

Optimizing the Reproductive Health Supply Chain

A User's Guide to Software



Reproductive Health
Supplies Coalition

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Contents

Acknowledgements	5
Purpose of This User’s Guide.....	7
Introduction: Providing Greater Clarity	9
Background.....	11
Major Components: An Overview.....	13
Supply Chain Mapping Exercise	15
What the Six Reproductive Health Supply Chain Applications Do	27
Benchmarking Best of Breed Applications	37
The Software Functionality Framework.....	39
Conclusion	45

Appendices

A. RH Software Application Installation Locations.....	47
B. Glossary	49
C. How to Obtain the Software.....	51
D. Additional Resources	53

Figures

1: Reproductive Health Supply Chain	16
2: End-to-End Reproductive Health Supply Chain.....	17
3: The Reproductive Health Supply Chain—Origin Points	18
4: The Reproductive Health Supply Chain—Freight Forwarder to Port of Entry	19
5: The Reproductive Health Supply Chain—In-Country Distribution.....	20
6: The Reproductive Health Supply Chain—Software Overlay	21
7: The End-to-End Reproductive Health Supply Chain—Software Overlay	22
8: The Reproductive Health Supply Chain—Origin Points with Software Overlay	23
9: Reproductive Health Supply Chain—Freight Forwarder to Port of Entry with Software Overlay	24
10: Reproductive Health Supply Chain—In-Country Distribution with Software Overlay	25
11: Reproductive Health Applications Grouped by Core Process Functionality	27
12. Current Worldwide Installation Locations for the Six Reproductive Health Applications	47

Tables

1. Software Functionality Framework	40
2. Functions Performed by Each of the Six RH Supply Chain Applications	42

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Purpose of This User's Guide

This guide provides in-country reproductive health (RH) supply chain managers and advisors with the information they need to make better informed decisions when they select technology/software with which to manage their RH supply chains. More specifically, the report is structured to help managers do the following:

- Understand the RH supply chain in terms of its three critical flows—material, information, and funds.
- See exactly where and how (functionality) the six RH supply chain software applications studied in this research project *map* to these flows—i.e., at what point in the RH supply chain does a particular software program *play*, and what functions does it perform at that point?
- Determine exactly what individual functions the six RH supply chain applications perform.
- Determine the collective functionality capabilities of the six RH supply chain applications—i.e., exactly what functions do the six applications perform when they are considered together.
- Understand what collective functions commercial off-the-shelf (COTS) supply chain applications perform—to identify gaps that the six RH applications do not address, and to determine how the collective functionality of the six RH applications compare to that of the *benchmark* commercial off-the-shelf supply chain applications.

Introduction: Providing Greater Clarity

In recent years, the number of software tools designed to strengthen the management of reproductive health (RH) supply chains has grown significantly. RH supply chain managers, advisors, and other in-country decision makers face the increasingly complicated task of selecting software to support specific supply chain functions. Variations in software functionality and capabilities, and the lack of a clear, single source of comparative information about these applications, can complicate the selection process.

To address these issues, the Systems Strengthening Working Group (SSWG) of the Reproductive Health Supplies Coalition (RHSC) asked a team of experts affiliated with the Supply Chain Management Center at the Robert H. Smith School of Business, University of Maryland, to conduct an in-depth review of six specialized RH supply chain applications. These applications are currently in use in RH supply chains around the world (see Appendix A). They are all public domain software and were developed separately with support from the U.S. Agency for International Development (USAID), United Nations Population Fund (UNFPA), or private foundations.

The six applications studied include—

- CHANNEL
- Country Commodities Manager (CCM)
- PipeLine
- Quantimed
- Reproductive Health Interchange (RHI)
- Supply Chain Manager.

USAID and UNFPA jointly managed this software review.

Background

Members of the Reproductive Health Supplies Coalition (RHSC or *Coalition*), a partnership formed in 2004, include multilateral organizations, donors, private foundations, civil society, and nongovernmental organizations (NGOs). The Coalition members share a common vision—that women and men in developing countries have sustained access to an affordable choice of quality reproductive health supplies. Using various means and approaches, the goal of the RHSC is to provide global leadership that will work toward achieving this vision.

The Coalition is organized into specialized working groups dedicated to specific technical and implementation agendas. The Systems Strengthening Working Group (SSWG), one of the working groups, focuses its work on improving the flow of information, financing, and supplies for RH programs in developing countries. One of the working group's priorities is to develop solutions that will help increase the reliability and efficiency of supply chains for RH supplies.

In December 2006, the SSWG identified the need to better understand the software tools currently being used to manage RH supply chains. Some of this software, developed with support from public sector organizations within the RH supplies arena, can be used without any licensing cost. Other commercially available software has been enhanced for use in developing country settings. This review focuses on the former category.

While country managers need software tools that are designed specifically to manage and improve in-country supply chain operations, they are not always sure which tools to select, what each tool can or cannot do, or how different tools complement each other. This research, or software review, has two broad objectives:

- to create a common framework for categorizing and describing the key functionalities of the RH supply chain software
- to classify existing software solutions according to this framework.

Major Components: An Overview

The software research study comprised several key tasks. In this guide, the research team discusses the findings of these three major components:

- RH supply chain map with software functionality overlay
- results of having road-tested the six RH supply chain applications
- results of the software benchmarking study.

The RH supply chain map with software functionality overlay contains two sets of maps: one that depicts the flow of material, information, and funds that occur in a prototype RH supply chain; and a second set that overlays the functionalities performed by the six software applications onto these flows. The second set of maps show where in the RH supply chain each of the six applications performs a function and indicates the nature of that function.

RH software road testing. The research team loaded the six RH software applications onto servers at the Supply Chain Lab at the University of Maryland, and ran the applications through their functionality paces. We also reviewed the software user manuals. From this road testing process, we describe the functionality of the six software packages—both collectively and individually—and their operating requirements; we also discuss the results of the road testing.

RH software benchmarking. The third and final component of this guide reports the findings from our benchmarking efforts. For this review, we define benchmarking as the process in which we compare the scope or universe of the collective functionality capabilities of the six software applications that we reviewed against the universe of functionality performed by broader, commercial off-the-shelf (COTS) supply chain software. We used three COTS software applications as *measures* of the state-of-the-art in supply chain management software, but remained realistic about the settings for which the RH supply chain software applications were designed. The benchmarking effort was done to reveal two things:

- the total functionality covered by the six applications
- any gaps between what the six RH applications do and what the COTS supply chain applications do.

The results of our benchmarking effort can inform future enhancements of the six RH supply chain applications and guide other software development efforts that aim to strengthen the management of RH supplies and other essential health commodities in developing countries. We describe our benchmarking effort and findings in the section titled *Benchmarking Best of Breed Applications*.

One final note. The RH supply chain is, like all global supply chains, highly complex. It spans countries that are often challenged from a human resource and infrastructure perspective—e.g., high staff turnover rates, lack of professional recognition for public health logistics, intermittent electrical power, poor or sporadic telecommunications access, outdated or scarce computing infrastructure and expertise, poor transportation infrastructure, and other constraints. The RH supply chain has numerous participants, and levels or tiers, and handles many different types of health care products, some with limited shelf lives.

Given these complexities, to manage supply chain outcomes effectively, there is a critical need for better control and visibility of RH supplies and equipment. More effective communication between widely dispersed supply chain participants must include more accurate, complete, and timely data and information.

The goal is to deliver supplies, medicines, vaccines, and equipment to the people who need them in a time sensitive, efficient, accurate, and effective manner. We hope that this user's guide will support that goal.

Supply Chain Mapping Exercise

The research team met with the developers of the six RH supply software applications to first map a prototype RH supply chain that shows the flow of supplies, information, and, to some extent, funds. Figures 1–5 illustrate this map.

With input from the software developers, we then overlaid the functionalities of the six RH supply chain applications onto the RH supply chain map. This overlay identifies which aspects of the supply chain the six individual programs address (see Figures 6–10).

While some of the functionality of the six RH supply chain applications overlaps when taken together, for the most part, the applications perform different functions within the RH supply chain. As a result, they support management of RH supplies at different points in the supply chain and at different locations in the overall RH supply chain process.

Taken together, however, the six solutions approximate end-to-end support across much of the RH supply chain. There are some gaps in this end-to-end support, particularly when compared to the benchmarked supply chain applications.

