Information System 2 (DHIS2), a common HMIS for low- and middle-income countries (LMICs), and varying levels of maturity in HMIS and LMIS systems and processes. In each country, the VillageReach team identified and interviewed key stakeholders including Ministry of Health (MOH) officials, program managers, partner organizations, health workers, and system administrators. HMIS-LMIS integration use cases identified in Uganda included quantification, data for management, improved data quality, and achieving a coordinated system or data repository. In Malawi the key use cases were data for management, forecasting and quantification, and creating a single data repository. Zambia's main use cases were data use for quality improvement and management, the creation of a single data repository, and forecasting and quantification.

Based on the information gathered in the assessments, VillageReach identified several generalized use cases for integration that were applicable for each of the countries assessed. The three most generalizable included forecasting, a single data repository, and data for management. Integration in each of these use cases can provide various benefits including better analysis, improved data quality, more accurate forecasts, and convenience to the end user. In previous experience with HMIS-LMIS integration in Tanzania and Senegal, however, the [UN Commission on Life-Saving Commodities for Women and Children](#) encountered several challenges that warrant consideration prior to integration. Several major factors, such as data quality, system harmonization, and data interpretation can preclude the potential benefits of integration. Lessons learned from the integration projects in Tanzania and Senegal are documented in a white paper entitled [Technology, People & Processes: Enabling Successful HMIS/LMIS Integrations](#). Many of the stakeholders across the three assessed countries identified the same challenges and concerns for potential integration.

All the generalizable use cases require LMIS data to be sent into the HMIS, which is commonly used as the central data repository for the health system. More complex, bi-directional integrations are also possible, but not required to support the most common and broadly applicable use cases based on the findings of the assessment. Countries may benefit, though, from considering the potential for more complex integrations in the future. Additionally, organizations creating or supporting HMIS or LMIS platforms should work to include import and export functionality, standard APIs, and architecture supporting interoperability. Countries pursuing integrations should carefully consider their needs and capability to support the integrated systems. Integration requires significant time, cost, and careful attention to the potential challenges in order to maximize its benefits.

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I. Background

Ministries of health and the managers of public health supply chains have a growing interest in the integration of logistics management information system (LMIS) and health management information system (HMIS) data to improve supply chain performance and service delivery. Many countries only analyze data sets together annually, to determine national forecasts, not routinely throughout the year. The lack of routine comparison may be due, in part, to the complexity of matching data elements, as different departments within ministries of health often manage LMIS and HMIS datasets. As a result decision makers often lack easy access to all the data necessary to effectively monitor and plan health system performance.

In 2014, the Supply Chain Technical Resource Team (TRT) of the [UN Commission on Life-Saving Commodities for Women and Children](#) (UNCoLSC) outlined potential benefits of linking HMIS and LMIS data in a white paper entitled [Considerations for the Integration of HMIS and LMIS](#). During the writing of this document, the Supply Chain TRT did not identify any existing case studies where HMIS and LMIS data were routinely and automatically linked. In order to test the technical feasibility and usefulness of HMIS-LMIS linkages, the Supply Chain TRT piloted [integrated HMIS-LMIS Dashboards in Tanzania and Senegal](#). To further this work VillageReach aimed to understand the use cases for integration: in what situation(s) does integration allow users to accomplish a goal (as well as which users and what goals). [Systems for Improved Access to Pharmaceuticals and Services](#) (SIAPS) funded an assessment across three countries (Uganda, Malawi, and Zambia) to extract key, globally applicable use cases for HMIS-LMIS integrations.

This report documents results of the HMIS-LMIS integration assessments in Uganda, Malawi, and Zambia. This assessment was conducted by [VillageReach](#) and funded by SIAPS.

