USAID | DELIVER PROJECT

Supply Chain Management E-Newsletter

Quarter 1, 2009

Welcome to the Quarter 1, 2009 installment of the quarterly USAID | DELIVER PROJECT Supply Chain Management E-Newsletter. The e-newsletter includes articles on supply chain best practices, public and private sector supply chain technology, project topics, and descriptions and evaluations of pilot programs.

The team welcomes your input! To submit an idea for a future newsletter, or to share information with our readers, please contact James Gibney, Technical Advisor, at jgibney@jsi.com, or Kelly Hamblin, Program Officer, at khamblin@jsi.com.

Automated Data Collection: Bar Coding and Other Scanning Options for Computerized Data Collection

Our last newsletter highlighted warehouse management systems (WMS) and the challenges and benefits that go with adding such a technology. Automated data collection (ADC) can be a practical complement to computerized warehouse management systems. What follows is a brief description of ADC options, and how they work.

Spotlight: International Public Health Logistics Addressed at Global Supply Chain Conference

For the first time in its history, the Council of Supply Chain Management Professionals (CSCMP), which is well known globally and highly regarded by supply chain management professionals, had a full track dedicated to international public health and humanitarian supply chains at its Global Conference held in Denver, Colorado from October 5 to 8, 2008.

How Complexity Affects Your Supply Chain

People who work in and around supply chain management for public health are used to the idea that supply chains are inherently complex systems. We know this ourselves, and we convey the fact to others so they can understand better what resources are needed for a well-functioning public health supply chain that assures product availability where and when needed.

This publication was produced for review by the U.S. Agency for International Development. It was prepared by the USAID | DELIVER PROJECT, Task Order 1.

Automated Data Collection: Bar Coding and Other Scanning Options for Computerized Data Collection

Our last newsletter highlighted warehouse management systems (WMS) and the challenges and benefits that go with adding such a technology. Automated data collection (ADC) can be a practical complement to computerized warehouse management systems. What follows is a brief description of ADC options, and how they work.

Bar coding is probably the best known of the ADC technologies, but others that carry out similar functions are voice systems, radio frequency identification (RFID), pick-to-light, laser scanners, charged-coupled device (CCD) scanners, handheld batch and radio frequency (RF) terminals, vehicle-mounted computers, and wearable computers.

This article will describe the most commonly used technologies in a warehouse setting, discuss advantages as well as implementation challenges, and briefly discuss use in international public health settings.

Bar Coding

Bar Codes

Before we begin the discussion on the actual devices, it is important to understand the different categories of bar codes: one-dimensional (1D) and two-dimensional (2D).

One of the most familiar examples of 1D bar codes is the Universal Product Code (UPC) code that we encounter on many products, such as those purchased at a grocery store, but there are many other varieties of symbology that use the same idea (Code 128, Interleaved 2 of 5, etc).

Two-D bar codes symbologies such as UPS's MaxiCode, can store more data than1D bar codes, however, they require special scanners to read them. Most warehouses and smaller shops continue to use 1D symbologies because the technology is less expensive and it still stores a sufficient amount of data for management purposes.

Depending on the circumstance, the symbology used can be imposed by supply chain partners through a standardized compliance label program to ensure that all partners are able to read the information. Companies not bound by this requirement use bar coding for their internal inventory management and can decide on the symbology they wish to use, and print their own labels for the products they wish to manage.

There is a movement to standardize the use of bar codes internationally, spearheaded by a non-profit organization called GS1. GS1 is dedicated to the design and implementation of global standards and solutions to improve efficiency and visibility in supply-and-demand chains globally and across sectors (www.gs1.org).

Bar Code Scanners—Laser or CCD

Most bar coding equipment use either laser scanners or CCD scanners. Laser scanners use a laser beam, which moves back and forth across the bar code to read the bar coded label while CCD scanners take digital images of the bar code, which is then decoded. Although they cost less than laser scanners, CCD scanners have more limited use as they need to be a few inches away from the bar code. Laser scanners are more common in warehouses as they can scan bar codes at significant distances.

