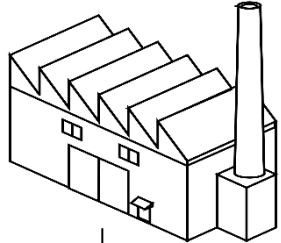




**OPEN SOURCE SOFTWARE FOR
MANAGING HEALTH SUPPLY CHAINS**

The Medical Commodities Supply Chain – a high level Overview

Pharmaceuticals Factory / Warehouse



Central Warehouse



Regional Hospital



Community Clinic



Health Post





















TETANUS TOXOID VACCINE ADJUBED
VACCINA ANTITETANICA FLOCCO TETANICO ADJUBATO
VACCIN ANTITETANIQUE (ANTIGÈNE TETANIQUE ADJUBÉ)

No. 110 Dose 0.5ml
Pack / Paquet / Paquete 5.0 ml (10 x 0.5 ml)
Shelf Life / Validité / Validade 36 Months / 36 M.
Do not freeze / Ne pas congeler / Não congelar
Store at 2-8°C refrigerated
Conserve au réfrigérateur de 2 à 8°C
Conserve em geladeira de 2 a 8°C

Manufactured by / Fabriqué par / Fabricado por
SERUM INSTITUTE OF INDIA LTD.
23/53 Havelock Road, Porur 605 006, India
407-02, No. 10, Road 6, Madhavaram, Chennai 600 044, India
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SERUM INSTITUTE OF INDIA - CHENNAI









A basic “R&R” or Requisition form



REPORT FOR ESSENTIAL MEDICINES AND MEDICAL SUPPLIES

Reporting Period: From: _____ to _____ Province: _____ Maximum Stock Level: 3 Months
 dd/mm/yyyy dd/mm/yyyy

Facility: _____ District: _____ Emergency Order Point: 0.5 Months

Date of last delivery of stock: _____
 dd/mm/yyyy

Drug Product	Unit	Beginning Balance of stocks in the storeroom	Total Quantity Received during the month	Total Quantity Issued from the storeroom during the month	Losses and Adjustments	Physical Count of stocks in the storeroom at the end of the month	Number of Days stocked Out
A	B	C	D	E	F	G	H
Acetylsalicylic Acid, tablet 300mg	1000 tabs						
Acyclovir, tablet 400mg	100 tabs						
Adrenaline Acid Tartrate, Injection, 1mg/ml	1ml Ampoule						
Amitriptyline hydrochloride, tablet 25mg	1000 tabs						
Amoxicillin (Trihydrate), Dry powder for suspension 125mg/5ml	100ml bottle						
Amoxicillin (Trihydrate) Capsule 250mg	1000 caps						
Amphotericin B, PWD for injection, 50mg	Vial						
Artemether/Lumefantrine, tablet 120/20mg	6 tabs						
Artemether/Lumefantrine, tablet 120/20mg	12 tabs						
Artemether/Lumefantrine, tablet 120/20mg	18 tabs						
Artemether/Lumefantrine, tablet 120/20mg	24 tabs						

Explanation for Losses/Adjustments: _____

Discrepancies or Remarks: _____

A more detailed "R&R" or Requisition form

DISPENSARY OR HEALTH CENTER REPORT & REQUEST FOR Anti-Retroviral MEDICINES AND RELATED MEDICAL SUPPLIES AND EQUIPMENT

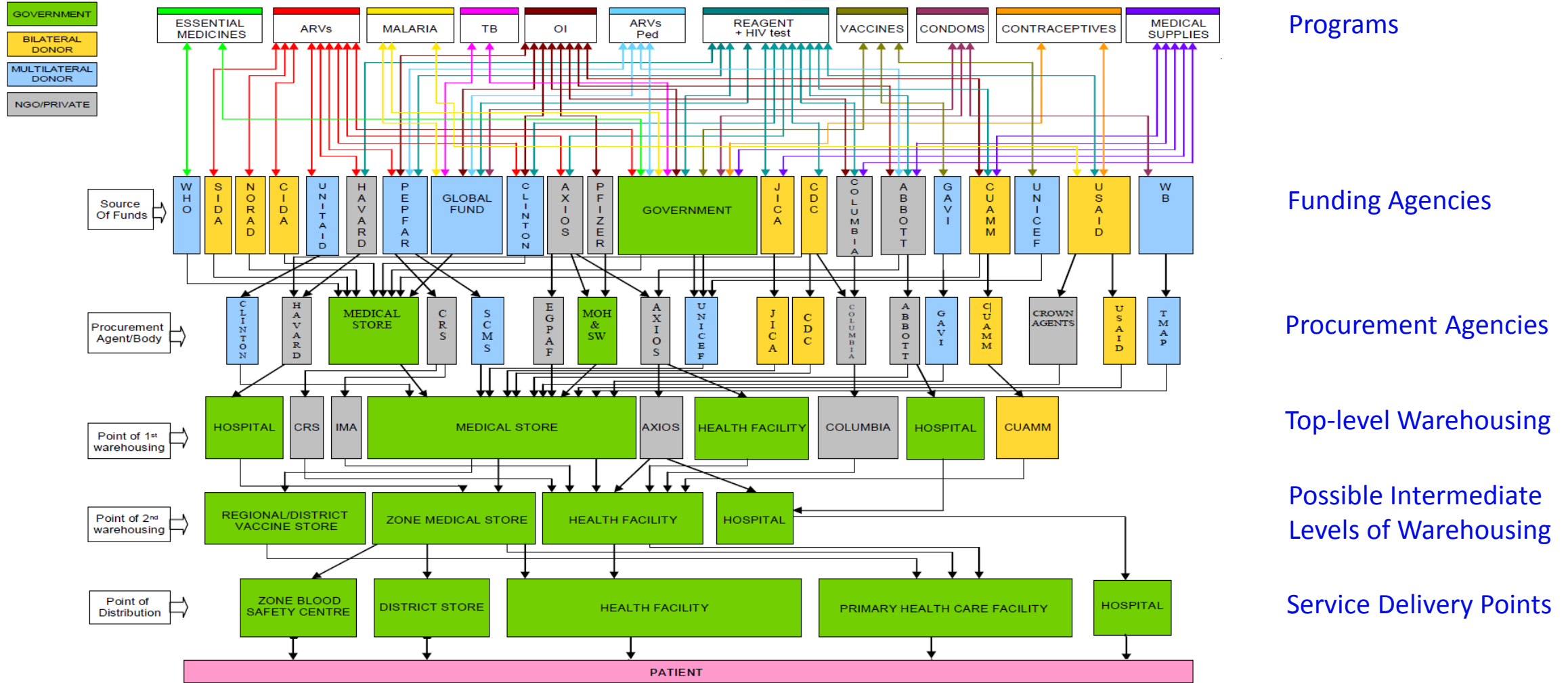
Facility Code: _____ Facility Name: _____ Type (GOV/NGO/FBO/OTHER): _____

