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ASSESSING SUPPLY CHAINS FOR HIV/AIDS COMMODITIES

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DELIVER
No Product? No Program. Logistics for Health

ASSESSING SUPPLY CHAINS FOR HIV/AIDS COMMODITIES

DELIVER
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Implemented by John Snow, Inc. (JSI), (contract no. HRN-C-00-00-00010-00) and subcontractors (Manoff Group, Program for Appropriate Technology in Health [PATH], and Crown Agents Consultancy, Inc.), DELIVER strengthens the supply chains of health and family planning programs in developing countries to ensure the availability of critical health products for customers. DELIVER also provides technical management of USAID's central contraceptive management information system.

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Abstract
This paper serves as a technical resource for assessing supply chain management systems for HIV/AIDS programs in the context of system design, implementation, and monitoring and evaluation. While many tools and indicators for the various types of assessments will remain relatively standardized across commodity groups, including forecasting and monitoring and evaluation for the purposes of system design, a number of key differences exist for HIV/AIDS commodities, notably in the types of assessments, the special considerations during the process, and the frequency and follow up of assessments. This paper serves as a guide for advisors and in-country partners to understand the various types of assessments that are undertaken to measure or monitor system performance, the purpose behind the different assessments, and the tools that are appropriate and valuable to use in the different circumstances.

DELIVER
John Snow, Inc.
1616 North Fort Myer Drive
11th Floor
Arlington, VA 22209 USA
Phone: 703-528-7474
Fax: 703-528-7480
Email: deliver_project@jsi.com
Internet: deliver.jsi.com

CONTENTS

ABBREVIATIONS AND ACRONYMS

AIDS	acquired immunodeficiency syndrome
ART	antiretroviral therapy
ARV	antiretroviral
ATLAS	Assessment Tool for Laboratory Services
FEFO	first-to-expire, first-out
FPLM	Family Planning Logistics Management
HIV	human immunodeficiency virus
JSI	John Snow, Inc.
LIAT	Logistics Indicators Assessment Tool
LMIS	logistics management information system
LSAT	Logistics System Assessment Tool
NGO	nongovernmental organization
OI	opportunistic infection
PMTCT	prevention of mother-to-child transmission
SCM	supply chain management
SDP	service delivery point
SPARHCS	Strategic Pathway to Reproductive Health Commodity Survey
TB	tuberculosis
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
VCT	voluntary counseling and testing
WHO	World Health Organization

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INTRODUCTION

This paper presents technical guidance for assessing supply chain management (SCM) systems for HIV/AIDS programs in the context of system design, implementation, monitoring, and evaluation. In general, DELIVER's approach and standards for system assessment for HIV/AIDS commodity management follow the same principles as those for other commodities. DELIVER has worked extensively in the past with systems managing contraceptives, essential medicines for primary care, and tuberculosis (TB) drugs. In large part, the tools and indicators developed for those other public health commodities can be used for assessing HIV/AIDS commodity supply chains with little adaptation. Nonetheless, although the tools and indicators will remain relatively standardized across commodity groups, a number of key differences exist between SCM assessments for HIV/AIDS and those for other public health commodities, notably in the types of assessments, the special considerations during the process, and the frequency and follow up of assessments.

This paper serves as a guide for advisors and in-country partners in understanding the various types of assessments that are undertaken to measure or monitor system performance, the purpose behind the different assessments, and the tools that are appropriate and valuable to use in the different circumstances. Furthermore, given the wide variety of types of assessments that are conducted of supply chains for HIV/AIDS commodities, the guide proposes a number of standards to follow in preparing and conducting assessments.

Refer to appendix A for more detailed information on standards to follow when conducting assessments. The user guides for the Logistics System Assessment Tool and the Logistics Indicators Assessment Tool are also useful references.

SPECIAL CHARACTERISTICS OF ARV DRUGS AND HIV TESTS TO CONSIDER DURING SCM SYSTEM ASSESSMENTS

Antiretroviral (ARV) drugs and HIV tests are both relative newcomers to public health logistics systems, and they have particular characteristics that often require making adaptations to the supply chain through which they are managed. The special nature of ARV drugs and HIV tests influences the design of the inventory control and logistics management information systems, the design of the storage and distribution networks, and the process for implementing upstream and downstream functions. Because the programs that use these commodities—for example, voluntary counseling and testing (VCT), prevention of mother-to-child transmission (PMTCT), and antiretroviral therapy (ART)—are still evolving in the way services are provided, assessment teams must have a basic understanding of how the special characteristics of HIV tests and ARV drugs affect supply chain performance, system design, and implementation.

The following commodity characteristics are most pertinent to teams involved in assessments:

- Short shelf lives, which can range from 6 to 24 months. It is not unusual for an HIV test kit with a shelf life of 12 months to reach a service delivery point (SDP) with only 6–7 months of remaining shelf life. In such cases, it is critical to measure the SDP's ability to effectively manage inventory using the first-to-expire, first-out (FEFO) method during an assessement.
- Necessity for cool storage for some products. Many test kits and ARV drugs need to be stored in temperatures not exceeding 25°C. Although this temperature negates the need for refrigeration at SDPs, temperatures often exceed 25°C in many SDPs, and assessment teams must have the ability to measure "room temperature" to determine adherence to storage requirements.
- High price, including a significant jump in price when moving from first-line to second-line ARV drug treatment regimens. As a result, in some systems, managers have decided that second-line ARV drug regimens are not routinely stored at SDPs and are ordered only when needed. In such cases, the lack of availability of second-line drugs should not be counted as a stockout.
- High value in prolonging survival for AIDS patients. This characteristic can create incentives for mismanagement and pilferage that go beyond commercial reasons and thus may be harder to identify.
- Treatment and testing protocols that require multiple products from multiple sources to be available simultaneously to provide a service. Multiple products that constitute a usable ART regimen or HIV testing algorithm must arrive from different suppliers at the same time at the central warehouse and then must be delivered simultaneously to SDPs. When assessing stock availability, assessment teams should evaluate the availability of a regimen of drugs, not just of the individual drugs.
- Dynamic technology for products leading to constantly evolving treatment and testing protocols. In the case of assessments that are geared to produce data for program monitoring, the drugs or tests on the assessment

list may need to change from year to year without compromising the ability to draw conclusions. For example, if Capillus is initially used as the screening HIV test and the program changes to Determine for screening, the subsequent stockout of Capillus should not be a problem if Determine is in supply.