II. Country Selection

To understand and derive potentially globally applicable use cases for HMIS-LMIS integrations, VillageReach conducted assessments in Uganda, Malawi, and Zambia. Country selection was based on (1) An implementation of the District Health Information System 2 (DHIS2), and (2) varying levels of maturity in both HMISs and LMISs. DHIS2 is one of the most widely used HMISs in low- and middle-income countries (LMICs) as well as one of the most requested systems for LMIS integration. Uganda has a robust HMIS but very little in the way of an LMIS; Malawi has an HMIS and an LMIS, both with lower levels of maturity and in the process of being upgraded; Zambia's main HMIS and LMIS are fairly mature, by comparison, with ongoing efforts focused on system harmonization and integration. All three HMISs and LMISs include a paper-based component, from paper-based at nearly all levels (Uganda) to only at the community level (Zambia). Common use cases across these three countries are likely to be more generalizable given the variety of systems in place and varying levels of maturity. Each country assessment focused on identifying use cases for that specific country. Upon completion of all three assessments, VillageReach reviewed the use cases from Uganda, Malawi, and Zambia to identify common themes and pain-points. Shared use cases were grouped into three predominant categories, described in Section IV.

III. Trip Overviews

VillageReach defined four specific objectives for each trip:

- To map the current HMIS process and identify strengths and pain points
- To map the current LMIS process and identify strengths and pain points
- Identify hypothetical or idealized features or requirements for improvements of either system
- Identify potential use cases for HMIS-LMIS integrations based on stakeholders' input

To achieve these objectives VillageReach identified key stakeholders at various levels of the system in each country and conducted interviews. VillageReach reviewed information from country-specific use cases and incorporated it into the identification and description of generalizable use cases for HMIS-LMIS data integration (Section IV). Key findings and use cases from each assessment are documented in this section. Please see the [country-specific trip reports](#) for further detail on any of the assessments.

Uganda

During the assessment in Uganda, VillageReach met with a number of stakeholders from the Ministry of Health (MOH), including individuals from the Pharmaceutical Division, Child Health Division, Information Technology (IT) Department, Monitoring and Evaluation (M&E) Department, and the HMIS Department. The team also met with stakeholders from the Center for Disease Control (CDC), Management Sciences for Health (MSH), Health Information Systems Program (HISP) Uganda, United Nations Children's Fund (UNICEF), National Medical Stores, and the Clinton Health Access Initiative (CHAI). Based on the information gathered during the assessment trip, several key findings were identified:

- Uganda's HMIS system is very strong and there is a consensus amongst stakeholders that it is working well, particularly at the central level.
- Data completeness and quality are main concerns for the HMIS.
- Uganda's LMIS system is weak. DHIS2 is currently used as an LMIS for HIV commodities. For all other commodities, facility level stock management is performed but stock levels and consumption data are not reported up the system. Stock levels on a few tracer commodities are reported thru the HMIS, but not tied to ordering.
- Stakeholders expressed desire for a more formalized, transactional LMIS that would provide access to facility level stock and consumption data.

The use cases for HMIS-LMIS integration identified in Uganda included quantification, data for management, improved data quality, and achieving a coordinated system or data repository.

Malawi

VillageReach met with several stakeholders from the Ministry of Health during the assessment in Malawi including several individuals at the Central Monitoring and Evaluation Division, and several individuals from Baobab Health Trust (BHT), the local technical organization that develops and supports the country's electronic medical record (EMR) and laboratory information management system (LIMS), who are currently working to integrate their systems with DHIS2. The interviews resulted in several key findings from Malawi:

- Malawi's HMIS was fragmented and using a variety of systems for different programs. Efforts are underway to bring HMIS data from various programs into one instance of DHIS2 owned and managed by the MOH. Most programs, with the exception of Reproductive Health, do not currently use DHIS2, but the MOH plans to incorporate all programs over time, with paper-based reports completed at facilities and entered into DHIS2 at the district level.
- No formal process exists to regularly review and act on HMIS data.
- Malawi currently uses Supply Chain Manager (SCM), an Access database, as the main LMIS and cStock, an SMS based program, to manage commodities between health facilities and Health Surveillance Assistants (HSAs) at the community level. SCM and cStock are not integrated. The health facility supplies the HSAs and logistics data for the community level is included in the facility's monthly (paper-based) reports, which are entered into SCM at the district level.
- SCM and cStock are managed completely separately from HMIS data.
- Supply chains and processes vary by program, including processes for data review. Some programs review data regularly or semi-regularly while others do so only on an ad-hoc basis.

Congruently, the processes by which decision makers act based on LMIS data also differ by program.

Key use cases identified for potential HMIS-LMIS integration in Malawi included data for management, forecasting and quantification, and creating a single data repository.