Name of Council / Region: _____ Date Submitted: _____

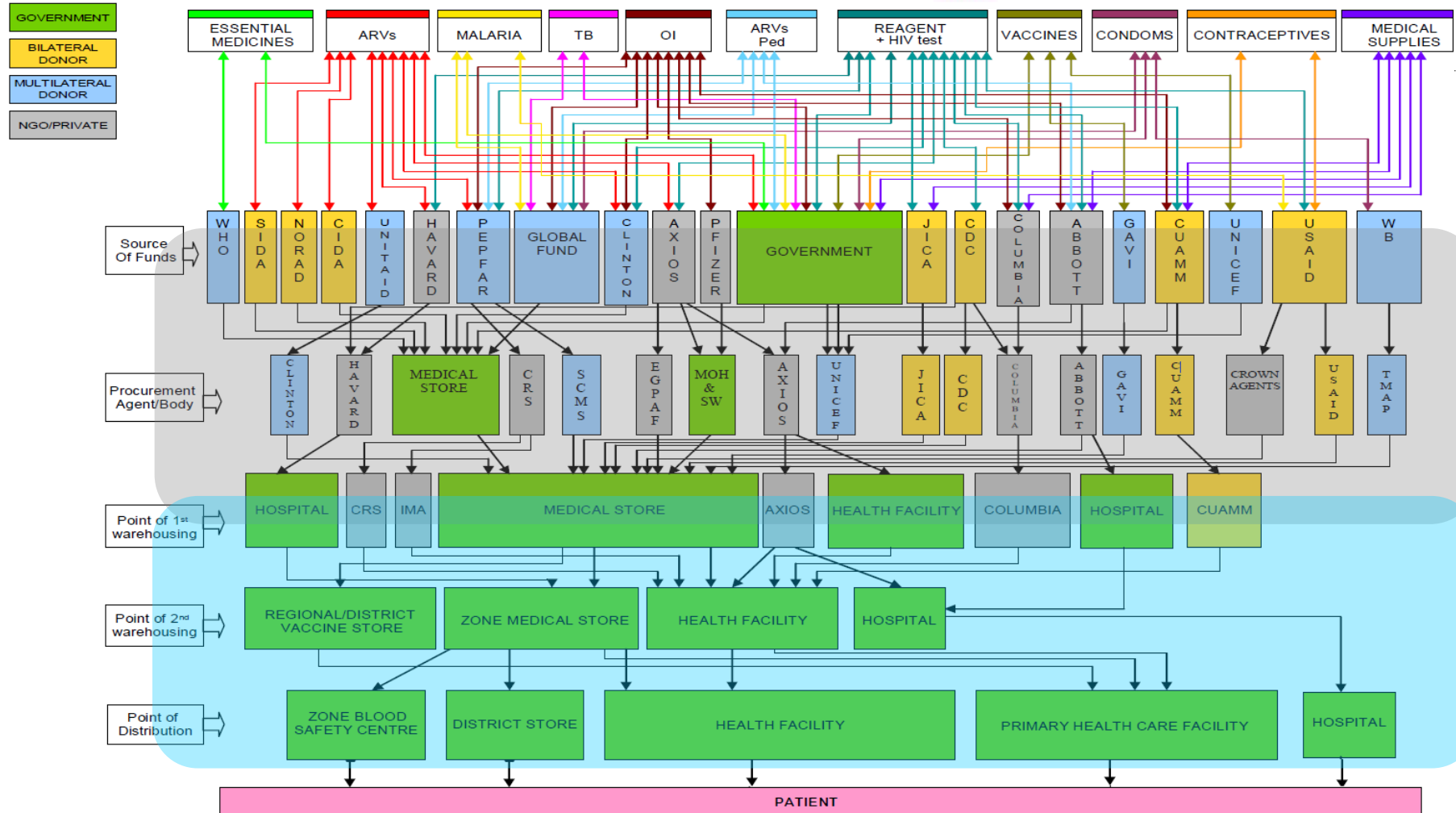
Reporting Period: Beginning Month: _____ Ending Month: _____ Year: _____