- Higher levels of accountability. These include special reporting or other documentation requirements either from donors or from manufacturers.
- Greater potential for redistribution of products from one facility to another to prevent the expiration of products before their use and to ensure the continuous availability of products. Although such initiatives often can be seen as a weakness in logistics system performance, in the case of short shelf life and limited supply, the ability to efficiently redistribute with full accountability should be viewed as an asset.
- Limited number of sites authorized to use the products. The number and type of sites that provide HIV testing and ART services will vary from country to country, affecting both sampling methodologies and sample size.
- Limited possibility of substitution in the case of stockouts. Often, multiple brands of the same drug will be available at a site, so a stockout of the branded version may not mean a stockout of the drug or regimen if the generic is available. Interpreting product availability results in this context requires knowledge of in-country regimens or testing algorithms and the supply pipeline.
- Failure of HIV tests kits to contain the full range of commodities needed to administer the test. Chase buffer—a critical component for completing the test—may be packaged separately from the tests, as may be other consumables such as pipettes, pipette tips, gloves, lancets, and vacutainers. As with an assessment of availability of an ARV drug regimen, the availability of all products needed for a test should be assessed.

Because of these special characteristics, HIV tests and ARV drugs are often managed through vertical or separate supply chains. Solutions appropriate for other commodity groups, such as contraceptives or TB drugs, may not apply for HIV tests and ARV drugs because, for example, holding large quantities of stock in inventory at the various levels requires significantly more money and increased storage space and increases the risk of pilferage, damage, and expiration.

HIV/AIDS PROGRAM CHARACTERISTICS TO CONSIDER DURING SCM SYSTEM ASSESSMENTS

A number of characteristics of the way HIV/AIDS programs are managed and services provided may affect the planning and conduct of SCM of these programs. Such characteristics include the following:

- Different components of HIV/AIDS programs are often managed as vertical programs. Many times HIV tests are managed through one supply chain; ARV drugs are managed through another; and other products for treatment of opportunistic infections (OIs), prevention, and palliative care are managed through other supply chains. Some components of the supply chains may be integrated in some cases. Depending on the scope of the assessment, the advisor may need to assess a number of different supply chains.
- HIV testing may be done at a number of different types of service sites; therefore, HIV test distribution will have a variety of end points. HIV tests may be used in standalone VCT centers, prenatal clinics, labor and delivery wards, and HIV/AIDS treatment centers or through routine clinical care settings. In some programs, HIV tests are administered by the laboratories associated with those sites; in others, the nursing staff at the site administer the tests. Those factors will affect how the advisor determines the sample of sites to visit during the assessment.
- In addition, ARV drugs may be provided through a number of different mechanisms. ART sites may be stand-alone centers, may be part of hospital outpatient services, may be situated in prenatal clinics doing PMTCT, or may be other types of sites. That factor will also affect sampling for the assessment.
- The number of sites accredited to provide ARV drugs is generally limited in a program. Programs plan for a full supply of ARV drugs for a limited number of patients. New patients are brought on as funding is secured for full supply of ARV drugs for those patients. Assessments should take into consideration how this scale-up in number of patients is managed to ensure commodity security for those patients who have started ART.
- HIV/AIDS commodities for a single program may be financed through a number of mechanisms and donors. Depending on those factors, more than one unit may be responsible for procuring commodities for a single program. For example, ARV drugs and HIV tests may be procured by the Ministry of Health using monies from the Global Fund to Fight HIV/AIDS, Tuberculosis, and Malaria; through a separate Multicountry AIDS Program office using World Bank funds; and by other units using funds from the U.S. Centers for Disease Control and Prevention or the U.S. President's Emergency Plan for AIDS Relief. In assessing the efficiency and effectiveness of procurement, the advisor should look at all procurement units applicable to the objectives of the assessment.

TYPES OF ASSESSMENTS FOR SCM OF HIV/AIDS COMMODITIES

Because of the emergency nature of the global response to HIV/AIDS, many HIV/AIDS programs and program components may not have evolved through a systematic approach to program development. In many cases, patients are started on ART while other HIV/AIDS services that usually would constitute a comprehensive, ideal package of services are not yet available, and the missing components are gradually being patched together either at individual sites or through networks at different levels of the system. At the same time, even though countries may have been early to jump-start national ART programs, many public health managers and stakeholders are still learning what works and what does not as the programs evolve.

DELIVER's experience is that assessments are conducted frequently, often with other partners with multiple objectives. Many times the purpose of the assessment is merely to determine broadly what is happening at SDPs, and managers can be reluctant to focus overtly on one issue (e.g., supply chain performance) for fear of losing track of what is happening with another key service delivery component (e.g., adherence levels). Management information systems are very immature, if they exist at all, and program managers have access to very limited data, of questionable reliability and accuracy, on which to base decisions. Because of various factors—including political pressure; high turnover of staff members at SDPs; shortages of human resources throughout the public health system; and movement of drugs between the public, mission, and private sectors—program managers often request assessments with broader objectives than supply chain issues. Furthermore, in some countries, DELIVER has conducted a series of assessments that have grown in scope each time as the focus of the program evolves.

It is important for teams that are asked to conduct assessments to clearly focus on the purpose of the assessment. After the purpose has been determined and shared with relevant partners and stakeholders, the planning process becomes a key factor in obtaining useful and appropriate data and information based on resources available.

Following is a description of types of assessments DELIVER has conducted. For each type of assessment, the context, the purpose and objectives, the appropriate tools for the type of assessment, and some discussion of the lessons learned or approaches that have proven successful are included. Full descriptions of the tools can be found in appendix B. Standards for planning and conducting assessments are included in appendix A and should be consulted before beginning preparations for any HIV/AIDS commodity SCM assessment.

ASSESSMENT FOR THE PURPOSE OF PREPARING A FORECAST OR QUANTIFICATION OF COMMODITIES REQUIRED

CONTEXT

DELIVER is usually first involved in this type of assessment at the country level, especially for countries new to its services. In many cases, programs have attempted to quantify their commodity needs, but usually that quantification is made on the basis of available funds rather than on the basis of need or by strategically matching proposed targets with available funding, service, and supply chain capacity and the existing pipeline. Few programs to date have implemented a national logistics management information system (LMIS) for HIV tests and ARV drugs that can provide logistics data on which to develop a forecast. As a result, collecting data and performing a supply chain assessment at SDPs are a critical first step in developing a forecast for HIV tests or ARV drugs.