Zambia

In Zambia, VillageReach met with stakeholders from various groups involved in health informatics, electronic health systems administration, and M&E. This included the MOH Monitoring and Evaluation team, Logistics Management Unit (LMU) at Medical Stores Limited (MSL), and several partner organizations: John Snow Inc. (JSI), Akros, the World Health Organization (WHO), Palladium, the Center for Infection Disease Research in Zambia (CIDRZ), and Imperial Health Sciences (IHS). Information gathered in Zambia supported the development of several conclusions:

- Zambia has a large, somewhat fragmented landscape of health information systems, which are often program-specific. A recent an ongoing MOH initiative aims to streamline the systems in use.
- SmartCare and DHIS2 are the main HMISs in Zambia. SmartCare is a facility-based EMR for the antiretroviral (ARV) program; DHIS2, based at the district level, serves as the central HMIS reporting system. The MOH M&E department administers and maintains DHIS2.
- eLMIS (a variant of [OpenLMIS](#)) is used nationally at the district level and deployed for direct use at 251 facilities. eLMIS handles stock management and monthly reporting for medical commodities for all programs with the exception of vaccines. The vaccine supply chain, managed separately, uses Logistimo for inventory management and reporting.
- Palladium is currently working to implement a DHIS2 dashboard that pulls information from several systems: the national instance of DHIS2, eLMIS, and Mwana (another system that handles dried blood spot samples). Though not currently live, Palladium hopes to incorporate the dashboard into the national instance of DHIS2 to provide a single place to view HMIS and LMIS data.

The key use cases for integration identified in Zambia included data use for quality improvement and management, the creation of a single data repository, and forecasting and quantification.

IV. Generalizable Use Cases for HMIS-LMIS Integration

Three categories of common HMIS-LMIS integration use case emerged from the assessments: forecasting, data repository, and data for management. VillageReach discovered use cases outside of these categories during the assessments and expects that additional use cases exist elsewhere, however, the three themes detailed in the following sections represent the most common and broadly applicable findings. In addition to a description of each category several examples serve to illustrate more specific, operationalized use cases. The examples included are abstract, generalized examples developed based on information from each country. Furthermore, the examples are intended to be demonstrative but do not represent an exhaustive list of all possible user stories: each category encompasses numerous specific use cases and details will vary across countries, systems, programs, and personas.

Forecasting

Many countries utilize both HMIS and LMIS data during annual forecasting exercises, using some combination of disease incidence (e.g. cases of diarrhea) and commodity consumption (e.g. sachets of oral rehydration salts consumed) to estimate national commodity needs. Reliable consumption data from an LMIS can be one of the best data sources for many commodities and incorporating broader data sets for forecasting can provide several benefits. For example, when looking at preventive commodities, such as vaccines and family planning products, the Expanded Program on Immunization (EPI) or Reproductive

Health Program may want to increase coverage and thus (most likely) increase consumption from previous years. In that case the forecasting team may use a combination of consumption data, population statistics, and service delivery data to create program targets. Similarly, in the case of new commodities or changing treatment guidelines, past consumption does not reliably predict future consumption: more accurate estimations require service delivery data. Further, when poor data quality or lack of collection and reporting make reliable consumption data unavailable, HMIS data is used in place of consumption data or used to inform how poor quality consumption data is considered. Each of these scenarios is a potential use case for HMIS-LMIS integration. Further examples of user stories for forecasting are included in Table 1.

Table 1. Forecasting User Story Examples

WHO "As a..."	WHAT "I want/need to..."	WHY "so that..."
As a member of the HIV quantification team	I need to access data on consumption of HIV commodities and number of patients currently accessing HIV treatment	So that I can base the forecast for a new frontline pediatric treatment regimen on the incidence of HIV amongst children and consumption patterns for the previously used first line regimen.
As a member of the RMNCH quantification team	I want to access data on the number of women who received implants last year and the number of implants consumed in the last year	Because I suspect the consumption data to be incorrect and want to use the service delivery to triangulate data and support the best estimate of future implant needs.

The potential for more accurate forecasting leads to great interest in viewing and analyzing HMIS and LMIS data together, and many countries and/or programs already do so manually or on an ad-hoc basis. System integration provides opportunity for automatic and routine data integration. Such integration, ideally, can allow for easier analyses, interpretation, and more frequent forecasting exercises – preferably continuous and on an iterative basis, rather than as a discrete annual process. Integration alone, however, does not guarantee these benefits: valuable integration requires consideration of several challenges, discussed in Section V.