The gaps fall in the following areas:

- inventory management—i.e., more robust inventory management capabilities and real-time inventory tracking and stock records updating
- transportation management—both inbound and outbound
- warehouse optimization—both of work flows and stock layout
- integrated—i.e., solutions seamlessly and automatically share data among operational areas, so that data is only entered once and then it populates the entire supply chain information system
- trading partner management—i.e., visibility into immediate up and down supply chain levels/tiers
 - real-time transaction/activity management—the six RH applications have limited capabilities in this area
 - ability to seamlessly and easily share information across the organization or with outside trading partners—a difference is that the six RH solution are desktop-based versus server-based; they reside on the user’s desktop in single, individualized, and separate installations.

Table 2 catalogs a more detailed list of functionalities performed by each of the six RH supply chain applications.

Figure 1: Reproductive Health Supply Chain



Figure 1 shows the beginning of the RH supply chain—Funds and the Global Program Management. The *Funds* box refers to the monies provided by country governments, donors, foundations, and global funds to support the procurement of RH supplies. The *Global Program Management* box refers to those organizations, agencies, and programs that provide the high-level information management systems/resource overlay to manage the start of the RH supply chain—the acquisition of RH supplies.

The map in Figure 2 represents an RH supply chain from end-to-end—from origin to final destination, with all the tiers and nodes in between. For easier reading and closer inspection, Figures 3–5 show the supply chain in sections.

Figure 2: End-to-End Reproductive Health Supply Chain

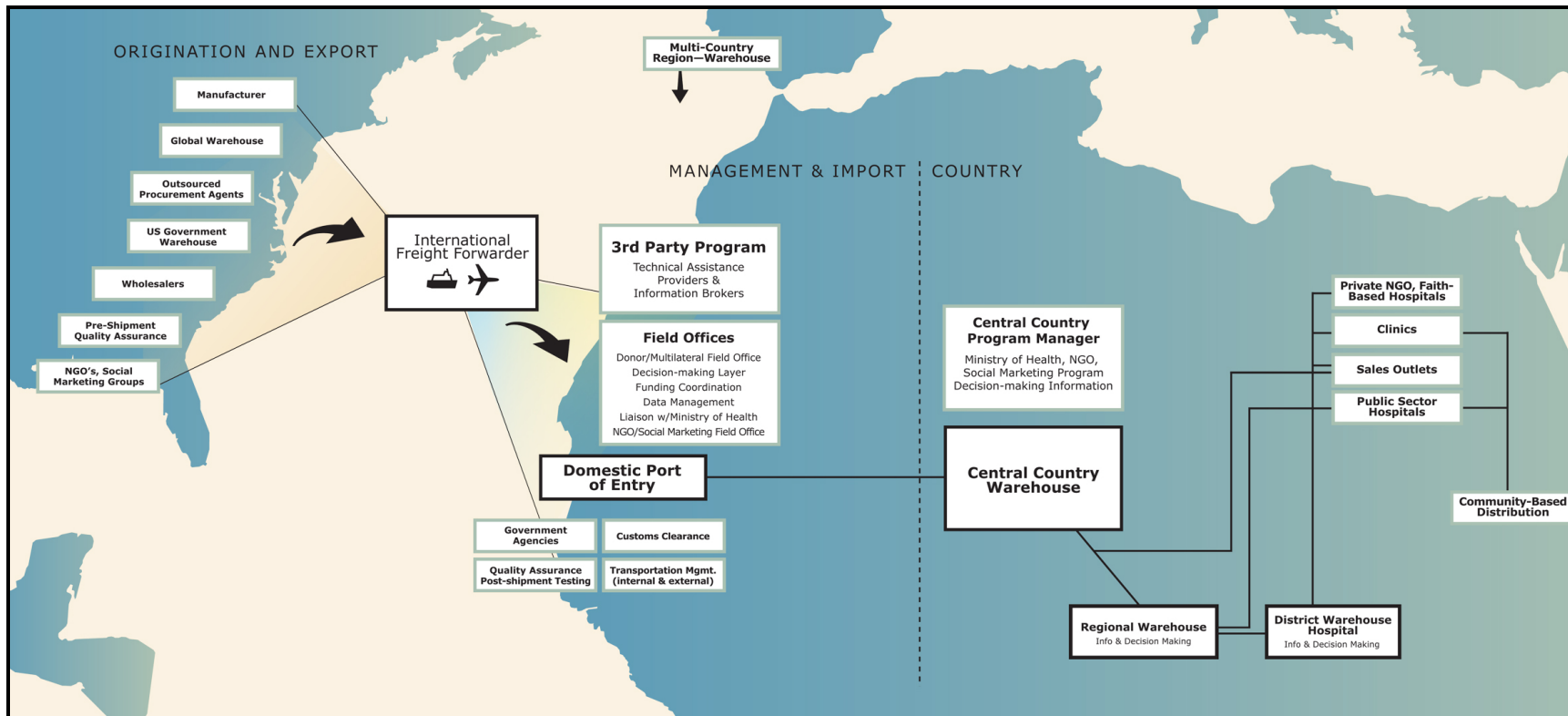
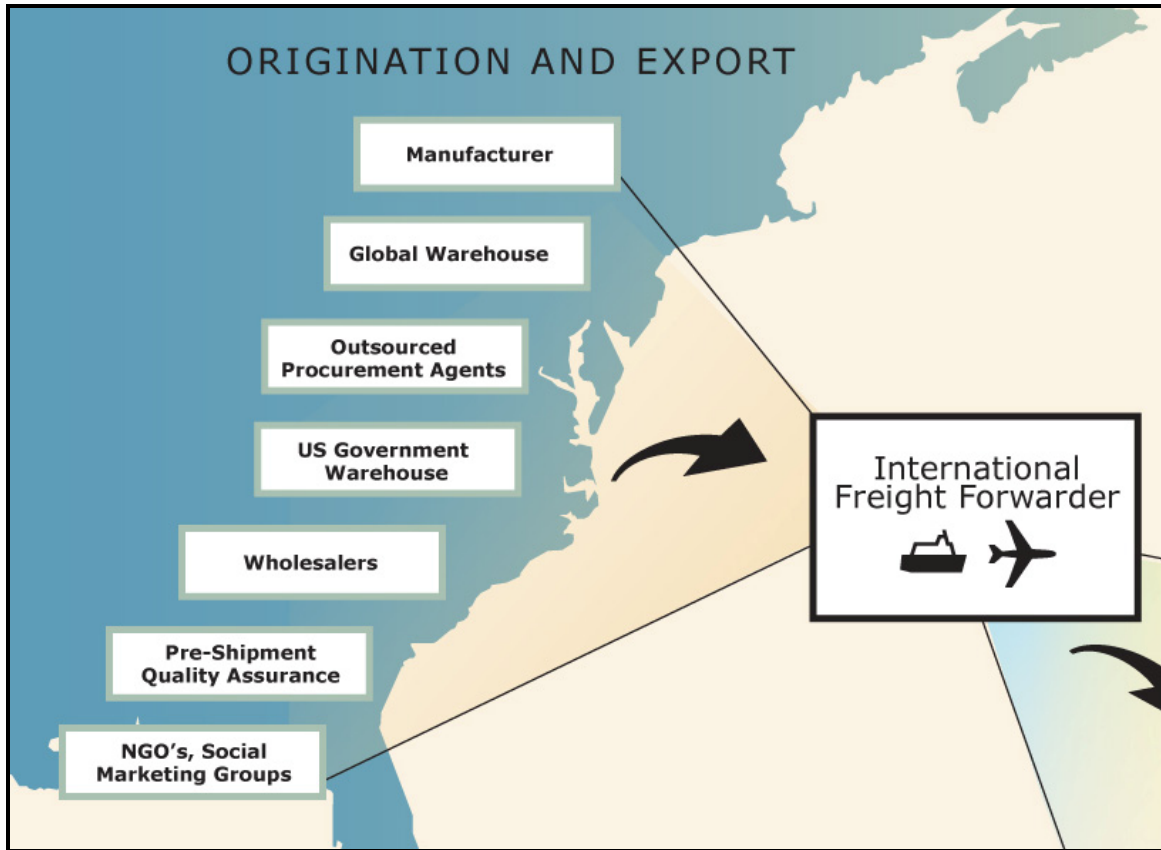