There are many types of bar code scanners including handheld, where the worker has the ability to carry the device with him/her and fixed position, where the product is moved in front of a scanner. Choosing the best type will depend on the function required. For warehouse use, handheld scanners usually are more practical, especially with "hands-free" stands that allow the worker to use both hands, while fixed-position scanners are very useful in a grocery store setting, for example.

Portable Computers

There are many types of portable computers suitable for use in warehouses. They all scan bar codes and require either batch terminals where data is collected into files and then connected to a computer for downloading the information, or they will use RF terminals where RF waves send live data to the host system or network.

Handheld Devices

Small and nimble, handheld devices including the **keyboard-wedge scanners** that connect between a computer keyboard and a computer, can be very useful in a warehouse setting, especially for cycle counting, but they do have drawbacks: holding a handheld device implies that you can no longer use that hand to handle materials or equipment, decreasing ease of use. Using the pistol-grip models, which allow workers to more quickly holster the device between scans and make use of both hands, will improve worker mobility. The small screen and keypads make it difficult to operate. Before deciding on implementing this type of device, make sure that you consider all the factors.

Vehicle-Mounted Systems

These have a larger screen than handheld devices, keypads similar to true keyboards, and because they are mounted on either a warehouse vehicle or distribution vehicle, you cannot drop, lose, or forget to charge them. Integration with existing programs designed for desktop computers is more likely because these systems probably have a Windows® or similar interface.

Wearable Systems

These systems are gaining popularity as they provide greater mobility than the handheld devices or the vehicle mounted systems. They usually strap to the wrist or forearm and use a small ring-type laser scanner for reading bar codes. Some come with voice technology, which is explained below.

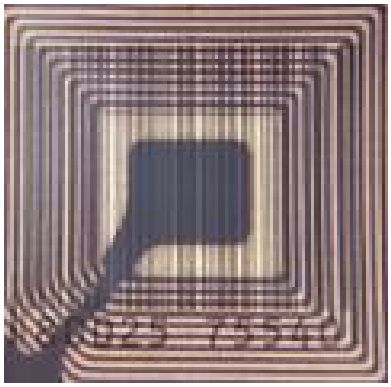
Voice Technology

Voice technology consists of two technologies: voice-directed and speech recognition. These systems consist of a headset with a microphone and a wearable computer. There are many advantages to voice technology, the most obvious being greater mobility for the warehouse worker.

Studies have shown that voice technology has not only increased efficiency significantly (no need to look at the computer screen has saved picking time), but it also has decreased the incidence of accidents.

RFID

RFID are devices attached to an object that transmit data to an RFID receiver. It is getting a lot of attention in the supply chain management world because of its potential, and the technology is getting smaller and less expensive. In fact, some clothing stores have begun to sew RFID tags into individual items of clothing. One of its great advantages is that a large amount of data can be stored on these chips, more information than what is really necessary however for most warehouses and distribution centers.



Other advantages are that an RFID tag can be read through other materials (though some materials may cause problems). Theoretically, this means that you could take a pallet of mixed products, all of which contain individual RFID tags, and have an RFID reader read all the tags within the palletized load without having to physically move any of the materials or open any cases. Many tags are read so quickly, it seems instantaneous. In addition, the more expensive read/write tags have the ability to change or add data as they pass through different operations, adding information to the tags at each step of the supply chain. RFID tags also are more durable against harsh conditions than most bar codes, avoiding lost or unreadable information because of tears, spills, or rain.

However, RFID has some drawbacks—the greatest at this time being its cost. While one could produce a bar code sticker for less than one cent (U.S.$0.01) RFID tags are still at a minimum of U.S.$0.50 per tag, which is a significant burden when adding to individual products, or even to individual shipments. More expensive rewritable tags cost as much as U.S.$40.00, and though these could be recycled for multiple shipments, the cost may still be prohibitive. In addition, the tags are not limited to line of sight and will read all of the tags within its range. Also when reading many tags simultaneously, there is no way to notify of one or two unread tags due to damage or poor placement around materials that may interfere with the tags.