PRIORITY SUPPLIES FOR DISPENSARIES AND HEALTH CENTERS													
MSD Code	Supply Item	Unit of Issue	Opening Balance	Received This Period	Lost/ Adjusted	Closing Balance	Estimated Consumed [A+B±C-D]	Quantity Needed [(E+3)x7-D]	Quantity Requested	Price	Cost [GxH]	Approved Quantity	Approved Cost
			(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
10010001	Artemether/Lumefantrine Tab 20/120mg (Yellow-1x6)	Disp/30								0			
10010002	Artemether/Lumefantrine Tab 20/120mg (Blue-2x6)	Disp/30								0			
10010007	Artemether/Lumefantrine Tab 20/120mg (Pink-3x6)	Disp/30								0			
10010004	Artemether/Lumefantrine Tab 20/120mg (Green-4x6)	Disp/30								0			
10011001	Acetylsalicylic Acid (Aspirin) Tabs 300mg	1000T								1900			
10011002	Albendazole Tabs 200mg	100T								1100			
10011005	Aminophylline Tabs 100mg	1000T								3500			
10011007	Amoxicillin Caps 250mg	1000T								33000			
10011018	Chlorpheniramine Tabs 4mg	1000T								800			
10011021	Chlorpromazine Tabs 100mg	500T								5000			
10011028	Co-Trimoxazole Tabs 400mg/80mg	1000T								9000			
10011031	Diclofenac tabs 50mg	100T								600			
10011033	Doxycycline Caps 100mg	1000T								13000			
10011034	Ephedrine Tabs 30mg	1000T								5000			

A Closer Look at the Supply Chain



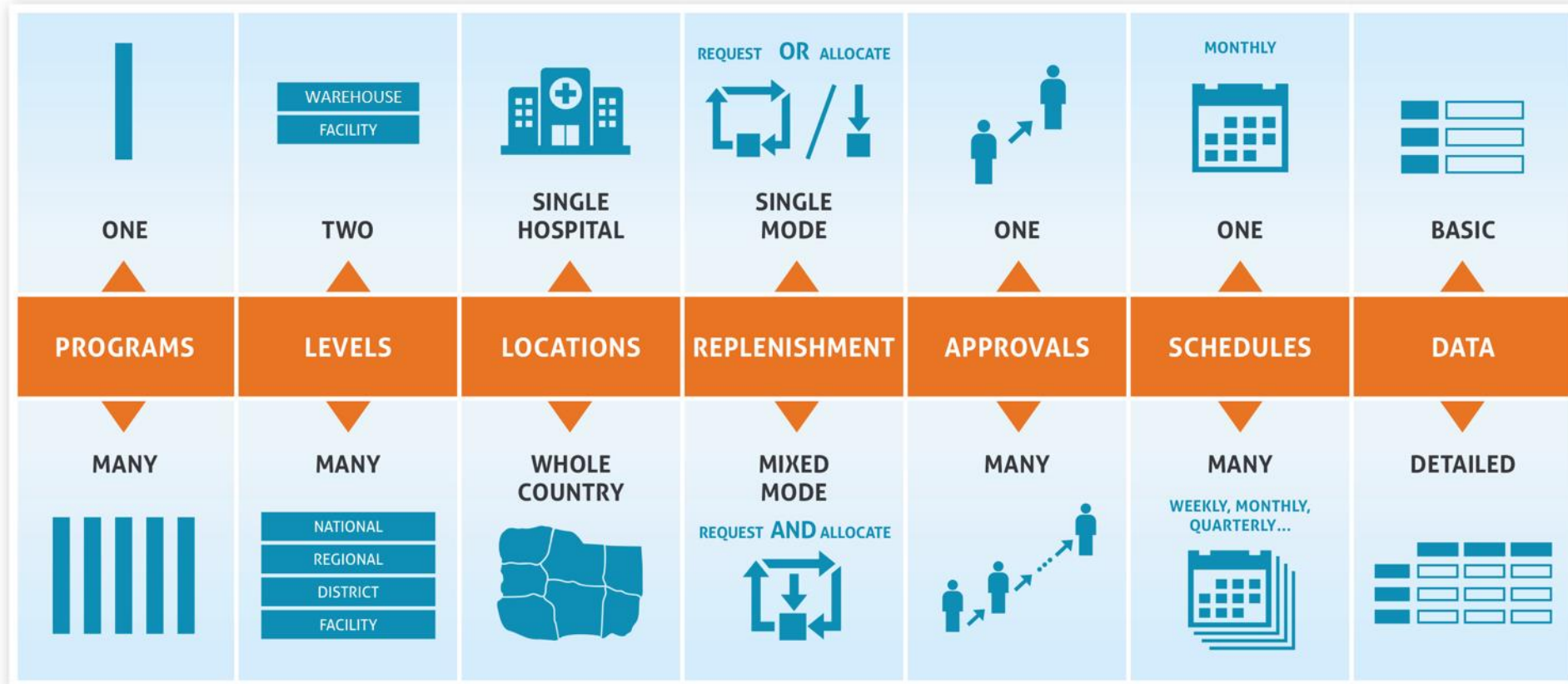
A Closer Look at the Supply Chain



= scope of typical ERP / Warehouse Management System

= scope of OpenLMIS

An LMIS needs to be configurable...