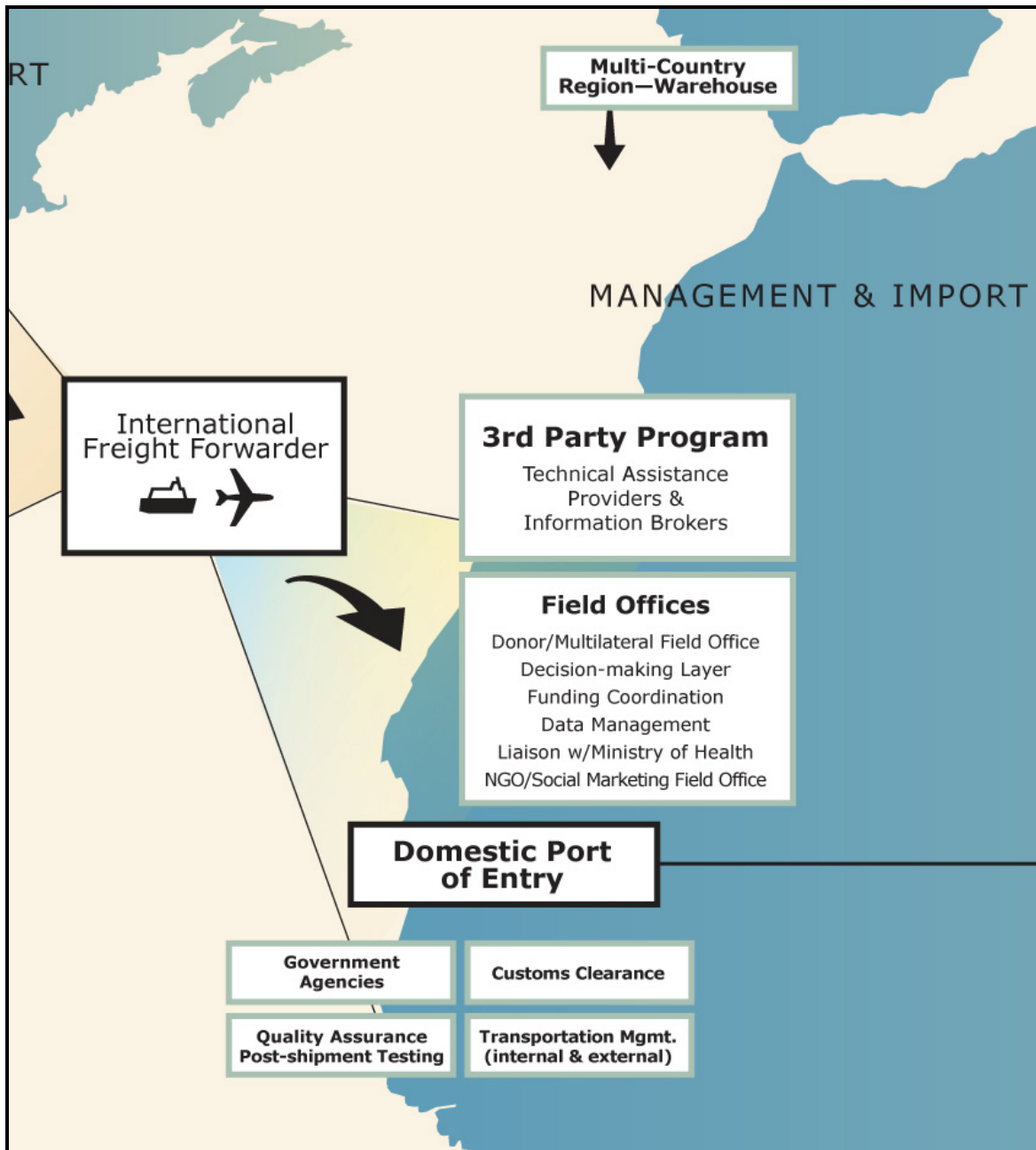
Figure 3: The Reproductive Health Supply Chain—Origin Points



Reproductive health supplies move from various origin points to the international freight forwarder for shipment to destination countries. While the map in Figure 3 shows the United States as the point of origin, this is only an illustration. Products can and do originate from worldwide locations.

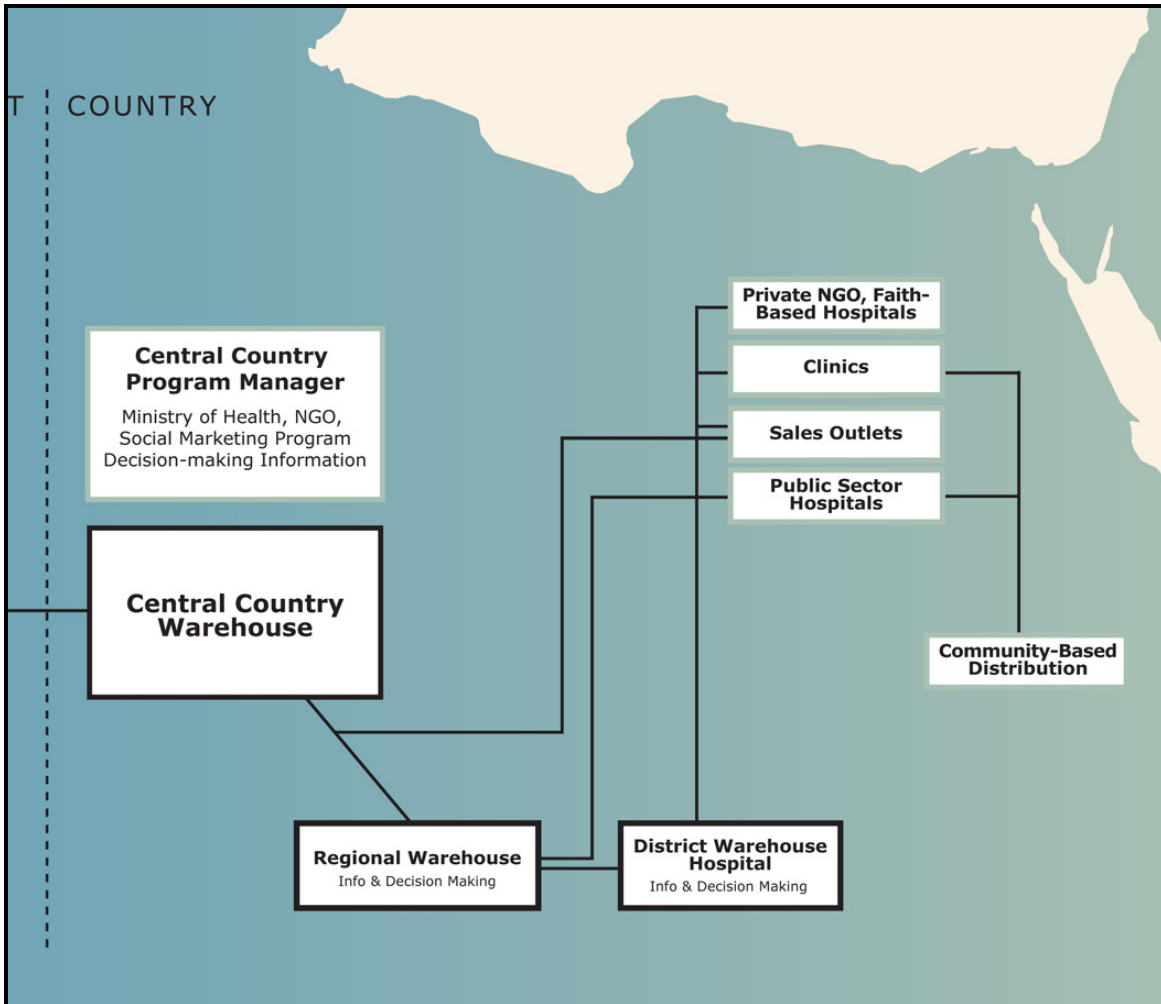
In addition to public sector procurers—like USAID and UNFPA—other international NGOs and social marketing organizations maintain global procurement services to support their country programs.

Figure 4: The Reproductive Health Supply Chain—Freight Forwarder to Port of Entry



Reproductive health supplies enter the country at the domestic port for in-country entry; from there they begin their in-country journey to multiple destinations. Shipment information flows with the goods to the various agencies and organizations responsible for managing in-country distribution.

Figure 5: The Reproductive Health Supply Chain—In-Country Distribution



Reproductive health supplies move from the point of entry to the successive Central Country Warehouse. From there, the supplies move to successive supply chain tiers for further distribution.

Figures 6–10 depict where the six RH supply chain software programs operate in the model RH supply chain described in the previous Figures. Figure 7 depicts the functions that each of the six RH supply chain software applications in the study perform in the model end-to-end RH supply chain. Figures 8–10 divide the supply chain into easy-to-read sections for closer inspection.