.

Pick-To-Light Systems

Pick-to-light systems use lights and LED displays for each pick location. The software lights up the next location to pick and displays the quantity to pick. This is expensive software but has proven to not only increase accuracy but also productivity. It is most useful when there are very high picks per SKU.

Advantages and Challenges of ADC/Bar Coding

Now that we have taken a bird's-eye view of the most common ADC in use in warehouses, we will discuss the advantages and challenges involved in their implementation.

The advantages of an ADC system/bar coding are obvious:

- Bar coding increases **accuracy** by reducing the likelihood of human errors.
- Bar code scanners are **easy to use.**
- Data captured is **uniform and standardized.**
- Bar coding promotes **timely feedback.**
- Bar coding improves many activities that streamline workflows, increasing **productivity.**
- By increasing efficiencies, bar coding can **save money** in the long term.
- Bar coding is **versatile** and can be used in different settings: manufacturing, warehousing, shipping and receiving, retail, and transportation.

But ADC or bar coding does not come without its challenges. The two greatest challenges are the **cost of hardware**, but more importantly, the **cost of integration** of the ADC within the facility, including any existing WMS. And as mentioned in our computerized WMS article, one must not discount the added **cost of changing systems**, **training staff**, and **maintaining/servicing** bar code printers and scanners.

Automated Data Collection in International Public Health

Many public health facilities share the same challenges as large commercial warehouses and distribution centers, and could benefit from what ADC has to offer, as shown above. In fact, low-cost options are feasible solutions in recording receipts and issues data in a warehouse, for example. Communicating between storage facilities would require compatible computerized systems at each point of the where the bar code is read. Such data collection could help to track lost or stolen product, prevent counterfeits, and follow tracer products data, which often are used as indicators to measure the effectiveness of the supply chain.

But as for all computerized systems, a significant amount of work needs to be carried out before a decision is made. The scope needs to be clearly defined, and an assessment of the different options needs to take place so that the system chosen actually carries out the work that is intended and required.

Sources for this article are:

Automated Data Collection (ADC) Basics. Available at www.inventoryops.com/ADC.htm (accessed December 22, 2008)
Barcodes for Beginners. Available at www.systemid.com/learning_center/beginners.asp (accessed December 22, 2008)
Images courtesy of Wikipedia at http://en.wikipedia.org/wiki/Barcode (accessed December 22, 2008)

International Public Health Logistics Addressed at Global Supply Chain Conference

For the first time in its history, the Council of Supply Chain Management Professionals (CSCMP), which is well known globally and highly regarded by supply chain management professionals, had a full track dedicated to international public health and humanitarian supply chains at its Global Conference held in Denver, Colorado from October 5 to 8, 2008.

This track, entitled "Matching Supply and Need in Resource-Constrained Settings," was co-led by the USAID | DELIVER PROJECT and the Massachusetts Institute of Technology (MIT)-Zaragoza International Logistics Program. The conference was attended by more than 3,000 supply chain professionals from 42 countries, and included more than 200 educational sessions split into 25 focus-area tracks.

The topics of the new track varied from managing international public health supply chains, to international and domestic emergencies. The following speakers provided a rich and diverse look at the logistical challenges and solutions that exist in resource-constrained settings.

