Ethiopia Pilot for E2E Supply Chain Data Visibility

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USAID DELIVER PROJECT

• Funded by the US government, the USAID | DELIVER PROJECT designs, develops, strengthens, and operates reliable and sustainable public health supply chains in developing countries.

• The project works on a range of health commodities, including contraceptives and condoms, essential drugs, and various commodities for HIV/AIDS, malaria, maternal and child health, infectious diseases, and avian influenza.

• Our motto—No Product, No Program—is a reminder that health programs cannot operate successfully without a full supply of essential commodities.
Ethiopia Ministry of Health & PFSA

- The supply chain for pharmaceutical products and medical supplies is managed by the Pharmaceutical Fund and Supply Agency (PFSA)
- PFSA is an automatous federal agency under the Ministry of Health; one of the three agencies under the Ministry
- With a population of 92 million; PFSA handles over $850 million dollars worth of commodities
- About 85% of these commodities are donated to support Family Planning, HIV, Malaria, TB, etc. programs
Central and Regional Distribution Centers
Health Commodities Management Information System (HCMIS)

- HCMIS is a warehouse and inventory management software developed to support PFSA.
- The application captures all transactions (Receives & Issues, transfers, orders, etc.) at Central and Regional hubs.
- HCMIS is used to serve over 3,500 public health facilities (Hospitals and Health Centers) and thousands more private pharmacies and clinics.
- Dashboard provides near live stock status across the country for use by the MOH as well as Donors.
Where Family Planning Commodities go
Directory Services – Master Lookup Database

- Central database to house commonly shared variables across the system such as:
  - Product/Items
  - Manufactures
  - Supplier
  - Facilities
  - Accounts
  - Region/Zone/Districts
  - Lookup Types (e.g. Purchase Order Status, etc.)
### List of Products

<table>
<thead>
<tr>
<th>Line No</th>
<th>Id</th>
<th>Product Name</th>
<th>Type</th>
<th>Is Confirmed</th>
<th>Is Active</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>12189</td>
<td>Head and Neck Musculature</td>
<td>Medical Equipments</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>18806</td>
<td>1GG 100 Tests cobas</td>
<td>Chemicals and Reagents</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>17709</td>
<td>1quot;post coupling</td>
<td>Medical Equipments</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>12208</td>
<td>10 headed microscope</td>
<td>Medical Equipments</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>06047</td>
<td>100ML UNIT</td>
<td>Medical Equipments</td>
<td>✗</td>
<td>✓</td>
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<tr>
<td>6</td>
<td>16472</td>
<td>12000B13 Box of 25 HP INJ Line 25cm w/rot</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>7</td>
<td>16474</td>
<td>12001733 Box of 25 HP INJ Line 75cm w/rot</td>
<td>Medical Supplies</td>
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<td>✓</td>
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<tr>
<td>8</td>
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<td>12001734 Box of 25 HP INJ Line 120cm w/rot</td>
<td>Medical Supplies</td>
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<td>9</td>
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<td>10</td>
<td>16477</td>
<td>12004924 Box of 1D-needle 021 21G 3.8</td>
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<td>✓</td>
</tr>
<tr>
<td>11</td>
<td>16436</td>
<td>1901GB surgical absorbable haemostatic gauze (oxidized regenerated cellulose) 5mx35cm</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>12</td>
<td>21009</td>
<td>20LB CYL CO2 Valve Unit</td>
<td>Medical Equipments</td>
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<td>✓</td>
</tr>
<tr>
<td>13</td>
<td>20997</td>
<td>3D DVD/ CD Histology</td>
<td>Medical Supplies</td>
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<td>✓</td>
</tr>
<tr>
<td>14</td>
<td>21173</td>
<td>3D DVD/CD EMBRYONIC DEVELOPMENT</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>15</td>
<td>21067</td>
<td>3D DVD/CD Pathology of all system</td>
<td>Medical Equipments</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>16</td>
<td>16678</td>
<td>4-DIMETHYL AMINO CINNAMALD</td>
<td>Chemicals and Reagents</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>17</td>
<td>16462</td>
<td>502524 Box of 5 GW 025150.13 fixed core 7cm TIP</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>18</td>
<td>16467</td>
<td>502652 Box of 25 1-piece needle 038 18G 7.0 with wings</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>19</td>
<td>16463</td>
<td>502735 Box of 5GW 035 260 1-3</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>20</td>
<td>16467</td>
<td>504604 Box of 5 AVANTI + CSI F4 W/M IN GW</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>21</td>
<td>16468</td>
<td>50-6055 Box of 5 AVANTI + CSI 035 F5 W/MINI GW</td>
<td>Medical Supplies</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Challenges