Figure 6: The Reproductive Health Supply Chain—Software Overlay

Software	Funds (to support procurement) Country Governments Donors Foundations Global Funds	Global Program Management Global Agencies—e.g., UNFPA USAID DELIVER PROJECT—USAID Supply Chain Management Systems (SCMS)—USAID Reproductive Health Interchange (RHI) Other
CHANNEL		Global Forecasts
Country Commodities Manager (CCM)	Present info to donor community to justify budget	Forecasting
PipeLine	Present info to donor community to justify budget	Monitors Levels Below
Quantimed	Generates costs of forecasts; can use alternate price list/scenarios	PEPFAR Projections; exchange info with manufacturers
RHInterchange (RHI)	Coordinate orders, info for decision making and advocacy research	Consolidate & Control Order Info
Supply Chain Manager (SCM)		

Figure 7: The End-to-End Reproductive Health Supply Chain—Software Overlay

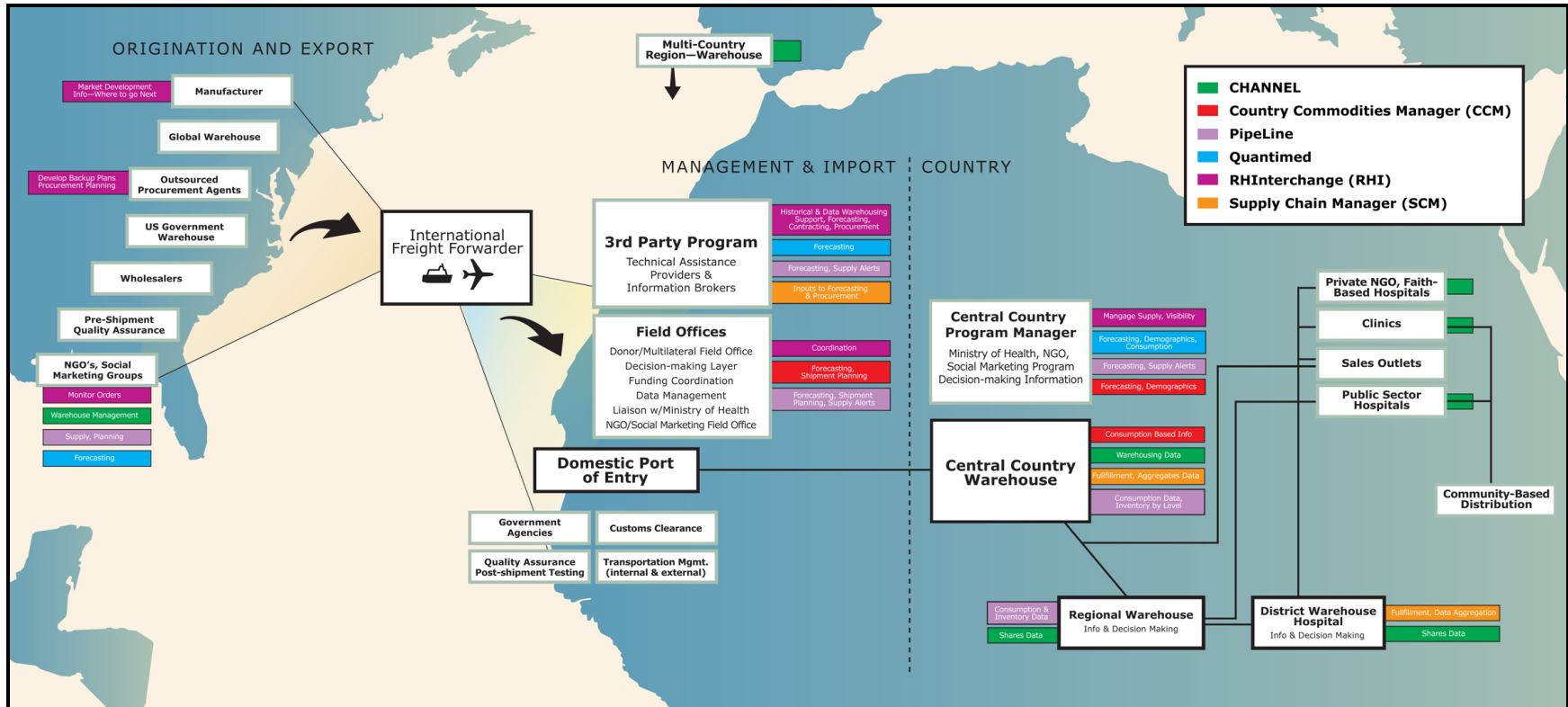


Figure 8: The Reproductive Health Supply Chain—Origin Points with Software Overlay

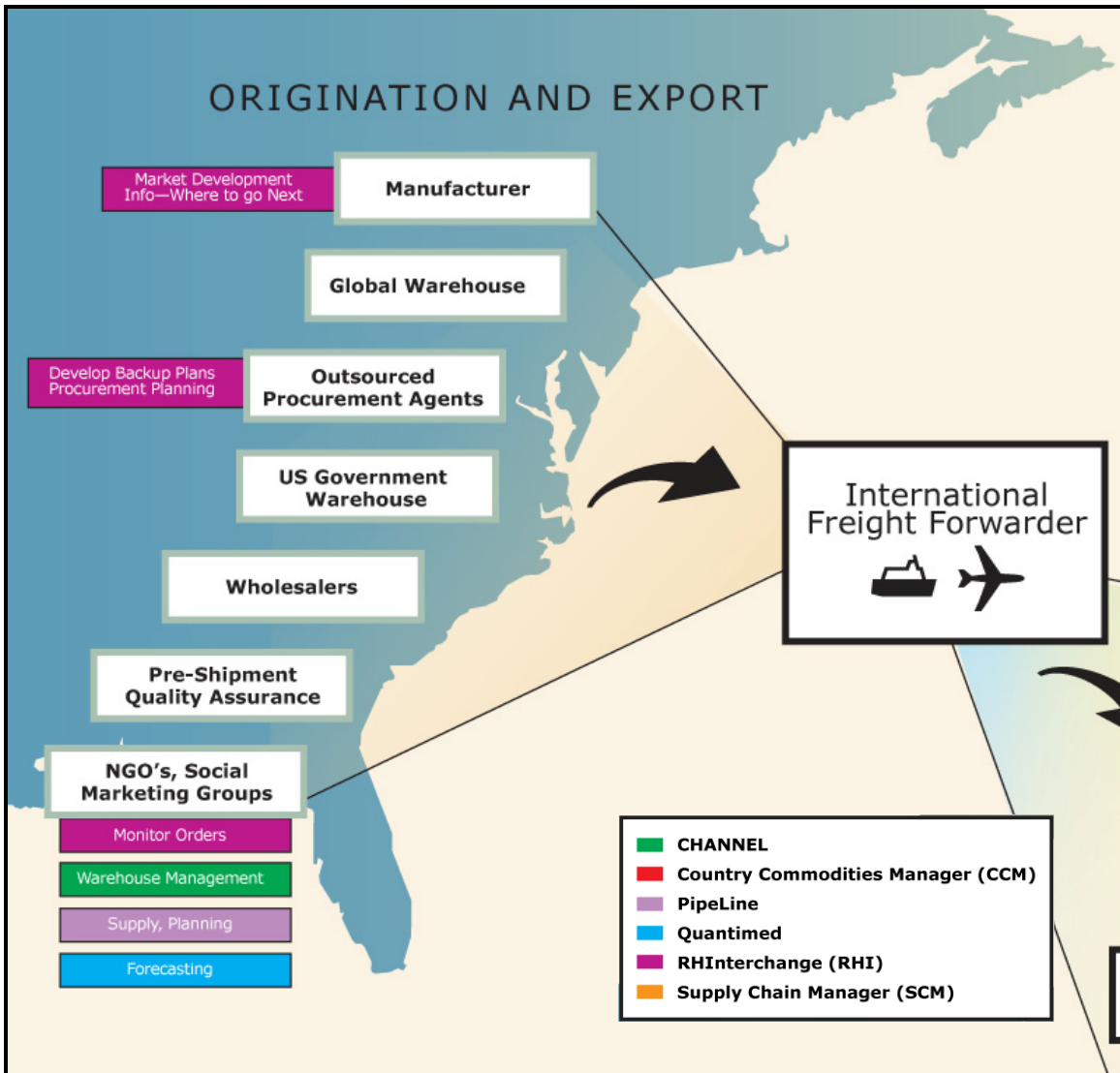


Figure 9: Reproductive Health Supply Chain—Freight Forwarder to Port of Entry with Software Overlay