Programs can be customized to match your health care services

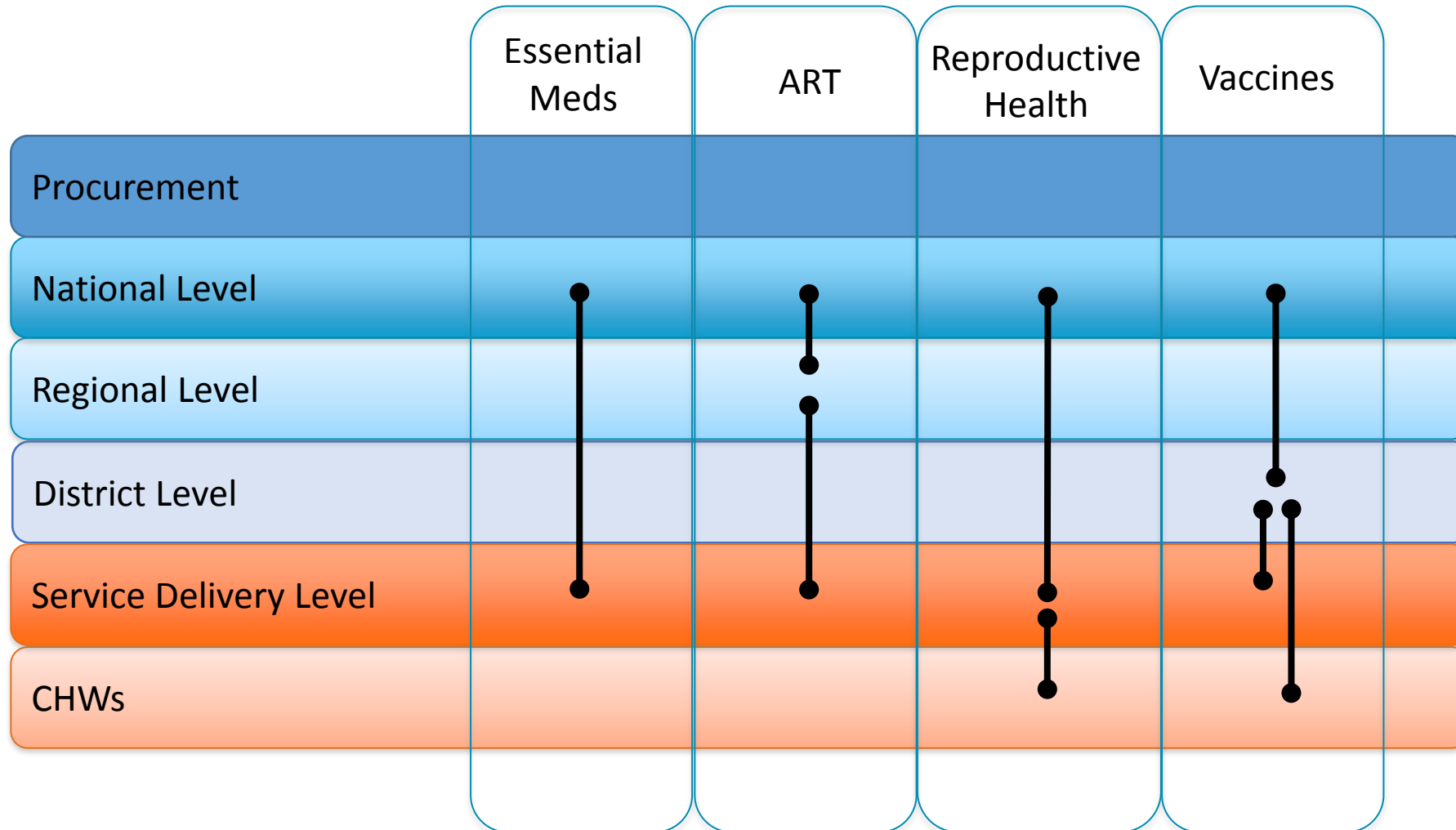
- **Essential Medicines**
- **Infectious Diseases**

- **Essential Medicines**
- **Malaria**
- **TB**
- **ART**

- **Essential Medicines**
- **Malaria**
- **TB**
- **ART – Adult**
- **ART – Pediatric**
- **PMTCT – Community**
- **EPI**

Variations in Distribution of Supplies

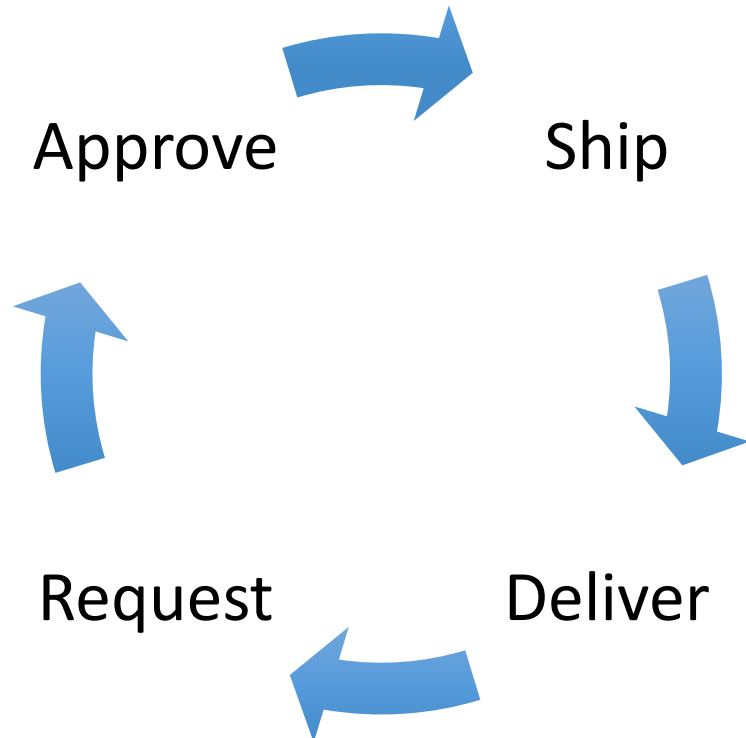
Stocking Depots at multiple levels, optional Level Skipping, etc – customizable by Program



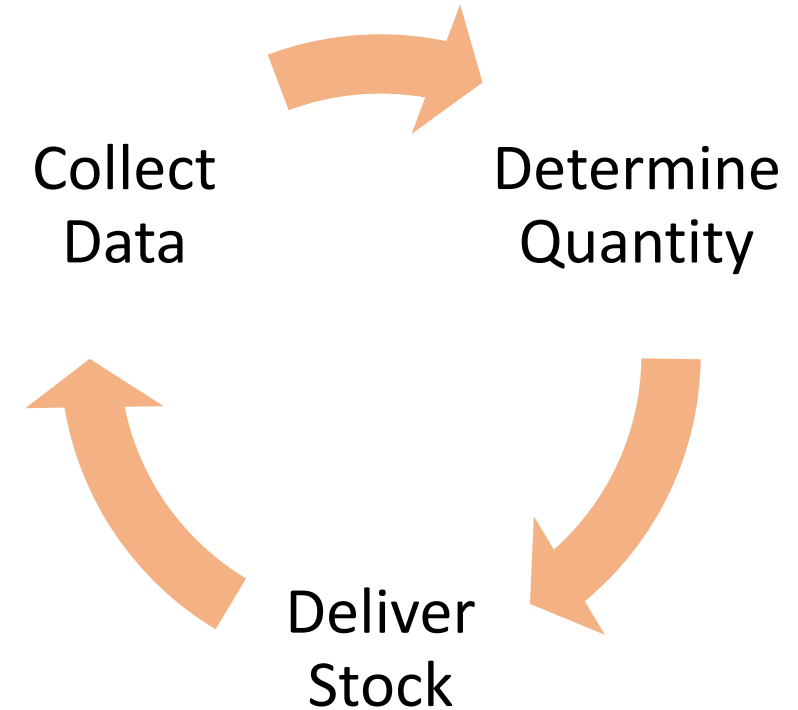
“Pull” and “Push” Replenishment Processes