Data Repository

Many stakeholders across the assessment countries noted the decentralization of health systems data as a major challenge. With multiple different systems in place decision makers and managers cannot access comprehensive HMIS and LMIS data in a streamlined way. Instead users require access and logins to multiple systems, must learn distinct processes for each system, and often use time-consuming manual processes to analyze and compare data from different systems. Integrated systems can provide a single data repository for users to access all relevant facility, district, and national information. Furthermore, users could also perform analyses and create dashboards and visualizations of relevant indicators from multiple data sources. User story examples related to the data repository use case are available in Table 2.

Table 2. Data Repository User Story Examples

WHO "As a..."	WHAT "I want/need to..."	WHY "so that..."
As the national ARV coordinator	I want to access data on how many facilities were stocked out of HIV commodities last month and the number of new ARV patients in each district	So that I have a unified, comprehensive, and system-wide overview of program trends and needs.

District Coordinator	I want a single location to view facility performance across a number of metrics (stock outs, emergency orders, children born, total cases of malaria)	So that I do not need multiple system logins and to learn multiple system processes to access information about my facilities' performance and status.
Reproductive health program manager	Access relevant LMIS information along with the HMIS information I already collect	I don't need to create duplicative indicators or forms to get LMIS data and overburden the health workers at the facilities.

Integration can provide other efficiencies in addition to the convenience of a single data repository. Many programs require overlapping data to be collected and reported in the HMIS and LMIS, such as coverage or stock out rates. Duplicative systems force those at lower levels (community, facility, and district) to record the same information in multiple places, requiring more time for unnecessary paperwork and documentation for already overburdened health workers, which takes time away from their clinical duties. Creation of a data repository through integration can eliminate the need for duplicative data collection: LMIS information on stock outs and HMIS data on coverage are already available in the same place, so neither system needs to collect data the other already has. The benefits of the data repository, of course, are not guaranteed. A great deal of time and effort is required to overcome the challenges to integration and fully realize the potential benefits (see Section V.).

Data for Management

The accessibility of integrated HMIS and LMIS information can help verify data, identify problems, and help managers make decisions or find solutions. Throughout the assessments users and stakeholders frequently expressed the desire to use data in the management of their programs and supply chains. Reviewing key indicators from both data sets can facilitate the triangulation of problems, highlight data quality issues, reveal trends, and provide a well-rounded understanding of issues; which, in turn, can lead to improved feedback and supervision. For example, a program manager reviewing consumption of malaria commodities would benefit from having data on the number of diagnosed malaria cases for the same period to ensure the consumption numbers are reasonable given the diagnosed cases. Bringing HMIS and LMIS data together in this way can provide better information and context to stakeholders and decision-makers, allowing them to build a case for known issues, identify new issues, and investigate accordingly. Table 3 contains several examples of how various people could use integrated HMIS and LMIS data.

Table 3. Data for Management User Story Examples

WHO <i>"As a..."</i>	WHAT <i>"I want/need to..."</i>	WHY <i>"so that..."</i>
As a national Malaria program manager	I want to review and compare consumption of malaria commodities and diagnosed malaria cases	So that I know if consumption is reasonable for the number of cases, or if there are issues with presumptive treatment or theft.
As a national HIV program manager	I want to review ARV consumption and availability and the number of patients initiating treatment	So that I can confirm that a new policy lowering the CD4 count threshold for treatment is being followed and that facilities have adequate stock.
As a District Reproductive Health program officer	I want to review usage and stock out rates of misoprostol and mortality rates for postpartum hemorrhage	So that I can identify if misoprostol is available or not and, therefore, if it is likely being underused.

As a District Health Officer	I want to review consumption and case data	So that I can identify discrepancies due to poor data quality and provide supervision to the facility and community health workers submitting the data.
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As illustrated by the examples, managers at various levels of the health system use HMIS and LMIS data to identify issues and make decisions. Individually both data sets provide information crucial for decision-making but integration of the two can provide deeper context and highlight discrepancies where further investigation is needed. As with the previously described use cases, however, the benefits from integrated HMIS and LMIS are not a given: data availability does not guarantee correct interpretation. Section V. discusses data interpretation and other challenges in further detail.