PURPOSE AND OBJECTIVES

Such an assessment has the following objectives:

- To obtain actual data and information on key inputs required for the forecast. Ideally, the data should be aggregated from individual data elements recorded and reported from the facility to the national level. Frequently, however, because of the newness of HIV/AIDS programs, systems for recording and reporting key logistics and service statistics or morbidity data that are required for forecasts are still in their infancy. Thus, during the assessment, the focus should be on collecting data on the number of patients on treatment, the number of patients on each regimen, the quantities of each commodity used for a defined time period, the stock on hand, and other information relevant to preparing forecasts.
- To collect sufficient information to inform assumptions related to the forecast in terms of both patterns of regimen use and realistic trends related to scaling up. In the absence of the availability of aggregated national data on commodity use, informed assumptions have proven to be a viable substitute if, in fact, the right resources inform the assumptions. In other words, assumptions that are based on a profile of data from facilities can greatly enhance accuracy of forecasts. Often, collecting the totality of those data for all facilities—especially in high-prevalence countries where a program may have up to 90 facilities—would be impractical, but a small sample of facilities can provide sufficient information to feed into assumptions.

APPROPRIATE TOOLS

The following assessment tools can be used:

- modified Logistics Indicators Assessment Tool (LIAT) tables, including a qualitative section on service capacity and scaling up
- LMIS records and reports for HIV/AIDS commodities
- PipeLine software
- ProQ software and the data collection questionnaire from ProQ.

LESSONS LEARNED

DELIVER's experience suggests the following:

- The purpose of facility assessments is not to collect data that are scientifically viable but to collect or validate assumptions required as inputs to the forecast—for example, the number of patients by regimen or the stock-out rates of individual drugs or regimens. Thus, a limited number of sites can provide sufficient data, if selected carefully. Make sure that at least one type of each SDP is visited (for example, tertiary level, district hospital, health center, standalone testing site).
- Reviewing patient and stock records at facilities often is very helpful in providing a sample of trends in numbers of patients by regimen, but data should be carefully interpreted on the basis of the types of sites visited. As an example, trends in numbers of patients by regimen will be very different at a tertiary-level hospital that has been providing ART for several years than at a district hospital that has just begun enrolling patients on ART.
- A key component of several forecasting-related assessments is determining the level of service capacity at facilities to deliver HIV/AIDS services. Often, this component is key in overall assumptions related to the target number of patients to test or treat, and assessing it at facility levels has enabled realistic forecasts to be prepared, hence minimizing wastage during procurement.

ASSESSMENT FOR THE PURPOSE OF LOGISTICS SYSTEM DESIGN OR REDESIGN

CONTEXT

The request to conduct a system design often follows as a result of the forecasting intervention. During the preparation of the forecast, inputs related to the design of the supply chain must be factored in (e.g., buffer stock and maximum and minimum supply levels). In new programs, these levels may not have been determined, and although a level might be assumed for the purposes of forecasting, programs quickly recognize the need to design a logistics system to manage HIV tests and ARV drugs to minimize the risk of stockouts. Although assessments may have been conducted before a system design, it is likely that none of them were focused specifically on the details that constitute SCM, including lead times; challenges related to capturing, recording, and reporting logistics data; and responsibilities for stock management. Information from an assessment focusing on the performance of supply chain elements is extremely valuable when one is trying to design a logistics system for HIV/AIDS commodities that will effectively meet both short- and long-term needs of programs.

PURPOSE AND OBJECTIVES

An assessment of this type has the following objectives:

- to diagnose supply chain strengths and weaknesses
- to gather information on building blocks of decisions that are made and documented during the system design process.

APPROPRIATE TOOLS

The following tools are appropriate:

- Logistics System Assessment Tool (LSAT)
- LIAT
- LMIS
- Assessment Tool for Laboratories (ATLAS)
- process mapping.

LESSONS LEARNED

DELIVER found the following to be true:

- The LSAT is very effective in identifying system strengths and weaknesses, highlighting assets on which to build the new system, and pinpointing areas for improvement (see box 1). The consensus process of the LSAT also creates buy-in to the subsequent system design.
- Because HIV/AIDS commodity supply chains may not have been fully established, assessing related systems, such as those for drugs to treat sexually transmitted infections or lab supplies, may be useful in determining which aspects of existing systems can be transferred or used as models for the HIV/AIDS logistics system design.
- The LIAT provides valuable baseline data that can be compared with similar data after a system is designed and implemented (see box 2).

BOX 1. USING THE LSAT FOR WORK PLAN AND SYSTEM DESIGN

In 2001, DELIVER used the LSAT in Tanzania to assess the logistics system for HIV/AIDS test kits to identify weaknesses and areas for improvement. Little logistics data were available, and no standardized inventory control system existed for HIV/AIDS commodities. The LSAT highlighted those areas of weakness and provided qualitative information on procurement, storage, distribution, organizational support, and other areas useful in assessing Tanzania's health logistics system for test kits.

Using the LSAT results, DELIVER advisors prioritized areas for improvement and developed the Country Strategic and Evaluation Plan. A process-mapping exercise and a redesign workshop were then conducted that resulted in a logistics system design for HIV tests and other health commodities. The LSAT information was instrumental in designing the system, and it continues to assist in monitoring as the system is piloted and implemented nationwide.

- DELIVER has used process mapping, which allows a more detailed analysis of strengths and weaknesses and enables the identification of unnecessary steps that can be eliminated in processes, thus streamlining supply chains.
- The LMIS may be of limited use for system design or redesign because the LMIS is often the area that needs the most input during the design or improvement process. Should a functioning LMIS be available during the assessment process, it will provide valuable data on the status of stock distribution, order or resupply frequency, lead times, and other components that can inform the design process. When the HIV/AIDS supply chain and LMIS have been established, the LMIS should provide ongoing monitoring data as well as data for periodic reassessment.

