OHIE-To-Supply Chain Architecture Brainstorm

This document serves as a place to brainstorm changes to the OpenHIE Architecture to support standardized supply chain information collection and dissemination. There are three types of architectures presented on this page, the Enterprise Architecture, Functional Architecture and Solution Architecture.

Enterprise Architecture - What pervasive digital infrastructure do we need so that our system will act like a system?
Functional Architecture - What things do we need to do; what workflows do we need to support?
Solution Architecture - What software products will operationalize these workflows within the context of the enterprise infrastructure?

Enterprise Architecture

The Enterprise Architecture identifies the pervasive digital infrastructure that the system will need.

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Descriptions

This section contains a textual description of each item added to the diagram above:

- **Product Catalog** - A Product Catalog serves as the source of truth about what a Product is within an HIE. It sources the information for this role through two expected means: 1) as the ongoing result of a process of master data management to properly define and categorize medical products and 2) as derived data on the proper definition and categorization of medical products (e.g. derived from GS1 GDSN).
- **Logistics Management Information System (LMIS)** - A Logistics Management Information System (LMIS) is an IT system that plays a central role in enabling commodity visibility and operational management of a wide-area supply chain operation. Typically the commodities in this supply chain are health-related, the organization that sponsors the system is a department or agency under a government's health ministry and the operation is carried out at scale for an entire region or even an entire nation. An LMIS typically bridges the health and supply chain operations by enabling re-supply workflows for clinical locations and the vertical programs targeting families of commodities, as well as interfacing with supplier's IT systems to ensure the re-supply process is fulfilled as needed. Particular LMIS tools may have additional capabilities that enhance these re-supply workflows and/or add to the maturity of the wider supply chain operation.

Functional Architecture

The functional architecture focuses on identifying the functions required in the supply chain as well as the workflows that deliver those functions.

Functions

- National Product Catalog (Product Catalog)
    - Product Definition
        - Identities
        - Version metadata
        - Attributes
    - Commodity / Classifications
        - Defines a fungible classification (i.e. functionally equivalent commodity)
            - Assumption: In supply chain there's a use-case that says if 4 products/items are classified the same in a system designed for supply-chain fungibility (e.g. Product Ibuprofen 200mg capsules and the items Tylenol, Advil and Motrin IB), that all 4 products/items may be considered functionally equivalent for supply-chain resupply workflows. It is assumed that other classification systems can be used in a similar manner: e.g. for health insurance the insurance system would also classify Tylenol into a classification system indicating that Tylenol would be covered by the patient's health insurance provider.
        - Classify each Product in one or more classification systems (e.g. UNSPSC, GPC)
        - Classify each Product into one or more classifications within a single system (e.g. SNOMED-CT)
        - Each must be able to be classified into multiple categories per classification system
    - Items
        - Defines an item that is tangible: it moves through the supply chain.
        - Trade name / ID (e.g. GTIN)
        - Expiration Date
        - Lot/Batch
        - Serial Numbers (e.g. SGTIN)
    - Catalogs

- Organization owned and published catalog(s)
- Product definitions cross mapped into equal Product's defined in other Catalogs.
- LMIS (component)
  - Report Inventory Status Across the Network
    - (Inventory is a snapshot at a point in time)
    - Receive Inventory Reports from Point of Service Systems
    - Provide this information to decision makers
  - Report Consumption Across the Network
    - (Consumption is a snapshot of disbursements and wastage over a period of time)
    - Receive Consumption Reports
    - Provide this information to decision makers
  - Report Stocking Location Status
    - Asset Management/Availability of store room equipment (e.g. CCE)
    - Report on available volume (e.g. volume of vaccines in fridge / total storage volume)
    - Alerts on functional status of store room equipment (e.g. CCE temperature, power, etc)
  - Track & Trace
    - Gateway to validate that a product in the system is not sub-standard (e.g. not approved or expired) or falsified (isn't what it claims to be)
    - (minimum: track chain of custody)
  - Orders and Shipments (public health supply chain)
    - Act as a clearinghouse for 3PL Pick-up Planning
    - Receive and Forward Advanced Shipment Notifications from Source to Recipient
    - Receive Proof of Delivery
  - Informing Group Purchasing Organization (GPO) Forecasting (should this stay?)
    - Inform network wide consumption and current inventory levels
    - (initially lagging, gradually loop it into the current cycle, finally move into full forecasting)
- LMIS (pos)
  - Inventory (Stock in Inventory)
    - Daily stock movements & adjustments
    - Regular Physical Inventory (Stock Take)
    - Receive
    - Issue
  - Resupply Workflow
    - Requisition
    - Program Approvals
    - Resupply calculations
- Location Registry (Facility Registry)
  - Registry for Storerooms, Warehouses, Suppliers, legal entities, and stocking locations in general.
  - Capable of mapping Location to GS1 GLN

Out of Scope Functions

- Disbursement level transactions at the point of service health facility

Workflows

This section defines high level workflows that should be considered within this functional architecture.