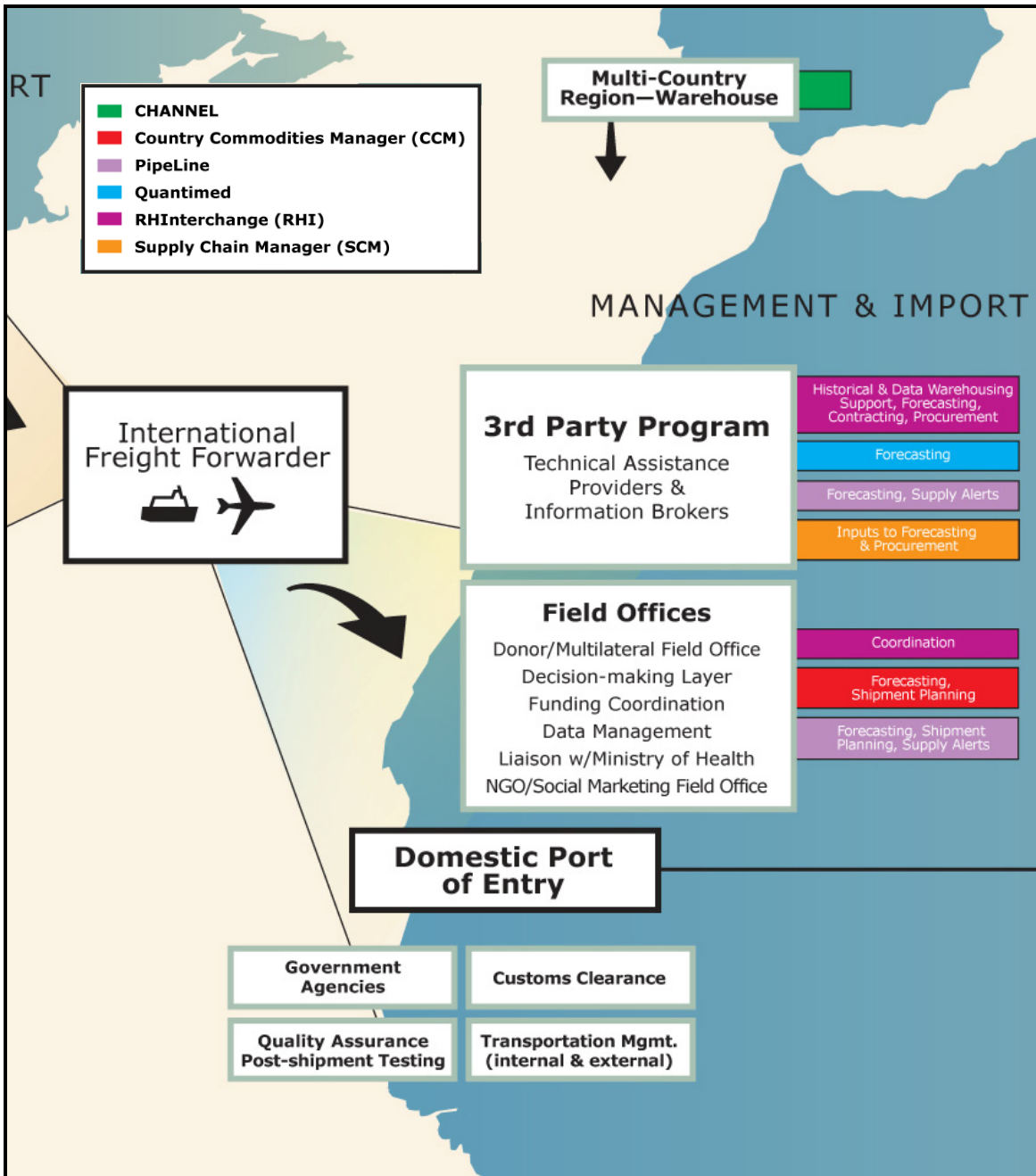
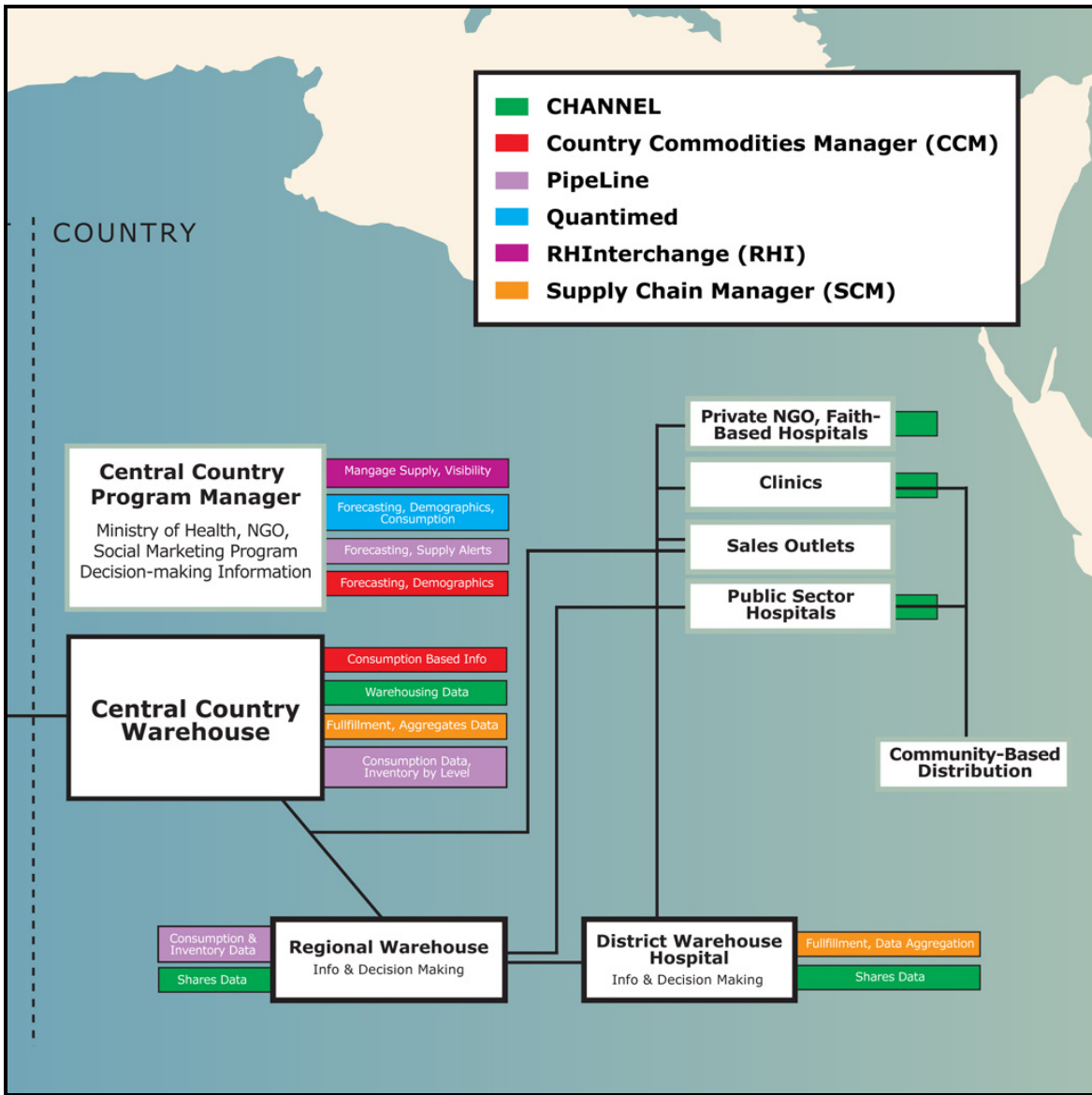


Figure 10: Reproductive Health Supply Chain—In-Country Distribution with Software Overlay



What the Six Reproductive Health Supply Chain Applications Do

As shown in the supply chain mapping exercise, the six software applications perform a variety of functions across the supply chain. In some cases, there is a certain amount of overlap in their functionality.

To further describe the function of each of the six software programs, the research team loaded the six programs onto servers at the University of Maryland’s Supply Chain Management Center Lab, and took each program through a trial run. This process is called *road testing*. The research team also reviewed the user manuals that accompany the six applications.

Here, we walk through each of the six programs and identify their specific functional capabilities. We also list their computer hardware requirements.

From a high-level view, the six applications fall into *four core process groupings*:

- Visibility (incoming product)
- Demand estimation
- Inventory management and order execution
- Delivery/distribution to the field.

Figure 11 shows the four functional groupings and identifies into which group each of the six applications falls.