ASSESSMENT OF ART SITE READINESS

CONTEXT

DELIVER has experience in conducting broad assessments of site readiness to initiate ART services that look beyond SCM and factor in a facility's overall capacity to provide ART services. Because of the tight budgets that programs have for ARV drug purchases, the high public health risks associated with emergence of drug resistance if ART patients do not receive adequate quality treatment, and the political attention ART programs receive in many countries, program managers in a number of countries have found it useful to assess a site's ability to perform all critical components related to treating patients with ART. The tool has proven popular because it

BOX 2. ASSESSING SYSTEM PERFORMANCE WITH THE LIAT

In 2002, laboratory services in Uganda were not widely available and often lacked key commodities, while at the same time, the country worked to scale up HIV testing, ART, TB, and other infectious disease services, all requiring laboratory facilities. A health facility survey using an adapted version of DELIVER's LIAT to evaluate SCM of key HIV/AIDS commodities was conducted in June 2002 and looked at the availability of HIV/AIDS prevention, treatment, and care services and commodities.

This survey identified certain supply chain deficiencies that affected the availability and the quality of laboratory services in the country. Many laboratories experienced frequent stockouts of key commodities, and many staff members had not been trained to use the necessary laboratory equipment and materials. The study findings motivated the Ministry of Health and its development partners to act. The U.S. Agency for International Development made additional funding available to DELIVER to provide technical assistance to the Ministry of Health and the national laboratory association for developing an improved supply chain and securing the resources required to ensure a more reliable supply of the necessary commodities to properly run its TB, OI, and HIV/AIDS programs.

provides sites and managers with an action plan of what interventions an individual site needs to progress to ART initiation and to expand the quality of services that can be offered. Furthermore, as experience with the tool has grown, national programs have used it to develop national ART site accreditation tools.

PURPOSE AND OBJECTIVES

An assessment of ART site readiness has the following objectives:

- To determine a site's ability to provide quality ART services based on minimum standard requirements. The results of such an assessment also provide each site and its managers with action plans for how to progress to the next level of ART service provision, whether that is initiation of services or expansion of the quality of ART services.
- To provide national accreditation standards for ART sites and to ensure that program managers are able to rate different levels of sites across different geographic regions in a comparable way in terms of providing ART.

APPROPRIATE TOOLS

The following tools are useful in the assessment:

- Tool to Assess Site Readiness for Initiating ART
- data collection instruments for use with the Stages of Readiness tool—usually an adapted LSAT and LIAT, an ATLAS, and a clinical services assessment tool.

LESSONS LEARNED

DELIVER's experience resulted in the following lessons learned:

- The Tool to Assess Site Readiness for ART is useful for summarizing the findings of the primary data collection tools and for showing site and program managers how best to focus their resources to prepare for or improve ART services. Because the tool measures status of the site in six domains—leadership, clinical services, management and evaluation, human resources, laboratory capacity, and drug management and procurement—the team conducting the assessment should be multidisciplinary and have experience in all those areas. The scope of such an assessment goes well beyond the supply chain.
- Although the Tool to Assess Site Readiness for ART summarizes detailed information on an individual ART site and helps managers determine how to best strengthen an individual site, when implemented at many sites it can give a picture of the general status of a national ART program and guide policymakers and program managers as to how to best channel their resources.
- A group consensus process with local stakeholders and the assessment team is used to score a site on its status in each domain. The process itself is particularly powerful in building commitment to improving each individual site and developing an action plan to do so.

ASSESSMENT FOR COMMODITY SECURITY INVOLVING A POLICY-LEVEL ANALYSIS OF FORECASTING, FINANCING, PROCUREMENT, AND DISTRIBUTION CAPACITY

CONTEXT

To ensure HIV/AIDS commodity security—in other words, to ensure that clients can obtain and use quality HIV/AIDS commodities when and where they need them—one must look beyond the supply chain functions and

consider potential policy barriers to the smooth operation of those functions. DELIVER has considerable experience in combining technical supply chain assessments for reproductive health commodities with policy-level work using the Strategic Pathway to Reproductive Health Commodity Survey (SPARHCS) assessment tool. Although no equivalent tool for HIV/AIDS commodities exists as yet, the broad approach described in the SPARHCS tool may prove useful for anybody considering this type of assessment. The nature and scale of national responses to HIV/AIDS mean that in most cases extensive policy-level work has already been carried out, although that work may not explicitly address commodity security. Often, an assessment will consist of studying existing policy and operational documents, supplemented, if necessary, with interviews with key policymakers and program managers. For each supply chain function, one must look at policy, legal, and institutional arrangements that affect commodity security for all the programs and sectors that use HIV/AIDS commodities.

PURPOSE AND OBJECTIVES

The objectives of such an assessment are as follows:

- to evaluate policy, legal, and institutional arrangements that affect the functioning of the supply chain
- to determine how closely policies for drug selection, procurement, financing, forecasting, distribution, and storage are followed by actual practices.

APPROPRIATE TOOLS

These tools have been successfully used:

- LSAT
- SPARHCS assessment tool.

LESSONS LEARNED

A number of lessons were learned:

- Policy and practice are often at variance; for instance, procurement policy may be quite explicit on product standards, but in practice those policies may not be applied. In some cases, bringing practices in line with policies may be desirable; in others, advocating for policy change to match practices may be better.
- When doing this type of policy analysis, one may find it helpful to consider how policies affect sectors other than the public sector. In many developing countries, most HIV/AIDS care is provided through the public sector. However, the private not-for-profit and commercial sectors also have important roles to play. The nature of HIV/AIDS has meant major efforts to tightly regulate HIV/AIDS activities in the private sector. This policy has many advantages, but it can mean that the needs of those sectors are not fully taken into consideration and should be looked at.

MONITORING OF LOGISTICS SYSTEM PERFORMANCE TO MAKE MIDCOURSE CORRECTIONS

CONTEXT

Logistics systems are in a state of continuous improvement, and annual assessments of logistics system performance are important to inform work planning and resource allocation, as well as to monitor progress toward achieving the goal of HIV/AIDS commodity security.

PURPOSE AND OBJECTIVES

Such assessments are performed for the following reasons:

- to evaluate the performance of the logistics system in its ability to ensure a continuous supply of quality commodities by measuring indicators such as stock status, rate of stockouts, accuracy and completion of recording and reporting, as well as to assess the functionality of the components of the logistics system as defined by the logistics cycle
- to indicate areas in need of redesign or improvement
- to inform work planning and resource allocation.

APPROPRIATE TOOLS

These tools have proven appropriate:

- LMIS
- LSAT.