- General Point of Service to HIE Workflows - These workflows initiate from the Point of Service application to interact with the HIE.
  - Query by Commodity Name/Type/Identifier
    - Description: Query the product catalog by the Commodity Name, Type or Identifier to get a description of the commodity
  - Query by GTIN
    - Description: Query the product catalog by the GTIN to get a description of the product
  - Query by SGTIN
    - Description: Query the product catalog by the SGTIN to get a detailed description of the product
  - Submit Inventory Report
    - Description: Submit a standardized inventory report from the point of service system to the Supply Chain Management Registry
  - Query Inventory Report by Location
    - Description: Query the Supply Chain Management Registry for a list of inventory reports by location
  - Submit Consumption Report
    - Description: Submit a standardized consumption report from the point of service system to the Supply Chain Management Registry
  - Query Consumption Report by Location
    - Description: Query the Supply Chain Management Registry for a list of consumption reports by location
  - Submit 3PL Pick-up Request
    - Description: Submit a standardized shipment pick-up request from the point of service system to the Supply Chain Management Registry
  - Query 3PL Pick-up Request by Location
    - Description: Query the Supply Chain Management Registry for a list of shipment pick-up requests by location
  - Submit 3PL Picked Up Action
    - Description: Submit a standardized shipment pick-up action from the point of service system to the Supply Chain Management Registry notifying that the requested shipment was picked up
  - Query 3PL Picked Up Actions by Location
    - Description: Query the Supply Chain Management Registry for a list of shipment pick-up actions by location
  - Submit Advanced Shipment Notification

- Description: Submit a standardized advanced shipment notification from the point of service system to the Supply Chain Management Registry
  - Query Advanced Shipment Notification by Location
    - Description: Query the Supply Chain Management Registry for a list of advanced shipment notifications by location
  - Submit Proof of Delivery by Location
    - Description: Submit a standardized proof of delivery from the point of service system to the Supply Chain Management Registry
  - Query Proofs of Delivery by Location
    - Description: Query the Supply Chain Management Registry for a list of proofs of delivery by location
- Health Related Point of Service Workflows
  - Product Verification (ensuring product is not sub-standard or falsified)
    - Immunization
      - Description: Query the HIE to identify if the immunization that has been received is valid before the immunization event takes place. If invalid, support the ability to notify officials.
    - General Medicine
      - Description: Query the HIE to identify if the medication that has been received is valid before the immunization event takes place. If invalid, support the ability to notify officials.
    - Consumer facing
      - Description: (Just an idea) Provide a national product verification service that can be accessed by point of sale systems or consumers who have received a medication at a chemist. Allow the consumer to notify officials if the product is counterfeit or invalid.
  - Recall Products - Central Authority to Point of Service
    - Identify the current inventory of that product throughout the system and check against global recall list
      - Description: Support the ability to query all products that are available in the system and check that against a global recall list.
    - Identify and estimate the recall
      - Description: Support the ability to identify the location of all recalled items within the network once a recalled item has been identified and estimate the response required.
    - Contact the organizations
      - Description: Provide a report that shows the list of organizations that need to be contacted about the recalled product so managers can contact those organizations.
    - Arrange Shipment or Destruction of the item
      - Description: Support the ability to verify that the recalled items were destroyed or shipped back to a central location.

Solution Architecture

This section defines the software products that can deliver the Enterprise and Functional Architectures cited above.

(WE WILL DO THIS LAST)

Focus on where the supply chain meets the patient and that will be the biggest impact for OpenHIE.
High Impact Interventions:
 - Recalls
 - End to End visibility
 - Sub-standard/falsified products (SGTIN - Serialized GTIN, every individual item is uniquely identified)
Components of the architecture:
 - Identification: Identify what products are available (as a service); use a standard identifier and a standard way to read that identifier (may be a barcode)

- - the service could send or receive or look up products based on standards (like GTIN with a Code 128 barcode reader device)

- - classifications can exist (commodity versus item; items can be grouped into commodity buckets)

- - some

 - Report consumption (consumption over a period of time) on a regular schedule in the HMIS
 - Delivery of Shipments (ASN)
 - Inventory Report

- - For commodities

  - - For items

(Out of OpenHIE - Dispensing Transactions against commodities)
 - Client Systems:
  - ERP
  - LMIS (OpenLMIS, mSupply, Logistimo)
 - Workflows

- - Start at point of service for a particular set of workflows

- - Show the sequence of the workflow and what data interchange makes that possible

- - Human/system workflows and start to tag standardized transactions to support those workflows

- - Reporting could happen partly into an HMIS and also into speciality supply chain reporting tools