GLOBAL DATA SYNCHRONIZATION NETWORK (GDSN) – AUTOMATED REQUISITION TRACKING MANAGEMENT INFORMATION SYSTEM (ARTMIS) INTEGRATION RECOMMENDATION REPORT

Deliverable 3.0

October 2017

GDSN-ARTMIS INTEGRATION RECOMMENDATION

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ARTMIS .... Automated Requisition Tracking Management Information System
CIC ....Catalog Item Confirmation
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CIN ....Catalog Item Notification
CINR ....Catalog Item Notification Response
CIS ....Catalog Item Subscription
CISR ....Catalog Item Subscription Response
GDSN .... Global Data Synchronization Network
GHSC ....Global Health Supply Chain
GLN .... Global Location Number
GTIN ....Global Trade Item Number
IIB ....IBM Integration Bus
IM .... 1WorldSync Item Management System
PSM ....Procurement and Supply Management
XML ....extensible markup language
UOM ....unit of measure
USAID ....U.S. Agency for International Development

DEFINITIONS

Term	Definition
Catalog Item Confirmation (CIC)	This notification indicates that GHSC-PSM physically received the published items. GHSC-PSM sends confirmation responses to 1WorldSync, who will in turn send them to GHSC-PSM suppliers relating to the items published.
Catalog Item Confirmation Response (CICR)	A response file that 1WorldSync (data pool) sends to GHSC-PSM relating to each CIC file that GHSC-PSM sent to 1WorldSync.
Catalog Item Notification (CIN)	File with the suppliers' published item data that 1WorldSync sends to GHSC-PSM
Catalog Item Notification Response (CINR)	File that GHSC-PSM sends to 1WorldSync; indicating that GHSC-PSM is able to read the CIN file content.
Catalog Item Subscription (CIS)	A message that GHSC-PSM creates in the 1WorldSync Item Management (IM) system to subscribe to each supplier's Global Location Number (GLN). This enables GHSC-PSM to receive the data published to them about items from specific suppliers. 1WorldSync sends these subscription messages to the GS1 Global Registry, which in turn, forwards them to the GDSN data pools of the suppliers. Those data pools forward the subscription request to the suppliers.
Catalog Item Subscription Response (CISR)	A response message sent by 1WorldSync to the GHSC-PSM, indicating whether 1WorldSync was able to process the subscription message sent by GHSC-PSM.
Correction	The "operation" attribute in a CIN file sent to GHSC-PSM from 1WorldSync on items when a supplier changes key attribute information on item data already published to GHSC-PSM.
Delete	The "operation" attribute in a CIN file sent to GHSC-PSM from 1WorldSync relating to published items that a supplier wants to stop data synchronization on with GHSC-PSM.
Initial Load	The "Publication Type" attribute in a CIN file sent to GHSC-PSM from 1WorldSync indicating that the supplier is publishing item information that GHSC-PSM already has

	some information about in their product catalog. The supplier leverages the GDSN network process to provide updated, accurate, and comprehensive information about that product.
Modify	The "operation" attribute in a CIN file sent to GHSC-PSM from 1WorldSync on items where a supplier had changed any attribute information on item data already published to GHSC-PSM.
New	The "Publication Type" attribute in a CIN file sent to GHSC-PSM from 1WorldSync indicating that the supplier is publishing item information about a brand new pharmaceutical or medical device that the supplier is introducing to GHSC-PSM for the first time. In this instance, GHSC-PSM does not currently have any information about this pharmaceutical or medical device in their catalog.
Received	The "state" attribute within CIC message, sent by GHSC-PSM to 1WorldSync, relating to a published item received by GHSC-PSM from the supplier. 1WorldSync forwards these message files to the data pools of the suppliers, who in turn, forward them to the suppliers. The "state" of Received means that GHSC-PSM has received the CIN file for a particular item.
Review	The "state" attribute within a CIC message, sent by GHSC-PSM to 1WorldSync, relating to a published item received by GHSC-PSM from the supplier. 1WorldSync forwards these message files to the supplier data pools, who in turn, forward them on to the suppliers. The "state" of Review means that GHSC-PSM has received the CIN file for a particular item but, after reviewing the data, identifies that there may be discrepant attribute data and needs to communicate this back to the supplier. GHSC-PSM can provide additional information in the CIC message communicating which attribute(s) are identified as discrepant and also how they expect the supplier to correct it. Once the attribute information is corrected, the supplier sends an item modify message back through the GDSN network to GHSC-PSM.
Synchronized	The "state" attribute within a CIC message, sent by GHSC-PSM to 1WorldSync, relating to a published item received by GHSC-PSM from the supplier. 1WorldSync forwards these message files to the data pools of the suppliers, who in turn, forwards them to the suppliers. The "state" of Synchronized means that GHSC-PSM had