• Unmanaged lists
  – Products / Item
  – Suppliers / Manufactures
  – Facilities

• Receipt
  – Manual receipts

• Pipeline / Confirmation
  – What’s coming
  – What’s received / as well as not received
Unmanaged lists

• Products
  – Most, it not all, products purchased for donation must be approved by the WHO (not the FDA; in the case of the US)
  – Very few of the products we see in country have any kind of barcode (with few exceptions)
  – Countries do not always have a say on the purchase process which adds to the complexity
  – Having to maintain a local ‘manual list’ of products and related variables leads to bad data – simply unsustainable
  – Adoption GTINS, GLNs & possible use of GDSN
Countries by Program

- **Antiretroviral Therapy**
  - Germany: 13.0%
  - United Kingdom (the): 13.0%
  - India: 13.0%
  - Netherlands (the): 6.6%
  - United States (the): 66.9%

- **Family Planning**
  - China: 31.8%
  - Germany: 10.5%
  - Denmark: 7.1%
  - Ethiopia: 9.1%
  - Hungary: 6.7%
  - India: 10.5%
  - Italy: 9.1%
  - Netherlands (the): 10.5%
  - Oman: 10.5%
  - Thailand: 10.5%
  - United States (the): 10.5%
  - South Africa: 10.5%

- **Malaria**
  - Switzerland: 31.6%
  - Germany: 13.0%
  - Denmark: 13.0%
  - Ethiopia: 13.0%
  - India: 13.0%
  - India: 13.0%

- **Maternal and Child Health**
  - Switzerland: 14.3%
  - China: 14.3%
  - Cyprus: 14.3%
  - Germany: 14.3%
  - Ethiopia: 14.3%
  - France: 14.3%
  - India: 14.3%
  - Italy: 14.3%
  - Mexico: 14.3%
  - Netherlands (the): 14.3%
  - Oman: 14.3%
  - Thailand: 14.3%
  - United States (the): 14.3%

- **TB and Leprosy**
  - United Arab Emirates (the): 27.0%
  - Switzerland: 5.7%
  - China: 5.7%
  - Cyprus: 5.7%
  - Germany: 5.7%
  - Denmark: 5.7%
  - Spain: 5.7%
  - France: 5.7%
  - India: 5.7%
  - Netherlands (the): 5.7%
  - Oman: 5.7%
  - United States (the): 5.7%

- **Vaccine**
  - United Arab Emirates (the): 27.0%
  - Belgium: 5.4%
  - China: 5.4%
  - Germany: 5.4%
  - Spain: 5.4%
  - India: 5.4%
  - Italy: 5.4%
  - Japan: 5.4%
  - Netherlands (the): 5.4%
  - Oman: 5.4%
  - Korea (the Democratic People’s Republic of): 5.4%
  - Russian Federation (the): 5.4%
  - Switzerland: 5.4%
  - Sweden: 5.4%
# Duplicate Manufactures

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>AB Amsterdam</td>
</tr>
<tr>
<td>43</td>
<td>Abbot Diagnostic Divisiona</td>
</tr>
<tr>
<td>44</td>
<td>Abbot Laboratories Ltd.</td>
</tr>
<tr>
<td>45</td>
<td>Abbott GmbH and Co.</td>
</tr>
<tr>
<td>46</td>
<td>Abbott Molecular Inc.</td>
</tr>
<tr>
<td>47</td>
<td>Abima Trade and engineering PLC.</td>
</tr>
<tr>
<td>48</td>
<td>Abon Biopharm Hanzhou Co. Ltd.</td>
</tr>
<tr>
<td>49</td>
<td>ABS international FZE</td>
</tr>
<tr>
<td>50</td>
<td>Abtek Biologicals Ltd</td>
</tr>
<tr>
<td>51</td>
<td>Abu Dhabi Medical Devices Co.</td>
</tr>
<tr>
<td>52</td>
<td>Access Bio Inc.</td>
</tr>
<tr>
<td>53</td>
<td>Acid Chem International</td>
</tr>
<tr>
<td>54</td>
<td>Acid Chem International SDN.BHD</td>
</tr>
<tr>
<td>55</td>
<td>Acoma</td>
</tr>
<tr>
<td>56</td>
<td>Acon Biotech</td>
</tr>
<tr>
<td>57</td>
<td>ACON Laboratories Inc.</td>
</tr>
<tr>
<td>58</td>
<td>ACP</td>
</tr>
<tr>
<td>59</td>
<td>Action Medeor</td>
</tr>
</tbody>
</table>
Barcode Pilot
HCMIS GS1 BARCODE READER