Figure 11: Reproductive Health Applications Grouped by Core Process Functionality

Visibility (Incoming Product)	Demand Estimation	Inventory Management and Order Execution	Delivery/Distribution to the Field
<p>RH Interchange (RHI)</p> <ul style="list-style-type: none"> • Aggregate multi-donor commodity flows to country central warehouses • Dates shipped & received 	<p>Country Commodities Manager (CCM)</p> <ul style="list-style-type: none"> • Consumption estimation • Overall demographic analysis for forecasting demand • Records stock on hand, inflows, outflows, expirations <p>Quantimed</p> <ul style="list-style-type: none"> • Forecasting based on three methods: Direct consumption, morbidity and proxy consumption 	<p>CHANNEL</p> <ul style="list-style-type: none"> • Stock management/ control of SKU min/max levels • Distribution of product to field/customer invoicing <p>PipeLine</p> <ul style="list-style-type: none"> • Monitors supplier orders/procurements • Tracks movements of commodities inbound to warehouse / outbound to client sites 	<p>SC Manager (SCM)</p> <ul style="list-style-type: none"> • MIS to record & track product flows to field warehouses/service points • Distribution Resource Planning: Helps plan deliveries

The following pages describe the specific functions performed by each of the six RH supply chain applications: CHANNEL, Country Commodities Manager (CCM), PipeLine, Quantimed, RHI, and Supply Chain Manager. For each, we identify the developer, describe the overall application, identify the process group into which it falls, identify languages in which software is written, list key functionalities, and identify hardware/software and operating system requirements. The map in Appendix A shows where each of the six applications is currently installed throughout the world.

CHANNEL

Developer: UNFPA

Overall Description: Helps manage warehouse processes—goods receipt, order management, and goods issued/allocated to field.

Core Process Group: Inventory management and order execution

Languages: English, French, Spanish, Russian, Portuguese, and Dutch

Key Functionalities:

1. Maintains stock records, including the following functions:
 - tracks commodity arrival date by distribution, agency, and commodity group
 - captures lot/batch number to track defective batches
 - monitors expiration dates
 - tracks unit cost
 - monitors quantities issued (distributed)
 - identifies total quantity on hand
 - displays *exhausted stock* or stockouts
 - includes search windows that enable users to search for products by provider codes or sources of supply.
2. Performs aggregate inventory management, including the following functions:
 - maintains expected issue/minimum and maximum (min/max) stock records
 - enables user to set stock on hand requirements based on multiplying expected monthly issue in units by months' worth of inventory being calculated
 - enables cross-system issue adjustment to send inventory from one district-level public warehouse to another
 - records stock issued to an outside NGO
 - records stock issued to a person/individual patient in hospital pharmacies.
3. Manages order fulfillment/distribution
 - handles picking list creation—for each recipient, CHANNEL assembles commodities to be issued
 - creates invoice based on pick list (saved under header of date/recipient #).

Hardware/Software Requirements and Operating System:

Windows 2000, Service Pack 4

Windows XP, Service Pack 2

Windows Vista

Country Commodity Manager (CCM)

Developer: UNFPA

Overall Description: CCM enables country demographic data to be used in generating demand forecasts for contraceptive products.

Core Process Group: Demand Estimation

Languages: English, French, Spanish, and Russian

Key Functionalities:

1. Estimate consumption:
 - captures current commodity inventory levels and monthly consumption amounts
 - for forecasts, divides the total annual consumption into months; monthly consumption is determined by annual distribution from central warehouse divided by twelve
 - performs demographic analyses for forecasting demand
 - demographic forecasting model is based on the total reproductive age (TRA) of women (15–59) multiplied by the contraceptive prevalence rate (CPR) multiplied by the couple-years of protection (CYP). (CYP is the average number of individual contraceptive units used by one couple in one year).
 - records stock on hand, monitors stock inflows, and tracks stock consumption and product expirations—on the product inflow/inbound side, CCM projects the stock of stockkeeping units (SKUs) expected to arrive from the supply pipeline and also estimates arrival dates.

Hardware/Software Requirements and Operating System:

Windows 2000, Service Pack 4

Windows XP, Service Pack 2

Windows Vista

PipeLine

Developer: John Snow, Inc., USAID-funded

Overall Description: Monitors inbound orders/procurements into national supply chains and outbound order flows to next distribution point.

Core Process Group: Inventory management and order execution

Languages: Arabic, English, French, Portuguese, and Spanish

Key Functionalities:

1. Monitors inventory
 - monitors warehouse (program) outbound flows: total quantities dispensed to users or estimated consumption based on warehouse issues
 - monitors warehouse (program) inbound flows: shipments of products (planned, ordered, shipped, or received) into a warehouse
 - focuses on making warehouse (program) stock on hand visible: includes stock balances (quantities and months of stock on hand), stock committed, and stock adjustment
 - does not track distribution to final users within a program
 - compares stock balances to minimum/maximum (min/max) policy thresholds, including couple-years of protection (CYP) conversion graphs
 - generates an action report based on shipment status, current date, and lead times.
2. Performs procurement planning
 - identifies shortfalls/surpluses based on actual consumption, forecasted consumption, stock on hand, and shipments incoming/in transit
 - tracks inventory by lead times
 - calculates procurement actions for needed quantities by process step: plan to order, order to ship, ship to receive, freight costing
 - includes contraceptive procurement tables and calculation of estimated costs of shipments and freight
 - performs straight-line trend analysis on historical consumption.
3. Interoperability
 - includes ability to upload forecasts from ProQ and Quantimed in the form of XML files
 - enables users to download reports as Microsoft Excel spreadsheets.

Hardware/Software Requirements and Operating System:

Windows 2000/XP

Microsoft Office 2003, Access Service Pack 2

CPU: Pentium III or higher

Memory: 256 MB

Hard Drive Space: 500 MB

Video Adapter: SVGA with 800 × 600 resolution

Quantimed

Developer: Management Science for Health Inc., USAID-funded

Overall Description: Quantimed enables health planners to calculate pharmaceutical and consumable medical supply item needs based on either historical consumption patterns or population morbidity trends.

Core Process Group: Demand estimation

Languages: English, with user's guide also available in French

Key Functionalities:

1. Calculates pharmaceutical and medical supply item needs based on either historical consumption patterns, or by applying product use in standard treatment guidelines (regimens) and the morbidity (incidence/prevalence) of health issues for the population to be served.
2. Forecasts demand based on forecast consumption and procurement and inventory parameters.
3. Forecasts consumption based on three alternative methods:
 - Direct consumption method: Forecasts future consumption of medicines and medical supplies based on historical consumption data, adjusted for stockouts; and user estimates of future trends in the use of these products.
 - Morbidity method: Forecasts consumption based on current and estimated future incidence and prevalence of health problems in the target population, standard treatment guidelines, and prescribed products.
 - Proxy consumption method: Indirectly estimates demand based on benchmarking against another health system or facility to determine demand proxies. Requires good information on demographics, incidence of health problems, and usage patterns in the comparison populations.
4. Compares alternative forecasts; enables manual blending of results to prepare a consensus forecast.
5. Can incorporate morbidity or consumption data from a disaggregated level (health facility or sub-national administrative areas) to generate site or regional forecasts.
6. In preparing forecasts, considers procurement and inventory factors, such as lead time, safety stock levels, stock on hand, and shipments yet to be received.
7. Facilitates decisions on resource allocation through analysis of estimated costs of forecast quantities using vital, essential, and non-essential (ABC) analysis of stock.
8. Product information can be imported electronically and forecast results can be exported to Excel or XML formats. Shares common product information with the Supply Chain Management System (SCMS) project, ERP (Orion), and the USAID | DELIVER PROJECT's PipeLine.

Hardware/Software Requirements and Operating System:

Windows 98 or a later version (Windows 2000 or Windows XP recommended)

CPU: Pentium based; Pentium 233 MHz recommended

Memory: 128 MB of RAM

Hard Drive Space: 100 MB free disk space

Reproductive Health Interchange (RHI)

Developer: Reproductive Health Supplies Coalition (RHSC). RHI is currently being operated by John Snow, Inc.

Overall Description: Enables display of aggregate supplies for a country procured by USAID, UNFPA, and the International Planned Parenthood Federation (IPPF).

Core Process Group: Visibility (Incoming Product)

Languages: English

Key Functionalities:

1. Online shipment registry
 - Aggregates XML shipment data feeds from donors' systems to display status of inventory moving into a region/country.
 - Enables country-level central warehouse managers to drill down into incoming multi-donor shipments; and to look at shipments by donor, commodity type, date of shipment, and purchase order number.
 - Shipping receipt information (from vendors to donors) is transferred daily from donor organizations.
 - Inbound shipment information (from donors to central warehouses) can be used by warehouse managers in forecasting and inventory management.