LESSONS LEARNED

DELIVER's experience shows the following:

- Many assumptions are made in the design of a logistics system—assumptions on lead times, appropriate review periods, level of effort on the part of workers to implement the system, and the like. Close monitoring (monthly or quarterly) of the performance of the logistics system is important when the system is first implemented so that adjustments can be made in ordering and resupply parameters to ensure the ultimate performance of the system. This requirement is particularly important for HIV/AIDS programs, because in such programs, the monetary and life-saving value of the commodities dictates smaller buffer stocks and less tolerance for wastage. In addition, the lack of information on HIV/AIDS commodity supply available in the design process means that assumptions on design parameters may be weaker than for other system design; therefore, more adjustments based on actual experience with the system should be expected.
- HIV/AIDS programs often start with small pilot activities, which are then scaled up to national level. Logistics system performance may change as the number of service sites increases and more is expected of the system. Closely monitored performance is critical so that adjustments are made either to the system parameters themselves or to the level of resources dedicated to implement the system to serve the increasing demand.
- A logistics system works within a given policy and resource environment. As the environment changes, so must the system adapt to the changes. This factor is even more relevant with HIV/AIDS programs, which function in a complex policy and resource environment with many donors or uncertain funding, often many sources of commodities, and a plethora of procurement regulations that may affect the functioning of the logistics system. Although the basic principles of logistics should weather any environmental change, certain adjustments may need to be made to ensure the optimal functioning of the logistics system.

TESTING OF ALTERNATIVE STRATEGIES (OPERATIONS RESEARCH) TO SELECT AND IMPLEMENT THE MOST APPROPRIATE STRATEGIES

CONTEXT

As HIV/AIDS programs expand, public-sector programs likely will develop substantive partnerships with the private nonprofit and commercial sectors to provide services and medicines and also to extend boundaries within

the sector of how and where services and medicines are delivered. SCM systems must be agile and flexible to keep pace with these changes and must develop appropriate solutions for each situation. In many countries, the testing of alternative strategies is occurring as programs are rapidly expanding, without a formal operations research framework; in other settings, a more systematic approach to measuring performance of one approach over another is being developed.

PURPOSE AND OBJECTIVES

Such testing has the following objectives:

- to use baseline and endline or experimental and control comparisons to test for new or improved supply chain strategies, which can be used for problem identification and needs assessment
- to celebrate successes.

APPROPRIATE TOOLS

Many tools are appropriate for this task:

- LSAT
- LIAT
- LMIS
- ATLAS
- smart card technology
- supply chain manager
- bar coding.

LESSONS LEARNED

- Automation of the LMIS, either fully or at central and regional levels, has significantly enhanced the ability of program managers to collect, analyze, and report logistics data on a more timely and accurate basis. Uganda has adapted and continues to adapt Supply Chain Manager for managing HIV tests and ARV drugs; Kenya is developing its own Oracle-based system for use at the central medical store to manage and use logistics data for HIV/AIDS commodities for resupply and forecasting decisions. Automation of data has made it possible to assess system performance more frequently and quickly and respond to system needs and changes.
- In South Africa, John Snow, Inc., (JSI) has partnered with Net1 (the leading provider of smart card technology in the country) and Catholic Relief Services to use smart cards for ART patient and program management. Providers, patients, and supply chain managers use the smart cards, and data are uploaded on a daily basis to a central database. The technology has been selected for its ability to be used in settings without electricity or phone connections.
- In Uganda, the central medical store is exploring bar coding all of the items it stocks for improved inventory management, beginning with essential medicines. The bar coding is intended to enable the central medical store to custom prepack each facility's order without significantly increasing the lead time. Thus, order forms for lower-level facilities have been designed with bar codes for each item, so that at the central medical store the order is captured electronically through use of the bar code reader, and a packing list is generated. Cost studies have been conducted to demonstrate the cost improvements from this initiative.

- In several countries, innovative distribution strategies are being explored for both routine and emergency transportation of HIV tests and ARV drugs. In Kenya, distribution of HIV test kits is outsourced to JSI as a local nongovernmental organization, which in turn has arrangements with the Kenya air force to fly the test kits to remote locations that vehicles cannot reach, as part of routine air force operations. Similarly, JSI has a contract with a local courier service to distribute emergency supplies of HIV tests when sites are about to experience a stockout. In South Africa, certain provincial ART sites have direct contracts with local manufacturers, which distribute prepackaged, monthly ARV drug packs directly to the facilities, thus eliminating central and regional warehouses and the distribution pipeline from that scenario.

APPENDIX A

STANDARDS FOR PREPARING AND CONDUCTING ASSESSMENTS

Regardless of the purpose of the assessment or the methodology selected, a number of steps exist that all teams must follow when preparing for and conducting the assessment. Because of the urgent nature and short timeframe of some assessment requests, assessment teams may have difficulty planning for all the details required to ensure quality outcomes of assessments. Thus, the standards proposed in the following list are intended to serve as a sample checklist to be used in the planning process to facilitate the work of the team leader:

1. **Preparatory work:**
   a. Identify the objectives of the assessment and develop a scope of work that is based on the program, the categories of HIV/AIDS commodities to be studied, or both. What is the goal of your study? Which commodity categories will be covered, and specifically which items within each category are important? What data do you plan to collect? What answers do you need to have? What will you do with the data? Is this a facility survey, a system assessment, a quantitative survey, or qualitative survey? The choice of the type of survey (qualitative, quantitative, facility based) will be affected by your budget, available resources, and objectives.

   b. Prepare a budget for the costs likely to be incurred by the assessment study teams, including travel and accommodations.

   c. Plan for the involvement of appropriate local counterparts as team members. Ideally, the team members should be involved in managing the HIV/AIDS programs or commodities being assessed to ensure buy-in as well as to ensure a basic knowledge of the characteristics of HIV/AIDS commodities. If all team members are not qualified in this manner, team composition should be designed in such a way that at least one team member has sufficient knowledge in this area.

   d. Present the scope of work to counterparts who are involved in or funding the assessment and negotiate the terms.

   e. Secure financing.

   f. Review and adapt the assessment instruments to meet the objectives identified for the assessment, as well as to meet ongoing monitoring needs:
      - Choose a tool to use for the assessment. Review the tool and adapt it with in-country stakeholder input. All of the tools listed in these guidelines may need to be adapted to some degree to meet the specific needs of the country, the products selected, and the particular assessment. For assessments with clearly defined objectives, when using comprehensive tools such as LIATs or LSATs, it is particularly important that the particular characteristics of the products and program being assessed are considered in adapting the tools.