V. Challenges to Integration

The assessments from Uganda, Zambia, and Malawi confirm the interest in HMIS-LMIS integration. The use cases in each country varied, yet there were several identifiable themes (forecasting, data repository, and data for management) that resonated across the countries assessed. In each of the generalized use cases integration can potentially provide convenience and beneficial information to stakeholders and decision-makers. VillageReach’s work on the [integrated HMIS-LMIS Dashboards in Tanzania and Senegal](#), however, revealed that despite the potential benefits, a variety of challenges can prevent effective and useful integration of HMIS and LMIS data. In conjunction with common use cases, VillageReach noted that many of the challenges identified by stakeholders were common across Uganda, Malawi, and Zambia, and echoed those experienced in Tanzania and Senegal.

Data Quality

While HMIS-LMIS integration can provide various benefits, pursuing integration requires careful consideration of data quality to fully realize those benefits. Data collected and/or entered inaccurately renders even the most technologically sophisticated integration of little use. Data quality concerns may affect decisions about the integration process: Is data integrated upon entry or does it require cleaning and/or approval first? Triangulation of data thru integration can illuminate data quality issues but that is only the first step to address root causes of poor data quality.

Moreover, high data quality does not guarantee effective integration. If the data needed to accomplish the goals of integration are not well planned and coordinated, it is possible—and perhaps even likely—that HMIS and LMIS data sets may not match up and/or provide all the necessary information. Disease incidence data, for example, can help forecast consumption. Forecasting may be more difficult, though, if HMIS data is not as specific as needed: HMIS may provide the number of cases, but not the patients’ ages, severity, or other factors that affect the type, quantity, or form of medication needed to treat those cases. High quality data is crucial for calculating indicators and engaging in data based decision-making but it is not enough: stakeholders also need to have the right data to make those decisions.

System Harmonization

Frequently HMIS and LMIS data and program management are completely siloed. The standardization and/or harmonization of data and processes between systems present a significant barrier to integration. In many cases the separation results in variations between indicators and reference data across systems (such as facility names or codes, product data, regimen lists, etc.). Additionally, reporting processes and schedules may not align. Processes to review and approve health system indicators and/or master facility and product lists will facilitate integration. If those conditions do not exist, as is often the case, efforts must be made to create master lists (ideally) or extensive data mapping is required (which is functional but less robust). Coordination of reporting processes and timelines is also required to minimize or account for differences. Otherwise, even with data from various systems accessible in a single location, a

user unaware of (or not trained for) differing reporting periods may make incorrect conclusions regarding the correlation of metrics across systems.

Data Interpretation and Use

Increased data availability, while beneficial, does not automatically improve data interpretation. In many cases, it can be helpful to compare disease incidence data with consumption data. Even where a clear discrepancy exists, however, its cause may not be obvious: cases may be underreported, clinicians may be presumptively treating patients, or there may be stock outs or theft of commodities. Comparing the incidence and consumption data can identify a potential issue but isolating the specific problem and its cause requires further investigation. Furthermore, many commodities are used, appropriately, for multiple purposes, in multiple forms, and in varying dosages. The relationship between cases and consumption is often complex and requires more detailed analysis and interpretation than a simple comparison of aggregate numbers.

In order to effectively use integrated HMIS and LMIS data, processes must be in place for decision makers (from both HMIS and LMIS teams) to routinely clean and review the data. Decision makers must be knowledgeable about the analysis and interpretation required to form appropriate conclusions as well as have a process in place by which they can act on those conclusions and disseminate the information. Identifying a need or problem is of little use if those who identify the issue lack the means and/or empowerment to act on their conclusion. Systems like DHIS2, in addition, are not generally used at the facility level, limiting the utility of integrated systems at lower levels without access and/or information and feedback from the higher levels. The analysis and identification of issues may occur at higher levels of the health system, but those at the facility and community level are likely the best positioned to enact the changes required to address those issues. Providing system access at lower levels may be difficult due to the available infrastructure. If, however, processes for data review and use at regional or central levels include feedback mechanisms for lower levels, users without direct access to the data repository can still benefit from integration. Ensuring effective policies and processes for data review and use is critical to a successful, beneficial HMIS-LMIS integration.