Customizable by Program

“Pull” or Requisition Process



“Push” or Allocation Process



Multiple Operating Schedules

Customizable by Program

Monthly Replenishment Cycles During the Year

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
-----	-----	-----	-----	-----	-----	-----	-----	------	-----	-----	-----

Quarterly Replenishment Cycles During the Year

Q1			Q2			Q3			Q4		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

Interleaved Quarterly Replenishment Cycles During the Year

Q1			Q2			Q3			Q4		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
[Orange bar]			[Orange bar]			[Orange bar]			[Orange bar]		
[Green bar]			[Green bar]			[Green bar]			[Green bar]		
[Yellow bar]			[Yellow bar]			[Yellow bar]			[Yellow bar]		
A	B	C	A	B	C	A	B	C	A	B	C
C	A	B	C	A	B	C	A	B	C	A	B
B	C	A	B	C	A	B	C	A	B	C	A

Replenishment Periods of Uneven Duration

Jan	Feb	Mar	Apr	May	Rainy Season (Jun - Aug)			Sept	Oct	Nov	Dec
-----	-----	-----	-----	-----	-----------------------------	--	--	------	-----	-----	-----

Simple or Detailed Data Collection Customizable by Program

open LMIS Logistics Management Information Systems [Logout](#)

Home Requisitions Orders Reports Distributions Français (Google Translated) | English

Regular Facility: F3020A - Steinbach Hospital Operated by: Maximum Stock Level: 3 Emergency Order Point: 1
 Region: Eastman Province: Manitoba Reporting Period: 01/03/2014 - 31/03/2014

Full Supply Product(s) **Non Full Supply Product(s)**

Product	Total Quantity Dispensed	Stock on Hand
Malaria Prophylaxis		
Doxycycline tablet 100 mg	<input type="text" value="270"/>	<input type="text" value="190"/>
Test Kits		
Malaria Rapid Diagnostic Test card 1 each	<input type="text" value="350"/>	<input type="text" value="300"/>
Anti-malarials		
Quinine Sulphate capsule 300 mg	<input type="text" value="200"/>	<input type="text" value="23"/>

open LMIS Logistics Management Information Systems [Logout](#)

Home Requisitions Orders Reports Distributions Français (Google Translated) | English

Regular Facility: F3020A - Steinbach Hospital Operated by: Maximum Stock Level: 3 Emergency Order Point: 1
 Region: Eastman Province: Manitoba Reporting Period: 01/05/2014 - 31/05/2014

Full Supply Product(s) **Non Full Supply Product(s)**

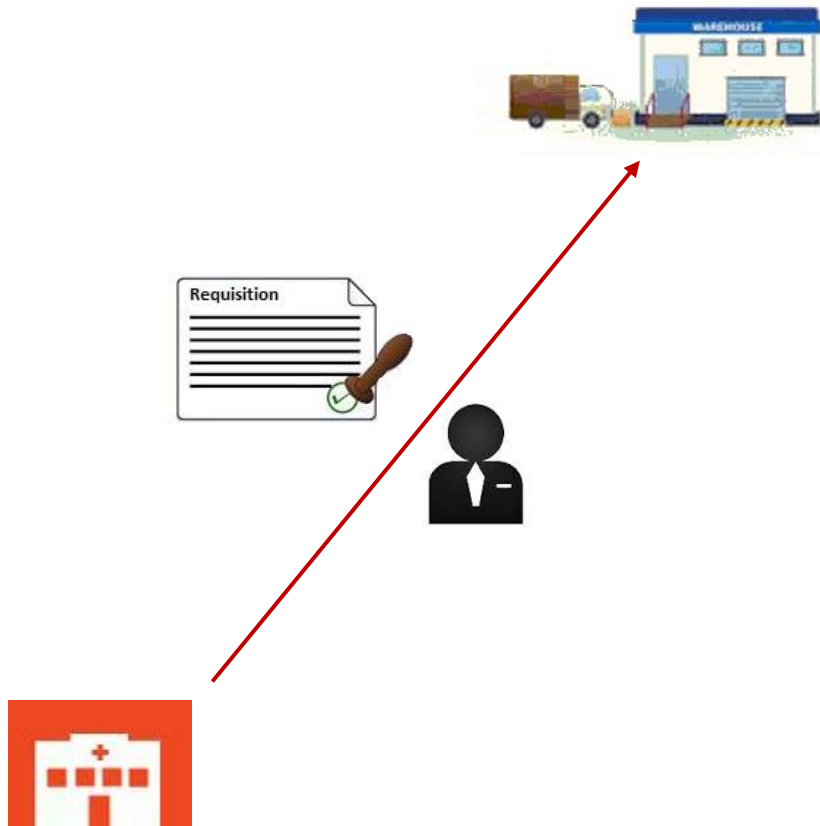
Skip All None	Product Code	Product	Beginning Balance	Total Received Quantity	Total Consumed Quantity	Stock on Hand	Total Stockout Days	Calculated Order Quantity	Requested Quantity	Explanation for Request
		Malaria Prophylaxis								
<input type="checkbox"/>	A41099	Doxycycline tablet 100 mg	<input type="text" value="272"/>	<input type="text" value="270"/>	<input type="text" value="190"/>	352	<input type="text" value="0"/>	257	<input type="text"/>	
		Test Kits								
<input type="checkbox"/>	KM3375-2	Malaria Rapid Diagnostic Test card 1 each	<input type="text" value="178"/>	<input type="text" value="350"/>	<input type="text" value="300"/>	226	<input type="text" value="5"/>	809	<input type="text" value="1000"/>	Rainy season is coming
		Anti-malarials								
<input type="checkbox"/>	P000833	Quinine Sulphate capsule 300 mg	<input type="text" value="15"/>	<input type="text" value="200"/>	<input type="text" value="23"/>	192	<input type="text" value="0"/>	18	<input type="text"/>	