The HCMIS GS1 BARCODE READER is an android mobile application designed to scan GS1 barcodes available on pharmaceutical products during warehouse transactions. The batch number, expiry date, serial number and quantity of commodities and other meta-data like geo-location captured by the mobile application enables our partners to build a robust supply chain management system.
HCMIS Barcode Scanner

- The HCMIS Barcode scanner application is a locally developed android application that makes use of the CMOS camera.
- Using open source barcode decoding library called Zxing.
- Also makes use of GSON and ActiveAndroid for serializing and deserializing data to and from JSON format.

HCMIS Barcode Scanner Main Screen
After extracting the data, the mobile application tries to identify the product and record the batch number, expiry date, serial number. In addition, the application captures other Metadata like geolocation of the scanning event. The application works by checking scanned GTIN number against a local database of known GTINs. If no match is found, the application offers to register the new GTIN to a local database which then gets synced to the data warehouse. GDSN Data pools are not currently being used.
Scanning GS1 Barcode

Syncing with the Data Warehouse
Continued

Scan your Receive document

Enter Receipt Document Details
Doc Type: Invoice
Identifier: Receipt Document Identifier
From Supplier: From Supplier

Receive products

QR Code Scanning

Device Registration

Device Name: LGE_Nexus_5
Android Version: 5.1.1
ID: 00000000-3083-707c-ffff-fffe4447227

Check registration status

Register
GS1 Barcode Pilot Test

- The pilot test exclusively uses GS1 Standard barcodes. The product piloted is:
  
  - Emergency Contraceptive – known as Levonorgestrel (D-Norgestrel) - 0.75mg – Tablet

  - Supplied by Famy Care LTD (India) and have GS1 barcodes printed on the tertiary and secondary level packaging.

  - The pilot test was done on emergency contraceptive products at PFSA’s Central Store and the Addis Ababa distribution hub.
Pilot Test Results

- The products were shipped from the manufacturer (Famy Care ltd) in 14 tertiary level boxes with 13 containing 450 secondary level packages.
- The remaining box containing 265 secondary level packages.
Continued

PFSA Central Warehouse
Continued

PFSA Central Warehouse
Continued

Scanning GS1 Barcodes on Tertiary Level Boxes
Family Planning Products Secondary Level Packaging
Pilot Test Continued…

• Scanning was done at the following key stages in the supply chain
  – Central Store where the products were first received
  – Products issued to the Addis Ababa distribution Hub
  – Received by the Addis Ababa distribution Hub
  – Issued by A.A Hub to Health Centers in the area.
Challenges and Observations

• Identifying 2D Data matrix barcodes is harder for the mobile application than identifying 1D barcodes.
• The main reason is the much smaller size of the 2D data matrix.

Size of a 2D Data Matrix on a Secondary Level Package compared To an Ethiopian 50 Cents Coin
Continued

• The quality and placement of the barcodes on the products is also critical in determining the success rate of the application.

• In some cases, the 1D barcodes on the tertiary level packages were covered by plastic stabilizer straps and other wrapping materials.
Conclusions

- Handling secondary level packages at the Central Store might not be feasible. Instead, more attention should be given to track products at the container level (SSCC).

- PFSA’s personnel found the application very exciting, however, more work needs to be done to educate them of the benefits.

- Using handheld Bluetooth device is preferred.
Advantages and Disadvantages

- Advantages of a software platform
  - Easy to modify to adopt to changes and new requirements
  - Supports many types of barcode types (QR Codes, 1D barcodes, 2D data matrix)
  - The platform can be programmed to include/enforce business rules without relying on another computing platform
Continued

• Disadvantages
  • Not as fast or as accurate as a dedicated hardware scanner which could make it a harder sell to warehouse personnel
  • May not be as ergonomically convenient as some hardware scanners
  • Depending on the model, a smartphone’s battery might not last full day
Next Steps

• Adoption
  – Electronic Purchase Order
  – Electronic Advanced Shipped Notices
  – EDI
Links

- http://gs1.hcmisonline.org
- http://barcode.hcmisonline.org/