VI. Technical Recommendations

All the generalized use cases identified during the assessments require, at minimum, a one-directional integration that allows LMIS data to flow into an HMIS, like DHIS2, which is often considered the main repository for health systems data. Considerations for the technical aspects of HMIS-LMIS integration must include ongoing support and maintenance, not only the initial implementation. As programs and systems change, integrations may break and require additional work to keep the integration updated and functional, which requires dedicated human and financial resources.

A unidirectional integration could be achieved with DHIS2's existing import feature and would require an export of LMIS data in the appropriate format (usually Excel or csv). Even the most basic importing process will require mapping of the data elements and reference data from LMIS to HMIS. If both systems existed previously without standard reference data such as master facility lists and indicators, mapping will be critical and likely extensive. If the implementation of one or both system(s) were starting, it would be possible to standardize the data to reduce the mapping required. Updating existing systems would also reduce mapping but may have additional effects (compatibility with past data, retraining, etc.). Either way, efforts to standardize data across systems can require significant time, effort, and investment. Additionally, an integration using the import feature may not be the most robust as it would require manual updates and maintenance to the mapping for any changes to either system. An interoperability layer (such as OpenHIE, etc.) could be used to reduce the manual maintenance required for this type of integration but would still require dedicated staff, potentially software developers, to support the integration.

A more sophisticated and likely more costly integration, whether unidirectional or bidirectional, could use application program interfaces (APIs) to access data from the systems. If using DHIS2, there are standard APIs included in the system and the LMIS could create APIs of its own to allow DHIS2 to pull data directly from the LMIS. Implementing this type of integration, even if there are standard APIs in both the HMIS and LMIS, would require a software development team to set up, support, and maintain the integration, which is a significant consideration for budgeting and resourcing.

An API-based integration has the ability to support the generalized use cases, as well as more sophisticated cases. A bi-directional integration could incorporate data from the HMIS-LMIS into the other system for routine functions beyond data aggregation and reporting. For example, HMIS data on the number of new patients starting ARV or TB regimens could flow directly into the LMIS system to be used to calculate the order quantity for the month. This use case requires a more sophisticated technical integration, standardization and harmonization between systems, and mature processes. This level of integration would not be recommended prior to a successful implementation of one of the common use cases, but implementing a more advanced integration may better enable the integration to mature. An LMIS with standard APIs would facilitate this process, as would architecture that supports interoperability.

VII. Conclusion

Interest in and requests for HMIS-LMIS integration continues to grow in LMICs due to the benefits it can provide. VillageReach conducted assessments in Uganda, Malawi, and Zambia to ascertain if common, broadly applicable use cases for integration exist. Each assessment gathered information about current HMIS and LMIS systems, processes, strengths, and pain points to develop use cases. Upon completion of the assessments, VillageReach reviewed country-specific use cases to identify commonalities.

While the specific use-cases identified in country varied, several clear themes emerged that represent generalizable, broadly applicable use cases for HMIS-LMIS integration: forecasting and quantification, creation of a data repository, and data for management. During the assessments stakeholders also identified several challenges to integration (or to effective integration) consistent with VillageReach's experiences in Tanzania and Senegal. Major challenges include data quality, system standardization and harmonization, and data interpretation and use. It is unlikely that a country can fully realize the benefits of HMIS-LMIS integration, even if technically successful, without addressing those challenges. That is not to say that all challenges must be solved completely prior to starting integration but rather to highlight the importance of considering those issues during planning. Treating HMIS-LMIS integration solely as a technology problem, rather than as an aspect of the overall health system, risks overlooking these challenges.

Other use cases for HMIS-LMIS integration certainly exist beyond these three categories. The additional use cases, however, were not the most common, highly prioritized, or generalizable use cases identified. Some also require more sophisticated technical integration as well as mature systems and processes. Based on the findings of the assessments, it is recommended that current efforts towards HMIS-LMIS integration focus on the generalizable use cases, though they may benefit from consideration of future integration needs. Furthermore, efforts by those developing or supporting HMIS and/or LMIS platforms to create standard integrations—or to improve the capacity for integration—should focus primarily, at least initially, on capabilities enabling LMIS data to flow into an HMIS for review and analysis. As system interoperability increases, and the policies and processes surrounding integrations improve and mature, more sophisticated integrations can build on the initial integrations.