Total R&R Cost: \$0.00

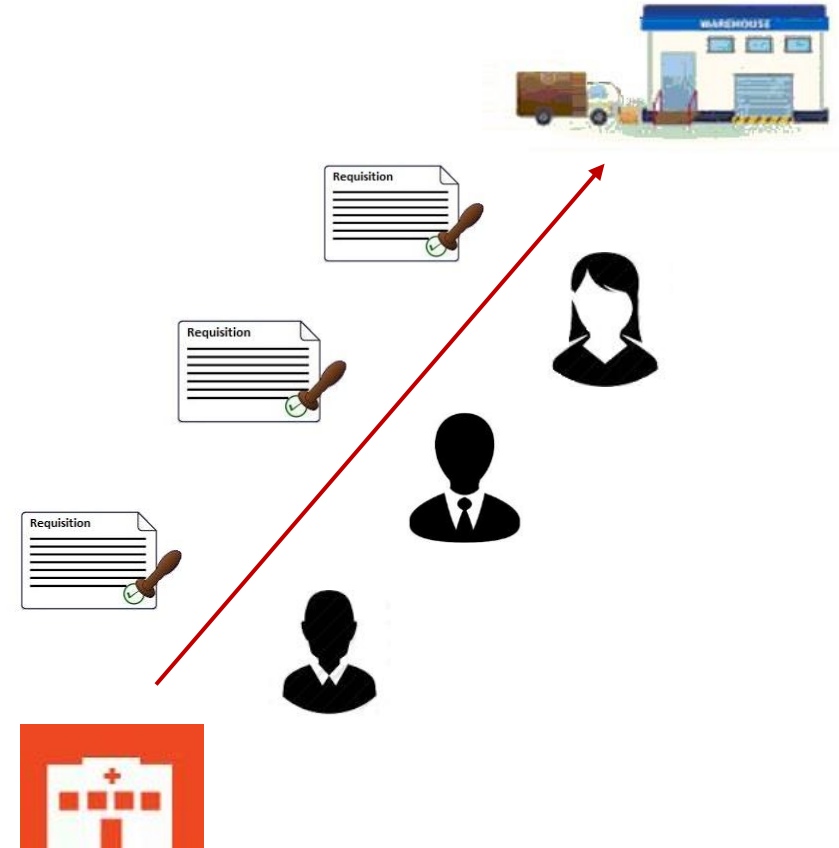
Custom Approval Hierarchies and Routing to Warehouses