- Mark Rilling (USAID) presented "No Product, No Program: Improving Global Health with Innovative Supply Chains," highlighting USAID's commitment to supply chains as a key to health service delivery.
- Edward Wilson (USAID | DELIVER PROJECT) presented on "Unexpected Technologies in Developing Country Supply Chains," looking at various pilots using devices such as cell phones and personal digital assistants (PDAs).
- Prashant Yadav (MIT-Zaragoza) and Jennifer Daily (Clinton Foundation HIV/AIDS Initiative) presented "An Overview of Global Health Supply Chains," focusing on key challenges, such as supply of essential products.
- Bryan Koon (Wal-Mart) presented on the "Corporate Role in Disaster Response: Lessons from Katrina", demonstrating Wal-Mart's extensive capacity in planning for and responding to domestic and international disasters.
- Iain Barton and Craig Usswald (Pharmaceutical Healthcare Distributors) presented on "Supply Chain Solutions in Africa," describing the three regional distribution centers set up to strategically manage inventory.
- James Coughlan and Chris Larson (UPS) presented on UPS's role as a "Need Logistics Provider" describing their partnerships with CARE and Supply Chain Management Systems (SCMS).
- Martijn Blansjaar (Oxfam) and Mitsuko Mizushima (Fritz Institute) presented on the challenges of "Humanitarian Logistics."

- Don Hicks (LLamasoft) and James Gibney (USAID | DELIVER PROJECT) presented on "Supply Chain Strategy and Network Design Issues in Delivery to Emerging Markets," highlighting the use of network optimization software for improved product availability.
- Modibo Dicko, World Health Organization (WHO) presented "Optimize—Immunization Systems and Technologies for Tomorrow", highlighting the challenges of cold/cool chain requirements for vaccines and how to ramp up.

What is CSCMP?
Founded in 1963, the CSCMP, formerly the Council of Logistics Management, is the preeminent worldwide professional association dedicated to the advancement and dissemination of research and knowledge on supply chain management. With more than 8,500 members representing nearly all industry sectors, government, and academia from 67 countries, CSCMP members are the leading practitioners and authorities in the fields of logistics and supply chain management. More information can be found on their website at http://cscmp.org/.

How Complexity Affects Your Supply Chain

People who work in and around supply chain management for public health are used to the idea that supply chains are inherently complex systems. We know this ourselves, and we convey the fact to others so they can understand better what resources are needed for a well-functioning public health supply chain that assures product availability where and when needed.

Complexity is inherent to the actual logistics activities, such as information management, transport, storage, and inventory management. Recently, however, we have been viewing the concept in new ways. The emphasis is now on explaining the complexity of the environments in which supply chains operate. The reason for this is that the pace of change in international public health is rapidly overtaking the capacity of existing supply chains to provide even minimally adequate service, i.e., how environmental factors can constrain the effectiveness of traditional supply chains, both vertical and integrated.

There has been a sort of knee-jerk tendency to use the word "complex" for anything and everything that gets in the way of explaining what a complex environment really is, or how its characteristic features inhibit effective supply chain service.

Here, we make an assumption that advocacy will be more effective when meanings are more clear, and supported by concrete examples. We begin with a discussion of contextual issues and move on to propose a definition of complexity when the term is applied to the environments in which supply chains operate.

Since the 1990s increasing numbers of countries have launched health sector reforms (HSR) that include the following interventions: separation of the payers and providers of services, integration of services, decentralization of decision making, and often, user fees to help defray costs. HSR is invariably underwritten by very large development bank loans in which a number of major changes are pushed forward simultaneously.

So it is that a Ministry of Health (MOH), meaning its workers from top to bottom, may find itself simultaneously attempting to integrate services in the clinical work place, introduce fees where non-existent before, devolve employment of many staff members to local municipalities, and transfer drug-distribution decisions from the central store to district health offices. The HSR investors tend to provide substantial funding to support improvements in quality of care and expansion of services. Very importantly, the funding normally covers infrastructural improvements, equipment, and expendable supplies. The expendable supplies include drugs, vaccines, medical supplies, and laboratory supplies.

In most settings HSR is accompanied by developments that affect the way the external funds are managed. One is the basket fund concept in which a number of investors, including multilateral agencies, bilateral agencies, and MOH simultaneously contribute funds to the "basket," which then are used for mutually agreed purposes. Related but distinct is the sector wide approach (SWAp) concept in which investors contribute to a basket in which funds are not earmarked for specific purposes, but rather intended to broadly support ministries' work across the health sector.