      - Develop a product list with in-country stakeholders. This process is extremely important for HIV/AIDS commodities such as HIV tests or ARV drugs because more than one product is required to provide a full regimen or testing service. For an assessment focusing on product availability, for example, a short list of indicator products is usually selected, and the results are extrapolated for other items

the site is supposed to manage. However, in the case of ARV drugs, the list should include all drugs required to complete an entire regimen, not just one drug from the regimen.

- Prepare a list of indicators to be produced from the data collection, a report template of what the output of the activity should look like to ensure that the activity stays on track with the desired outcome, or both. Again, HIV/AIDS commodity characteristics must be considered at this stage. Will the indicator be the availability of a single HIV test or all three tests required to provide results?
- Review and adapt the training curriculum if one already exists for your type of assessment. Previous versions will require adaptation if they were not specific to HIV/AIDS commodities.

g. Conduct necessary background research:
   - Review internal and external documents on the country, particularly any reports on previous assessments.
   - Read documents or fact sheets on the products that will be studied to become familiar with their particular characteristics.

h. Determine the appropriate sample size and develop the sampling frame of the facilities to be visited. The main purpose of the sampling design is to avoid a convenience sample. Randomly select the facilities as much as possible. To calculate the sample size and select sites—
   - Compile a list of the total number of facilities in the country.
   - Document the total number of each type of facility (warehouse, hospital, SDP) and the location and distribution of facilities.
   - Ensure that all parties involved agree to the criteria for the selection of sites.
   - For a statistically significant sample, use a standard sampling formula, which often yields a large sample size. In case of resource constraints, visit a default number of a minimum of 100 facilities, or 15 percent of facilities, whichever is smaller.
   - Determine the sampling frame by stratifying for each type of facility in the country; evaluators should randomly select sites proportionally within each stratum, without breaking the supply chain between levels. In other words, select higher-level warehouses first; then randomly select districts within selected regions, SDPs within selected districts, and so on.
   - If statistical significance may not be an important consideration, such as with assessments for forecasting, select sample size and criteria for site selection appropriate for the purpose of the assessment. For example, criteria can include geographic considerations (urban, periurban, rural sites); performance level of sites (if sites are known to be good, medium, and poor performers, visiting a sample of each can provide valuable information for system design purposes and forecasting); and type and range of commodities stocked at each site (not all sites are authorized to maintain all commodities).

i. Train and orient assessment team members. Devoting sufficient time to this activity is especially important. Expanding HIV/AIDS programs and service delivery sites makes it difficult to anticipate every question and script it in advance. Without sufficient preparation, if team members have no or limited experience or knowledge of HIV/AIDS commodities, they will not be able to ask appropriate follow-up questions during the assessment.

j. Obtain written or formal authorization for team members to visit facilities (where needed).

k. Prepare itineraries and logistical arrangements for team travel and accommodations.

l. Schedule a meeting to be held at the end of the assessment to present preliminary findings to stakeholders in the country.

m. Field test the tool at one or more accessible health facilities with all team members.

n. Review the results of the field test and discuss final revisions with the study team members.

o. Finalize the assessment tool.

2. Work performed during the assessment:

a. Observe teams conducting data collection at each level of the system being assessed.

b. Review completed questionnaires to clarify any data inconsistencies. This step is very important to ensure that the study team is collecting complete and accurate data.

c. Enter the data collected into the chosen database or spreadsheet.

3. Work performed after the assessment:

a. Conduct data analysis, whether quantitative or qualitative. If no formal data were gathered as part of the assessment, ensure that general trends or findings are summarized across all teams.

b. Ensure data are interpreted within the local context of the program and with specific application to the commodities being assessed. For example, if the person performing data analysis has no connection with the realities of the program, the team leader should ensure that the data analysis results are translated into tangible actions and recommendations appropriate for the program.

c. Present the preliminary results, conclusions, and recommendations from the assessment to all stakeholders.

d. Write the report of results, conclusions, and recommendations.

e. Disseminate the final report to key stakeholders.

APPENDIX B

ASSESSMENT TOOLS FOR HIV/AIDS COMMODITY SUPPLY CHAIN MANAGEMENT

DELIVER has developed several tools to collect the data required for the assessment, monitoring, and evaluation of logistics systems. The two primary tools are the Logistics System Assessment Tool, which can be used to assess the logistics system of any health program and to monitor progress toward commodity security, and the Logistics Indicators Assessment Tool, which is useful for monitoring logistics system performance, evaluating progress toward meeting objectives, and measuring commodity availability. In addition to the LSAT and the LIAT, DELIVER uses routine data collected by logistics management information systems. The Assessment Tool for Laboratories is a DELIVER tool that can be used to assess laboratory capacity, and the JSI Stages of Readiness tool is useful in assessing a site's readiness to introduce ART.

DELIVER has developed a number of quantitative and qualitative indicators to measure the performance of a logistics system. Table B1 lists the primary indicators collected by applying each tool.

All of the tools and indicators described in the table can be applied for assessing, monitoring, and evaluating supply chains for HIV/AIDS programs with relatively little adaptation. However, some may be more relevant than others, depending on the program's needs. For example, both the LIAT and the LSAT can be applied to any health commodity supply chain with little or no change, but collecting all of the data in the tools is not necessary. Depending on the indicators identified by the program and the human, financial, and time resources available to conduct a focus group or a facility survey, programs may choose to remove certain indicators and focus on data collection for their key indicators. Additional questions could be designed to address the specific considerations for the commodities required for HIV/AIDS programs, which include the following:

- security of commodities in all warehouses or storerooms and transportation
- high value of commodities
- cold chain storage
- extra training of personnel
- additional or more thorough supervision
- comprehensive program requirement of more than 200 commodities
- prevention of the interruption of service
- rigid treatment guidelines.

The tools in Table B1 are available through the DELIVER website. More details about each tool are provided below.