Customizable by Program and by Region

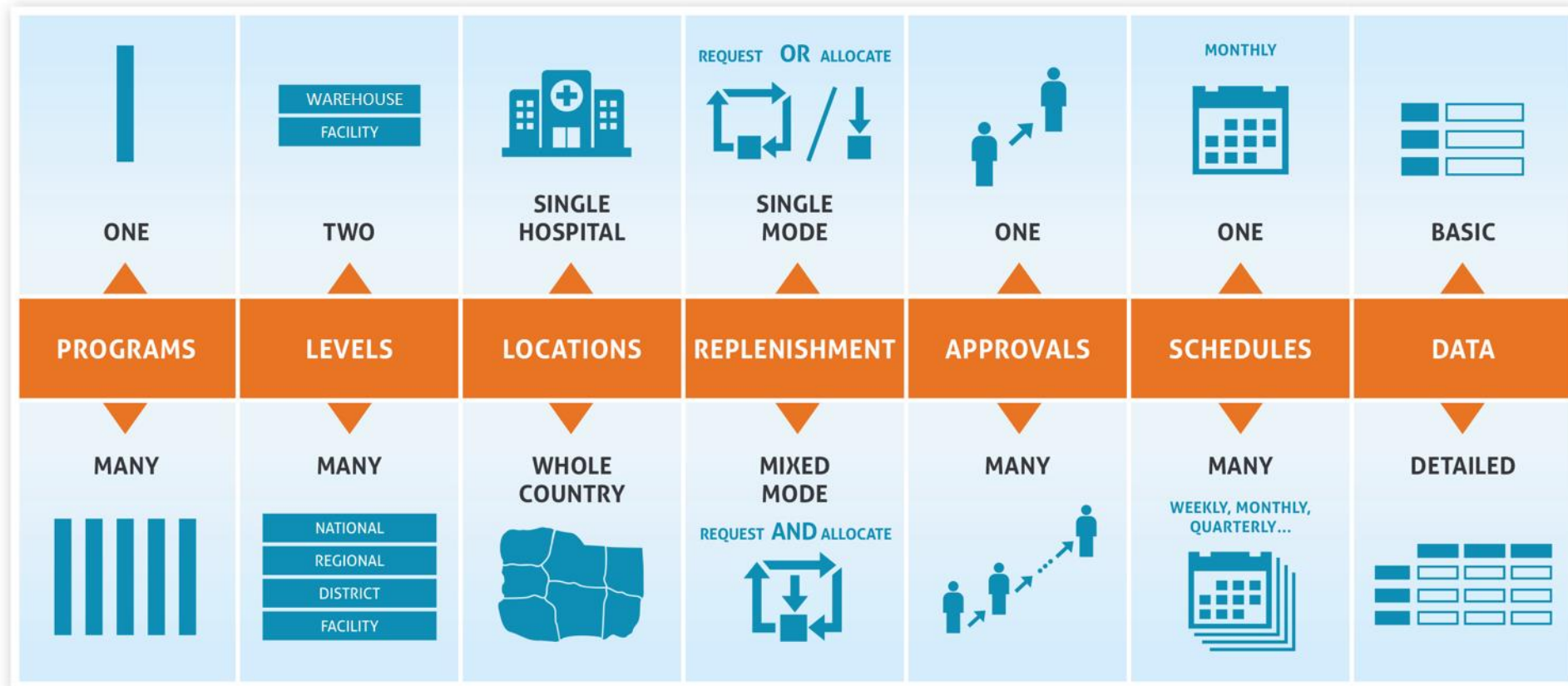
Single-step Approval Process



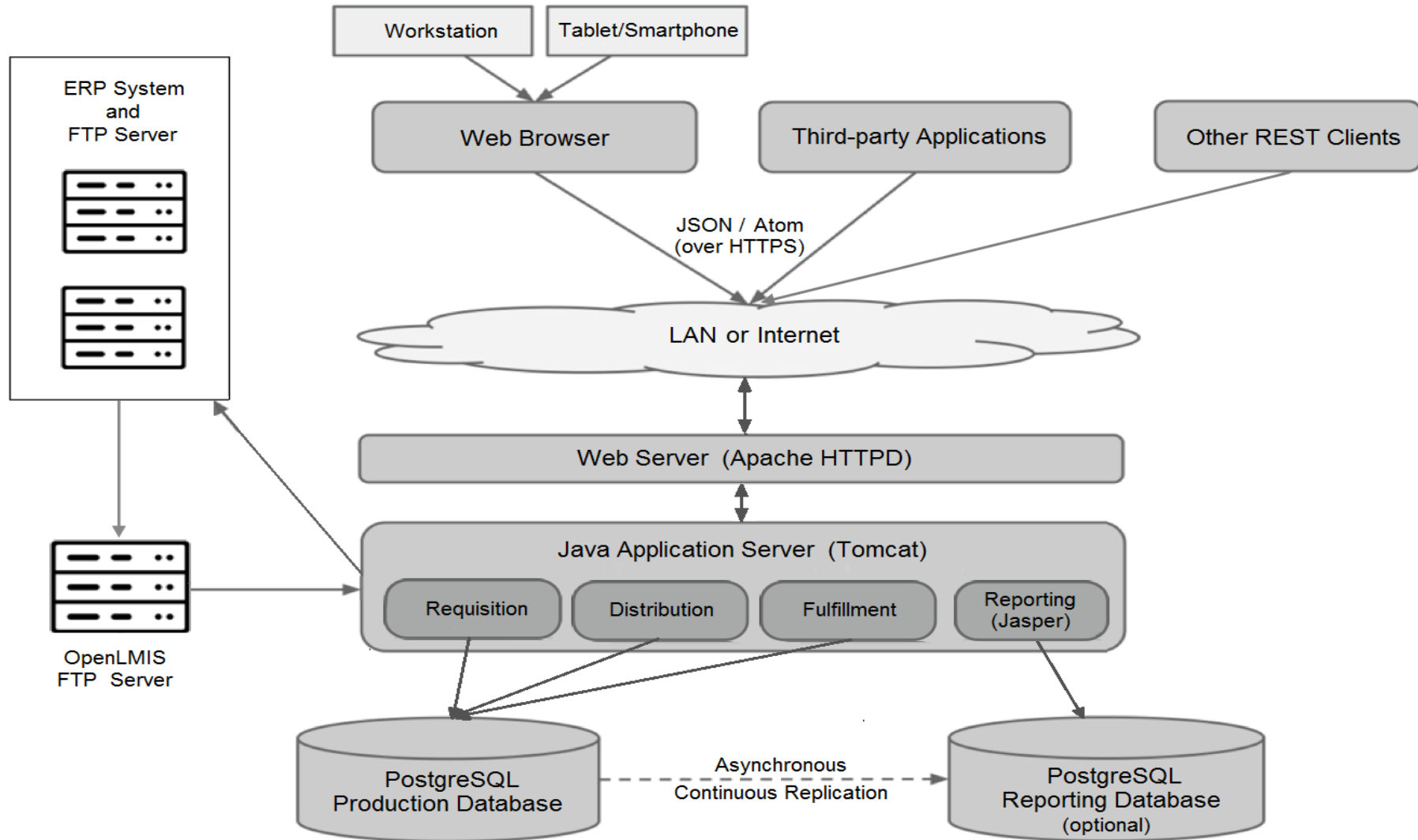
Multi-step Approval Process



OpenLMIS: Adaptable & Highly Configurable



OpenLMIS System Architecture



System Architecture Design Considerations

- Open source technology. OpenLMIS is built entirely with open source technology, using open source tools, and designed to run on open source platforms.
- Hosting platform neutral. The system is designed to be deployable on physical server(s) or virtual server(s), whether on-premise or cloud-based instances of standard Linux configurations.
- Stateless processing. Core services are accessed via REST style interface.
- Bandwidth efficient. Modules and applications (web-forms and clients) can be deployed on PC's and mobile devices (phones, tablets, etc.), while user-interface screens make limited use of large graphical elements.
- Minimum browser requirements. OpenLMIS is designed to be compatible with Firefox, v25.01 or newer, Chrome, v23 or newer, and IE10 or newer. Since browser-based applications for mobile devices will be specific to a device.
- Reporting. The default reporting engine, Jasper, is an open-source solution, and can be configured to use the production data base, or a separate reporting database with near real-time replication.
- Connection agnostic. The architecture is compatible with private and public networks that support connectivity between end-user devices and the respective system gateways.