The investors who back individual disease-control programs also come bearing gifts. The commitments to provide better treatment for HIV and AIDS, tuberculosis (TB), vaccinatable diseases, and malaria are all accompanied by funding programs that provide financial or commodity grants. These are the global funds, such as Global Alliance for Vaccines and Immunization (GAVI), Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), and Global Drug Facility of the Stop TB Partnership (GDF). The United Nations' agencies, including the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and the World Bank (WB) make significant contributions in a variety of ways, as do the regional development banks. There also are bilateral programs that perform similar roles, such as the President's Emergency Plan for AIDS Relief (PEPFAR) and the President's Malaria Initiative (PMI) of the U.S. Government as well as programs funded by the European Union and its individual countries, Canada, Japan, and many others. Continuing to make major contributions are the very large United Nations Population Fund (UNFPA) and the U.S. Agency for International Development (USAID) contraceptive supply programs.

While development bank loans, basket funds, SWAps and global funds are very different concepts and mechanisms, they do have some common impact on supply chains. The most important is the universal requirement by investors that commodities be purchased using ICB or "international competitive bidding" procedures. The process requires public advertisement for tenders and a well-documented process for evaluating bids and awarding contracts. Many countries, perhaps most, find the ICB process difficult and time consuming. This results in delayed procurements, and, in turn, delays in health-program implementation. Efforts to train up MOH staff on ICB has had positive results, but when these staff members are transferred to other positions, they take their knowledge with them and we find ourselves back to "square one".

As if the foregoing were not enough, we also note that for both HSR and specific disease control programs, the day will come to ramp up the new services and provide them countrywide. There will be exponential increases in the volumes of supplies to purchase, store, and distribute. As noted above, some very important ones will have special storage and transport requirements. The need to ramp up services is common to all of the new programs and some of the existing ones. In a sense, it represents the Achilles' heel in the overall drive to achieve global public health goals through an array of defined programs. In order for any program to achieve its goals, it needs to ramp up. However, in most countries, the supply chain(s) cannot realistically sustain the increases in product volumes and services. The boxed example below gives a sense of what ramping up can mean in terms of scale and velocity.

Ramping up existing and new programs in Uganda 2001–2006

- Between 2001 and 2006 the value of essential drugs that MOH distributes grew from $18.7 to $84 million in US dollars. Over the same period, the value of TB drugs increased from $1.46 to $3.22 million. Vaccines from $2.36 million to $17.7, with the introduction of polyvalent vaccines. Antiretrovirals (ARVs) from zero to $16 million. Over the same period the increase in contraceptive funding was more modest, but still significant at 20%.
- MOH served no antiretroviral therapy (ART) patients in 2001, 2,225 in 2004, and had about 35,000 in June 2006; the target for 2007 was 56,000. From 2004 to 2006, the number of sites providing ARVs grew from 26 to 220.
- The number of condoms distributed was 35 million in 2001 and 80 million in 2006.
- During the same period, there took place procurement-related activities for GFATM, the WB and PEPFAR, with a total value in excess of $250 million. Procurements also were in the planning stage or underway through GDF and PMI.

In summary, we can say that complexity occurs when demands like the following ones are made simultaneously on the supply chains:

- Product availability is maintained for existing programs even though human resources, storage, and transport resources are not sufficient.
- New programs are introduced that bring along new products with divergent handling requirements, as well as new service delivery points (SDPs) and new clients.
- Ministry organizational environments are in transition, usually as a result of health sector reform.
- The overall supply of drugs, vaccines, contraceptives, expendable medical supplies, and laboratories are financed from multiple sources.

- The ability to execute procurements is conditioned by externally imposed mechanisms such as basket funds, SWAps and ICB.
- Surges in volumes of supplies required and clients served are planned or underway.

Recognizing the complexities affecting public health supply chains is an important first step in addressing supply chain issues. However, applying well-known practices such as supply chain segmentation, which are designed to make complex supply chains more manageable, can help in working toward ensuring product availability and commodity security.

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