TABLE B1. PRIMARY INDICATORS BY TOOL

LSAT	LIAT	PipeLine	LMIS	ATLAS	Stages of Readiness
Organizational context LMIS Product selection Forecasting Procurement of supplies Inventory control Warehousing and storage Transport and distribution Organizational support for the logistics system Product use Finances	LMIS data quality (in "pull" systems) Storage conditions Order fill rate (in pull systems) Stockout frequency Product availability and stock status	Fo recast accuracy Existence of an adequate multiyear procurement plan Stakeholder commitment to procurement plan	Stockout frequency Product availability and stock status Rate of consumption Losses and adjustments	Product availability and stock status Availability and condition of equipment LMIS Supervision and personnel Forecasting Procurement Inventory control Warehousing and storage Distribution Organizational support for the logistics system Quality assurance Testing services Finances	Six program domains: • Leadership and program model • Services and clinical care • Management and evaluation • Human resource capacity • Laboratory capacity • Drug management and procurement

LOGISTICS SYSTEMS ASSESSMENT TOOL (LSAT)

The LSAT is a diagnostic and monitoring tool that can be used to complete an annual assessment or used as an integral part of the work planning process. The information collected using the LSAT is primarily qualitative and is analyzed to identify issues and opportunities and, from those, to outline further assessment or appropriate interventions. As assessments using the LSAT are conducted and analyzed in successive years, the results can contribute to the monitoring, improvement, and sustainability of system performance and can provide critical nonlogistics data that can identify a country's commodity security strengths and weaknesses.

The LSAT can—

- provide stakeholders with a comprehensive view of all aspects of a logistics system
- be used as a diagnostic tool to identify logistics and commodity security issues and opportunities
- raise collective awareness and ownership of system performance and goals for improvement
- be used by country personnel as a monitoring tool (to learn and continually improve performance)
- provide input for work planning.

The LSAT can be conducted annually or as agreed on, ideally prior to work planning or strategic planning exercises.

There are two methods for data collection:

- Discussion groups are the preferred approach. They involve either (a) a central discussion group and a separate lower-level discussion group (e.g., of district representatives) or (b) a joint discussion group composed of central and lower-level participants. Plan to conduct, at a minimum, one discussion group involving central participants.
- Key informant interviews can be conducted at both the central and lower levels using the LSAT as a guide.

It is highly recommended that the discussion group participants or interviewer and interviewees complete a limited number of field visits. The visits can be made before data collection to sample current circumstances or after data collection to follow up on issues that arise during data collection. The process of using the LSAT can foster capacity building in diagnosis and system monitoring among the assessment group.

Data analysis and development of recommendations and a work plan should take place immediately after data collection. This process should include a thorough review of system strengths and weaknesses in order to develop and prioritize a set of objectives and interventions that will address issues raised during the LSAT exercise. The results of individual components of the LSAT can be scored and an overall composite score can be developed for comparison with subsequent LSAT results.

Each year, the findings from the current and prior years' assessments should be compared to measure progress. Likewise, the results of interventions and the assumptions that they are based on should be examined so the experience can be applied to the coming year's work plan.

Among the benefits of the LSAT is that it requires few resources and can be done in a relatively short time (approximately one week). Personnel using the LSAT should have knowledge of logistics and good facilitation skills.

LOGISTICS INDICATORS ASSESSMENT TOOL (LIAT)

The Logistics Indicators Assessment Tool, a quantitative data collection instrument, is used to conduct a facility-based survey to assess the performance of the health commodity logistics system and the availability of commodities at health facilities. The LIAT can be used to monitor the performance of certain processes involved in the logistics management of health commodities over time, to evaluate certain outcomes of logistics interventions, to provide ongoing supervision and performance monitoring, and to monitor commodity availability.

The data collected using the LIAT can be used to calculate the following core logistics indicators:

- accuracy of logistics data for inventory management
- percentage of facilities that receive the quantity of products ordered
- percentage of facilities that maintain acceptable storage conditions
- percentage of facilities whose stock levels ensure near-term product availability (stock status)
- percentage of facilities that experienced a stockout at any point during a given period or at the time of the visit.

In addition to being used to calculate those indicators, the data collected can be used to calculate related indicators, such as duration of stockouts and reasons for stockouts. Supplemental questions provide additional information about the characteristics of the supply chain being assessed, such as the use of LMIS information, ordering procedures, transport systems, supervision frequency, and cold chain management.

As a quantitative facility survey, the LIAT can be used to establish a baseline of logistics system performance for future comparison to subsequent LIAT results. Because of the large number of facilities surveyed during the LIAT, it is resource intensive in terms of time, money, and personnel. Although it could, in theory, be used for monitoring purposes if resources were unlimited, in practice it cannot be applied frequently enough to give managers the information they need along the way between baseline and endline assessments. However, portions of the tool can be adapted for more streamlined facility-based surveys to assess stock status, ordering and supervision practices, and other parameters. In addition to logistics knowledge and facilitation skills, personnel conducting the LIAT should have skills in data analysis.

LOGISTICS MANAGEMENT INFORMATION SYSTEM (LMIS)

Information that is collected and reported through a logistics management information system is vital to the functioning of a supply chain. LMIS data are used to forecast future needs, to plan procurement of commodities, to maintain adequate inventories at all facilities, and to ensure routine distribution of orders to service delivery points. Data collected through the LMIS can also be used to routinely assess supply chain performance.

The basic logistics data that must be collected in an LMIS include stock on hand, rate of consumption, and losses and adjustments. Indicators that can be routinely assessed using these LMIS data include the following:

- stockout rates at any point during a given period
- supply status or facility performance at ensuring near-term product availability (stock levels between minimum and maximum)
- rate of loss of product by reason (expiration, damage, pilferage, and the like)
- frequency of product redistribution
- accuracy and completeness of reporting
- frequency of reporting and nonreporting facilities
- rates of consumption in a given period.

Any of those indicators can highlight areas of strength and weakness, either by facility or by administrative level, and can help program managers determine where performance improvement efforts should be directed. The LMIS can be a very effective monitoring tool with periodic review of these data, allowing problems in the system to be regularly detected and improvements made. Some examples of LMIS forms for HIV/AIDS programs are the Monthly Logistics and New Patient Report, Record for Returning Unusable Drugs, ARV Drug Dispensing Log, and HIV Test Daily Use Log.

Using the LMIS as an assessment tool or for routine monitoring requires a functioning LMIS. Standard LMIS forms should be in use, data should be of good quality, and reporting rates should be high. Because many HIV/AIDS logistics systems do not yet have a well-established LMIS, its use as an assessment tool should be delayed until reliable data are available. When the LMIS is established, use of routine LMIS data for assessment and monitoring requires relatively low resources.

ASSESSMENT TOOL FOR LABORATORY SERVICES (ATLAS)

The Assessment Tool for Laboratory Services is a data-gathering tool developed by the DELIVER project to assess laboratory services and logistics. The ATLAS, a diagnostic and monitoring tool, can be used for a baseline survey, to complete an annual assessment, or as an integral part of the work planning process. The information collected

using the ATLAS is analyzed to identify issues and opportunities and to outline further assessment or appropriate interventions.