System Architecture Design Considerations, cont'd

- Online and offline capability. End-user devices with appropriate data and form caching capabilities allow intermittent connections between browsers and the system for collecting data related to the informed-push replenishment process.
- Scalability. Depending upon the number of supported users and the transaction volume, the system can be deployed on a single server, or distributed across a cluster of servers. OpenLMIS has been tested to support 5,000+ concurrent users, with a simulated mix of user activities (creating requisitions, reviewing and approving requisitions, etc). Details of the scalability tests are available at openlmis.hingx.org
- Data hygiene at point of entry. Modules incorporate data validation at point of entry – including when in offline mode – and again at the point of data submission.
- Security by roles. Access to system functionality is assignable per user, based on roles. Roles encompass the right to take one or more actions, e.g. create a requisition, or approve a requisition). Users are granted role(s) for a specific scope, e.g. review requisitions from their base facility or from all the facilities they supervise, and specifically for the TB program or the Malaria program, etc.
- Transaction models. Transaction models supported include: form-based data entry/editing, real-time transaction processing of data submitted by external systems (e.g., mobile apps), and ftp-mediated data exchanges with external systems.

System Architecture Design Considerations, cont'd

- Online and offline capability. End-user devices with appropriate data and form caching capabilities allow intermittent connections between browsers and the system for collecting data related to the informed-push replenishment process.
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OpenLMIS Demo...

Recent Supply-Chain Innovations

Passive Vaccine Storage Device (PSVD), developed by Global Good







Thank you

extra slides...

OpenLMIS Feature List

Basic Capabilities and Configurability

- One or more customizable programs (e.g. ART, PMTCT, EPI, Malaria, Primary Care, RMNCH etc.)
- Hierarchy of geographic zones can be defined with arbitrary depth
- Facilities (with 30 facility-specific attributes), plus programs supported by each facility
- Products (with 45 product-specific attributes), grouped by customizable product categories
- Products can be segmented by program, and assigned to one or more programs
- Products can be further segmented by facility type, and assigned to one or more facility types

OpenLMIS Feature List - continued

Basic Capabilities and Configurability

- Multiple customizable operating schedules (e.g., monthly, quarterly, interleaved quarters, schedules with non-uniform periods, etc.)
- Facilities can be grouped per common programs, schedules, approval hierarchies, supplying depots, and delivery points, to simplify managing approvals and order fulfillment
- Multi-tier or nested requisition/order/fulfillment loops, including mixed requisition- and allocation-based replenishment process
- Level skipping for distribution of commodities, for both requisition and allocation replenishment processes
- All user interfaces can be customized to support one or more languages, simultaneously

OpenLMIS Feature List - continued

Requisition-Based Replenishment (“Pull” process)

- Customizable requisition form for each program
- Products organized by category (anesthetics, antibiotics, etc) – assignable and sortable per Program
- Shipment/receivals data from previous cycle is automatically populated on new Requisition
- Arithmetic validation of user-entered data
- Replenishment amounts are automatically calculated, based on historical consumption
- Optional automatic calculation of “dependent values” (e.g., remaining stock on hand)
- Configurable work flow for review and approval of Requisitions, with one or more review steps
- Automatic notifications of pending work sent to users involved in the review-approval workflow
- Emergency requisitioning, with optional customized format
- Optimized to minimize bandwidth - only changed data is submitted back to the server
- HMIS data collection tool (configurable forms to collect summary patient data, e.g. for ART regimens)

OpenLMIS Feature List - continued

Informed-Allocation Replenishment (“Push” process)

- Facilities grouped into delivery zones, independent of geographic location
- Manage product distributions per delivery zone and program
- Define ideal stock amounts per WHO formulas, with optional enhancements, plus exceptions for individual facilities
- Calculate quantities to take on delivery run
- Forms to capture field observations, inventory data, usage data, cold chain status, plus coverage data for immunization program
- Data collection forms are compatible with browsers on both computers and tablets
- Status indicators highlight fields and forms where mandatory data is missing
- Data can be entered while online or offline
- Data entered while offline can be uploaded whenever users reconnects on the internet

OpenLMIS Feature List - continued

Order Process

- Fully approved requisitions are released as orders, ready to be filled
- Orders can be exported to a warehouse ERP system
- Format of order export files is customizable
- Orders and associated export files can be manually reviewed

Shipment Process

- Import shipment files from warehouse ERP system, confirming order was filled
- Generate and print the packing list / "Proof of Delivery" document (POD)

Receiving Process

- Update delivery records after POD is completed including substituted products, mis-delivered products, and returned products
- Review updated PODs returned from the field

OpenLMIS Feature List - continued

Reporting

- Integrated with Jasper Reporting Server (available free open source)
- Reports can be in HTML, PDF and Excel formats
- System can be configured to report from the production database, or from a dedicated clone reporting database server, with automatic real-time data propagation

System Deployment and Administration

- Role-based security for all operational responsibilities, assignable by task, by program, by facility
- Role-based security for all administrative responsibilities, assignable by task
- Graphic user interfaces (GUIs) to manage:
 - users, and their roles and rights
 - geographic zones and facilities
 - programs and products
 - schedules, workflow and order fulfillment

OpenLMIS Feature List - continued

Interoperability

- Application interfaces to operate with CommTrack
- Application interfaces currently in development to export data to DHIS2
- Application interfaces currently in development to operate with ColdTrace remote temperature monitoring equipment

Facility Budgets

- Budget allocations can optionally be assigned by facility, by program, by period
- Budget allocations are received from a ministry finance or accounting system, (based on customizable CSV file format)
- System records spending by program and period when budgeting applies, and flags any overspending

Forecasting

- Forecasting can be done through data extracts for “Quantimed” and “Pipeline” software