Hardware/Software Requirements and Operating System:

Internet: IE 5 and up

Operating System: Windows 95 and up

Supply Chain Manager (SCM)

Developer: John Snow Inc., funded by USAID

Overall Description: Records and tracks product flows to the field, the warehouse, and service delivery points. Helps plan delivery routes and loads.

Core Process Group: Delivery/Distribution to the Field

Languages: English, Spanish

Key Functionalities:

1. Facilitates replenishment planning.
 - Calculates facility requirements based on quantities dispensed, maximum inventory level, and current inventory, at different tiers.
2. Performs product tracking.
 - Maintains opening balances, receipts, issues, and closing balances.
 - Records and tracks consumption or dispensed-to-user rates to allow for calculation of average monthly consumption and months of stock on hand.
 - Can export data in XML or text files to other systems.
3. Performs distribution resources planning (DRP).
 - Lists pre-defined routes and drop-off points.
 - Describes vehicle capacities.

Hardware/Software Requirements and Operating System:

Windows 95/98/2000/NT

CPU: Pentium II class or higher

Memory: 32 MB

Hard Drive Space: 100 MB

Video Adapter: VGA with 800 × 600 resolution

Benchmarking Best of Breed Applications

We define benchmarking as the process of comparing the scope or universe of the collective functionalities of the six RH software applications against the universe of functionalities performed by the COTS supply chain software. Our benchmarking effort was intended to reveal to the user any gaps between what the six RH applications do and what the COTS supply chain applications do.

Using the results from the supply chain mapping and *road testing*, we categorized the functions performed by each of the six RH applications, then put them into a master list or framework. We performed the same categorization on the three COTS software applications, which were also installed on the servers at the University of Maryland Supply Chain Lab. These commercial applications included a *best of breed* supply chain management application and supply chain modules from two enterprise resource planning (ERP) software solutions.

The term *best of breed* refers to software that is widely recognized as being an example of the best software available within a particular functional discipline—in this case, supply chain management. Best of breed software is designed specifically to manage the area on which it concentrates, as opposed to broader, more generic business management software.

From the categorization of the COTS applications, we developed a second listing or framework of software functionality, which represents the functionality universe of the benchmarking software. This listing is broader in terms of functionality performed than the listing for the six RH applications. It encompasses more end-to-end supply chain functional capabilities, and can be a marker for the state-of-the-art in supply chain management software. Comparing the two frameworks reveals gaps in the collective capabilities of the six RH software applications.

As noted earlier in this report, there are a number of gaps between the collective capabilities functionality of the RH applications and those of the COTS solutions. These gaps fall into two distinct categories: functionality-specific and underlying system architecture-specific.

Function-specific:

- Inventory management—i.e., more robust inventory management capabilities and real-time inventory tracking and stock records updating
- Transportation management—both inbound and outbound
- Warehouse optimization—for both work flows and stock layout.

Architecture-specific:

- Integrated—i.e., solutions seamlessly and automatically share data among operational areas, so that data only has to be entered once and it populates the entire supply chain information system
- Trading partner management—i.e., visible into the immediate up and down supply chain levels/tiers

- Real-time transaction/activity management—the six RH applications have limited capabilities in this area
- Ability to seamlessly and easily share information across the organization or with outside trading partners—a difference is that the six RH solution are desktop-based versus server-based. They reside on the user’s desktop in single, individualized, and separate installations.

The function-specific gaps can be closed by adding functionality to the appropriate RH supply chain application best suited to manage that functionality. Adding such functionality could be a short-term goal for the software development process; this could round out the total RH supply chain capabilities of the collective six software applications.

Longer-term, the solutions could migrate to a more collaborative, unified underlying architecture, which would enable them to share data more readily and with less data entry. They could communicate more immediately with trading partners up and down the supply chain, so that transaction records would be updated in a more timely fashion.

The Software Functionality Framework

Tables 1 and 2 are software functionality frameworks. Table 1 depicts the collective functionality capabilities of both the COTS supply chain software benchmarked in this study, and the six RH supply chain software applications. (*Note:* For a definition of terms used in Tables 1 and 2, see Appendix B.)

Users can read down the list of software attributes or functionality on the left-hand side to determine if a particular function is performed by the COTS solutions and the six RH software programs. We noted that, in all cases, the COTS software performs their functions in real time—i.e., as an event or activity occurs in the supply chain. This is not the case, in most instances, with the RH applications.

The gaps indicate what functionalities are not currently available in the six RH applications; these can inform future software development efforts.

The framework in Table 2 provides a snapshot of the functions performed by each of the six RH supply chain applications considered in the research study. It is based on the same functionality framework used in Table 1.

Table 1: Software Functionality Framework

Software Attribute/Functionality	COTS Supply Chain Software	The 6 RH Supply Chain Software Applications
GENERAL ATTRIBUTES		
Type of database:		
Relational server-based (common/single view across enterprise)	Y	Y ¹
PC desktop/stand-alone (individual desktop view)		Y
Common data model	Y	Y
Internet-based access	Y	Y ²
Web services—provides foundation for application data sharing and functionality	Y	N
FUNCTIONALITY		
Demand Planning	Y	Y
Demand Forecasting	Y	Y
Inventory Management		
Real-time inventory tracking/updating	Y	N
Visibility of what’s in warehouse/available	Y	Y
Visibility of inbound to warehouse	Y	Y
Visibility of outbound to customers/market/next tier	Y	Y
Inventory demand/usage analysis	Y	Y
Inbound Transportation Management		
Inbound shipment planning and scheduling	Y	Y
Carrier management—freight rating, etc.	Y	N
Inbound shipment visibility	Y	Y
Warehouse/Stores Management		
Receiving	Y	Y
Immediate needs/cross docking	Y	N
Wave planning—released orders to warehouse picking	Y	N
Stock putaway	Y	N
Order picking	Y	Y
Warehouse labor management—overall	Y	N
Labor workload planning/scheduling	Y	N

¹ RH Interchange only

² RH Interchange only

Labor productivity tracking	Y	Y
Stock location management	Y	Y
Warehouse facility layout/slotting optimization	Y	N
Outbound Transportation Management		
Carrier management—freight rating, etc.	Y	N
Outbound load planning	Y	Y
Shipment documentation	Y	N
Shipment tracking/visibility	Y	Y
Trading Partner Management—Web-based Communication Capabilities	Y	N
Performance Management Indicators/Reporting Capabilities	Y	Y
Costs/financials	Y	Y
Activities	Y	Y
Inventory	Y	Y
Trends	Y	Y
Proactive Problem Alerting	Y	Y ³
Proactive Error Alerting	Y	N
RFID Enabled	Y	N

³ PipeLine only

Table 2: Functions Performed by Each of the Six RH Supply Chain Applications

Software Attribute/ Functionality	CCM	CHANNEL	PipeLine	Quantimed	RHI	SCM
GENERAL ATTRIBUTES	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No	Yes or No
Type of Database:						
Relational server-based (common/single view across enterprise)*	N	N	N	N	Y⁴	N
PC desktop/stand-alone (individual desktop view)	Y	Y	Y	Y	Y⁵	Y
Common data model	Y	Y	Y	Y	Y	Y
File sharing between software applications	Y⁶	Y⁷	Y	Y⁸	Y⁹	Y¹⁰
Internet-based access	N	N	N	N	Y	N
Web services—provides foundation for application data sharing and functionality	N	N	N	N	N	N
Multiple languages	Y	Y	Y	N	N	Y
FUNCTIONALITY						
Demand Planning	N	N	N	Y	N	N
Demand Forecasting	Y	Y	Y	Y	N	N
Inventory Management						
Real-time inventory tracking/updating	N	N	N	N	N	N
Visibility of what's in warehouse/available	Y	Y	Y	N	Y	Y
Visibility of inbound to warehouse	N	Y	Y	N	Y	N
Inventory demand/ usage analysis	Y	Y	Y	N	N	N

⁴ RHI is web-based, so information can be accessed by users anywhere, at any level, via the Internet.

⁵ Requires Internet access.

⁶ Can export data to Excel spreadsheets.

⁷ Can export data to Excel spreadsheets.

⁸ Results exportable to Excel or XML file formats.

⁹ Unidirectional file sharing only—from central procurement databases to RHI.

¹⁰ Can export data in XML or text files to other systems.