The ATLAS is used to analyze the entire laboratory system and includes three questionnaires: central administrative level, intermediate administrative level, and facility (laboratory) level. Depending on the questionnaire, the recommended data-gathering methods include group discussions, key informant interviews, and facility visits. The three questionnaires need to be adapted for the in-country system. The questionnaire for the intermediate administrative level focuses on decentralized logistics functions. In a highly decentralized system, this questionnaire will need to be adapted. For a complete assessment, it is highly recommended that the ATLAS be used for a group discussion at the central level (and intermediate level, if applicable) and for field visits at the facility level.

Assessments using the ATLAS can be conducted and analyzed in successive years, and the results can contribute to monitoring, improving, and sustaining laboratory performance and can provide critical nonlogistics data that identify a country's laboratory systems' strengths and weaknesses.

The ATLAS can be used to provide the following:

- a comprehensive view of all aspects of the laboratory services for stakeholders
- a snapshot of testing capabilities and commodity availability at laboratories throughout the system
- input for work planning.

The ATLAS can be used—

- as a diagnostic tool to identify issues and opportunities for each individual laboratory in a given country
- by country personnel as a monitoring tool (to learn and continually improve performance)
- as a means of focusing collective awareness and ownership of laboratory services performance and goals for improvement.

The ATLAS provides a comprehensive overview, particularly at the facility level. The baseline data it provides can facilitate performance and process improvement. However, it is preferable to wait until interventions have been implemented before repeating the ATLAS.

Like the LIAT, the ATLAS is fairly resource intensive (time, human, and financial). The assessment team should have skills in facilitation, team management, HIV clinical experience, laboratory expertise, and logistics.

TOOL TO ASSESS SITE PROGRAM READINESS FOR INITIATING ART (STAGES OF READINESS)

Though not a primary data collection tool, this tool was designed specifically for HIV/AIDS programs as a way of measuring a facility's readiness to introduce or expand ART. After completion of a separate qualitative questionnaire, the tool is used to guide Ministry of Health and facility personnel to a consensus on site capacity in the following six program domains:

- leadership and program model
- services and clinical care
- management and evaluation

- human resource capacity
- laboratory capacity
- drug management and procurement.

Although this tool can also be used to monitor the scale-up of an ART program, it is especially useful in the beginning stages to measure a facility's capacity and readiness to introduce ART and to identify what areas need additional inputs to be better prepared to provide comprehensive ART to clients on an ongoing basis. Despite the focus of this tool on site readiness to provide ART services, the tool is included in this paper in recognition of the strong links between site readiness and supply chain management. Offering high-quality, comprehensive HIV/AIDS services requires that all applicable elements function well.

The tool can be used for site self-assessment or by external reviewers or program directors to assist sites, programs, and donors in identifying areas that need technical assistance and to assist programs in selecting sites for ART introduction and scale-up. It is not meant to present a barrier to sites but rather to offer an opportunity to work toward start-up or scale-up. In some countries, the tool has been used for monitoring, accreditation, and quality improvement of sites already providing ART. The assessment results should be used to develop work plans to start ART-related preparedness activities or to improve existing services for all sites.

Although using the tool itself is not resource intensive, using the LIAT, ATLAS, and clinical services questionnaires can be. The team collecting the primary data and using the Stages of Readiness tool will need skills in facilitation, team management, HIV clinical experience, laboratory expertise, and logistics.

PIPELINE

The PipeLine software is used to calculate commodity requirements and is a valuable tool for procurement planning and monitoring for health commodities. The forecasting methodology used with PipeLine and the software itself can be applied to any health commodity. Ideally, data collectors base their forecasts on actual consumption data or, alternatively, on quantities issued from higher-level warehouses or storerooms. Projections using demographic data or service statistics should also be developed as a comparison, especially when logistics data are incomplete or questionable. These forecasts of future requirements can then be used to plan procurement and monitor shipments, set shipping schedules and delivery dates, set budgets, and plan allocations, all with the ultimate goal of maintaining the continuous availability of the key commodities required to run the program.

PROCESS MAPPING

Process mapping is an information-gathering and analysis tool that can be used to—

- assess and redesign an existing process or system
- create a new process or system
- rationalize job assignments.

DELIVER has used process mapping to assess in detail the processes of logistics systems so that it can identify inefficiencies and breakdowns and plan for logistics system improvements.

Process mapping focuses on outputs: something that will be created, accomplished, or done. Examples from health commodity logistics include such steps as drugs are ordered, drugs are delivered, a report is submitted. Through an interview process, process mapping makes all significant steps visible and charts the way that work is actually

conducted (sometimes as opposed to the way that work is "supposed" to be done). This process leads to identifying actual weaknesses that need to be improved, as well as existing strengths that can be built on in a process redesign.

A process map is a tool for conducting a workflow analysis and improvement. It is a diagram that describes the chronological sequence of work steps used to achieve a particular desired outcome or result, including all process steps, inputs, and decisions. Maps can be used in a number of ways to analyze work performance:

- to evaluate how the work activities actually flow as compared with the policies and procedures that were established to describe and ensure the efficiency and effectiveness of the work system
- to connect the personnel, work activities, resources, and location in a process that helps to determine the capability of the process to produce the desired output
- to identify how the suppliers, processors, and customers communicate during the process
- to identify the cross-functional areas of responsibility for activities and decisions
- to identify customer and supplier requirements
- to identify breakdowns in the current system—duplication of effort, gaps, bottlenecks, and so on—and to connect them to their effect on customer requirements and expectations of products or services
- to identify the current time cycle, staffing requirements, logistical support needed, and so on for operating the process
- to identify current strengths and weaknesses of the system in carrying out its purpose to the satisfaction of customers and stakeholders
- to identify major implications for the redesign of the system.

Because most work processes are undocumented, process maps are created in a collaborative process through interviews with the personnel who do the work. A cross-functional team is organized to develop the maps. The team should include those who actually do the work of the process; those who manage the process; and, if possible, those who are suppliers to the process and customers of the process.

Process mapping is time and resource intensive. A process-mapping team for a logistics system should have experience in conducting process mapping, facilitation, and logistics system design.

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DELIVER
John Snow, Inc.
1616 N. Fort Myer Drive
11th Floor
Arlington, VA 22209
USA tel: 703-528-7474 fax: 703-528-7480
deliver.jsi.com