Software Attribute/ Functionality	CCM	CHANNEL	PipeLine	Quantimed	RHI	SCM
Inbound Transportation Management						
Inbound shipment planning & scheduling	N	N	Y	N	N	N
Carrier mgt.—freight rating, etc.	N	N	N	N	N	N
Inbound shipment visibility	N	N	Y	N	Y	N
Warehouse/Stores Management						
Receiving	Y	Y	Y	N	N	Y
Immediate needs/cross docking	Y	Y	N	N	N	N
Wave planning—released orders to warehouse picking	N	N	N	N	N	N
Stock putaway	N	Y	N	N	N	N
Order picking	N	Y	N	N	N	N
Warehouse labor management - overall	N	N	N	N	N	N
Labor workload planning/scheduling	N	N	N	N	N	Y
Labor productivity tracking	N	N	N	N	N	N
Stock location management	N	N	N	N	N	N
Warehouse facility layout/slotting optimization	N	N	N	N	N	N
Outbound Transportation Management						
Outbound load planning	N	N	N	N	N	Y
Shipment documentation	N	N	N	N	N	N
Shipment tracking/visibility	N	N	Y	N	Y	N
Trading Partner Management—Web-based Communication Capabilities	N	N	N	N	N	N
Performance Management Indicators/Reporting Capabilities						
Costs/financials	Y	Y	Y	Y	N	N
Activities	N	Y	Y	N	N	Y
Inventory	Y	Y	Y	N	N	Y
Trends	Y	Y	Y	N	N	Y
Proactive Problem Alerting	N	N	Y	N	N	N
Proactive Error Alerting	N	N	N	N	N	N
RFID Enabled	N	N	N	N	N	N

Conclusion

This user's guide is a tool that in-country supply chain managers and advisors can use to make better informed decisions as to which software applications might best suit their needs. The guide provides a detailed description of the functions performed by six specialized RH supply chain software applications currently in use around the world. It also provides a graphic illustration of the major flows of material, information, and funds across the RH supply chain; it clearly shows at what points in these flows the six applications provide functionality. The maps highlight what functions are performed at these locations in the supply chain.

The user's guide also provides two functionality frameworks that list the functional capabilities of the six RH supply chain software programs; it compares their capabilities, both individually and collectively, to a broader functionality model available with the COTS supply chain applications. In-country supply chain managers and software developers can use this comparative framework to determine where gaps exist between the six RH applications and the major COTS supply chain software. These gaps—both functional and architectural—indicate the capabilities that are not currently available in the six RH applications; they can also inform future software development efforts.

Taken together, the RH supply chain applications provide much-needed management capabilities with which users can manage their supply chains. This research effort identified exactly what each of the six applications do with regard to their functionality and capabilities. This listing should provide in-country supply chain managers and advisors with better insight into which of these tools best suit their needs.

The research also highlights potential opportunity areas for further augmentation of the current RH supply chain management functionality, based on what, currently, is the best practice in commercial supply chain software design. Such augmentation/enhancements could address both functional needs (i.e., warehousing, inventory management, etc.) and architectural/structural issues (integration with other applications, ability to communicate seamlessly, ability to move to a more real-time information updating environment, etc.).

Overall, the software user's guide should help in-country supply chain personnel make more informed decisions about their technology platforms and, as a result, help them improve how they manage their RH supply chains.

Appendix A—RH Software Application Installation Locations

Figure 12. Current Worldwide Installation Locations for the Six Reproductive Health Applications



Appendix B—Glossary

The following terms are used in the functionality framework.

demand planning. The business-planning process that enables management to develop demand forecasts as input to service-planning processes, production, inventory planning, and supply chain operations.

demand forecasting. Used to estimate the quantity of a product or service that consumers will require or purchase.

inventory management. All activities relating to managing inventory both across the supply chain and within specific distribution facilities or locations. Includes tracking inventory inflows and outflows and updating inventory records, accordingly. Effective inventory management requires visibility into what is inside the warehouse and available to promise to customers, as well as what is coming to the warehouse from suppliers or other sources.

outbound transportation management. Planning, optimizing, and managing all activities related to the transport of goods to the receiver/customer. Activities include transportation mode and carrier selection, vehicle load and route planning and optimization, transport costs management, rate negotiation, shipment documentation, and shipment tracking.

trading partner management—web-based communication capabilities. The synchronizing of business processes with those of trading partners across the supply chain using enhanced communication tools such as web-based applications. These applications enable users to manage orders, inventory, and shipments throughout the supply chain via the Internet.

performance management indicators/reporting capabilities. Systems and reporting capabilities that enable users to track and manage supply chain costs, activities, inventory, and trends, according to established performance thresholds.

proactive problem alerting. Capabilities within software applications that alert users when an out-of-tolerance event occurs in the supply chain. The system automatically sends out alerts based on pre-defined user parameters. Alerts can be sent via email, fax, pager, PDA, etc.

proactive error alerting. Ability to alert users to an inputting error as it occurs (e.g., typographical error, incorrect data entry).

radio-frequency identification (RFID). A technology that uses radio frequency *tags* to store and transmit data about shipments—e.g., detailed contents information, shipping information, and order processing information.

Appendix C—How to Obtain the Software

The following information is current as of the date of this publication.

PipeLine

To obtain copies of PipeLine, contact askdeliver@jsi.com or trisha_long@jsi.com. The *PipeLine 4.0 Users Guide* is available at http://deliver.jsi.com/dlvr_content/resources/allpubs/softwaremanuals/PipeLine4_UserManu.pdf.

Supply Chain Manager

To obtain copies of Supply Chain Manager, contact askdeliver@jsi.com or john_durgavich@jsi.com. The *Supply Chain Manager Version 3 User's Manual* is available at http://deliver.jsi.com/dlvr_content/resources/allpubs/softwaremanuals/SCM_UserManu.pdf.

Country Commodity Manager (CCM) and CHANNEL

For further information, including how to obtain CCM and CHANNEL, contact ccm@unfpa.org.

Reproductive Health Interchange (RHI)

To access the RHI, go to <http://rhi.rhsupplies.org>. No software download is required. You can download a brochure and navigation instructions from the same website. For additional information on using the RHI, contact the RHI manager at supply@jsi.com.

Quantimed

For additional information, including how to obtain Quantimed, contact cpmsoftware@msh.org.

Appendix D—Additional Resources

Boyson, S., L. H. Harrington, and T. M. Corsi. 2004. *In Real Time: Managing the New Supply Chain*. Westport, Ct.: Praeger Publishers.

[Discusses how new software technologies can improve supply chain management through improved real time visibility of supply chain events (from customer orders to delivery of product) and improved connectivity between different actors in the supply chain. The application of these technologies in developing countries can leverage the growing availability of computers, cell phones, and personal digital assistants (PDAs).]

DELIVER. 2006. *Guidelines for Implementing Computerized Logistics Management Information Systems (LMIS). Second Edition*. Arlington, Va.: DELIVER, for the U.S. Agency for International Development. <http://deliver.jsi.com>.

[Defines the computerized LMIS; recommends the components of a successful computerized LMIS; and explains development, implementation, and operations of such a system. Includes lessons learned based on field experiences and sample reports and graphs.]

John Snow, Inc. 2000. Family Planning Logistics Management (FPLM). *Logistics Management Information System Assessment Guidelines*. Arlington, Va.: FPLM/John Snow, Inc., for the U.S. Agency for International Development. <http://deliver.jsi.com>.

[A general reference for field advisors conducting assessments of logistics management information systems.]

Family Planning Logistics Management (FPLM)/John Snow, Inc. 2000. *Programs That Deliver: Logistics' Contributions to Better Health in Developing Countries*. Arlington, Va.: FPLM/John Snow, Inc., for the U.S. Agency for International Development. <http://deliver.jsi.com>.

[Aimed at policymakers and program managers—describes why developing country health and family planning programs must have a strong supply chain if they are to succeed.]

John Snow, Inc./DELIVER. 2003. *Malawi: Health Commodities Logistics Management System Procedures Manual*. Arlington, Va.: John Snow, Inc./DELIVER, for the U.S. Agency for International Development. <http://deliver.jsi.com>.

[Developed for the Republic of Malawi Ministry of Health and Population (MOHP); provides standard operating procedures for the management of health commodities within the MOHP integrated supply chain.]

USAID | DELIVER PROJECT. 2007. *The Logistics Handbook: A Practical Guide for Supply Chain Managers in Family Planning and Health Programs*. Reprint. Arlington, Va.: USAID | DELIVER PROJECT. <http://deliver.jsi.com>.

[Explains the major aspects of logistics management with an emphasis on contraceptive supplies; for managers who work with supplies every day, as well as managers who assess and design logistics systems for entire programs.]



Reproductive Health
Supplies Coalition