	received the CIN file for a particular item and wants to communicate back to the supplier that they agree with the item information received and are integrating it into their internal system.
Reject	The "state" attribute within a CIC message, sent by GHSC-PSM to 1WorldSync, relating to a published item received by GHSC-PSM from the supplier. 1WorldSync forwards these message files to the data pools of the suppliers, who in turn, forwards them on to the suppliers. The "state" of Reject means that GHSC-PSM had received the CIN file for a particular item and wants to communicate back to the supplier that they no longer want data synchronization for this item.

INTRODUCTION

Chemonics is acting on behalf of the U.S. Agency for International Development (USAID) in connection with the Global Health Supply Chain (GHSC) Program – Project and Supply Management (PSM) project.

The purpose of the Project is to:

1. To serve as the primary vehicle through which USAID will procure and provide health commodities for all USAID health programs, including but not limited to, HIV/AIDS, Malaria, Reproductive Health, and Maternal & Child Health; and
2. To provide systems strengthening technical assistance to improve supply chain management and commodity security in partner countries.

Through the Project, life-saving health commodities will be delivered to many of the world's most vulnerable populations.

USAID has been investigating the use of GS1 standards to improve the management of health commodity procurements for a number of years and has instructed the GHSC-PSM project to design its management information system (MIS) to support GS1 standards. The GHSC-PSM MIS team is designing and developing the Automated Requisition Tracking Management Information System (ARTMIS) for its operation and management of USAID's global health supply chain.

As part of this effort, the Project is leveraging 1WorldSync as the Global Data Synchronization Network (GDSN)-certified data pool to source item attribute information to form the basis of the Project's product catalog. To improve coordination with other donors, counterparts, and stockholders, GHSC-PSM will mandate that health commodity suppliers register their trade items with GS1 in order for all commodities supplied by the project to have a Global Trade Item Number (GTIN) and to exchange this information via the GDSN. Increasing the use of GTINs by GHSC-PSM suppliers and collecting attribute data will improve the Project's ability to coordinate with other stakeholders engaged in the delivery of health commodities to developing countries and to improve the ability to perform analytics on commodity procurement.

Deliverable 3.0 is a recommendation report on the best approach to integrate the GDSN with ARTMIS, primarily these of the GDSN network and e-commerce messaging to integrate the data received from the GHSC-PSM suppliers into the GHSC-PSM ARTMIS system. The recommendations are based upon collaborative discussions held between GHSC-PSM business and technical staff and 1WorldSync.

Based upon the work plan in Deliverable 1.0, testing of the GDSN messaging will be performed with 1WorldSync and pilot supplier(s) to ensure the desired results of integration with ARTMIS. 1WorldSync will also provide support throughout the project, including the testing, Go-Live, and supplier ramp/enablement. Refer to Deliverable 2.0 regarding engagement of the suppliers for this imitative.

RECOMMENDATIONS FOR USE OF THE GDSN STANDARD MESSAGINGTHE GLOBAL DATA SYNCHRONIZATION PROCESS FLOW EXPLAINED

The following is the e-commerce process for Global Data Synchronization through the GDSN, which leverages a web-based platform:
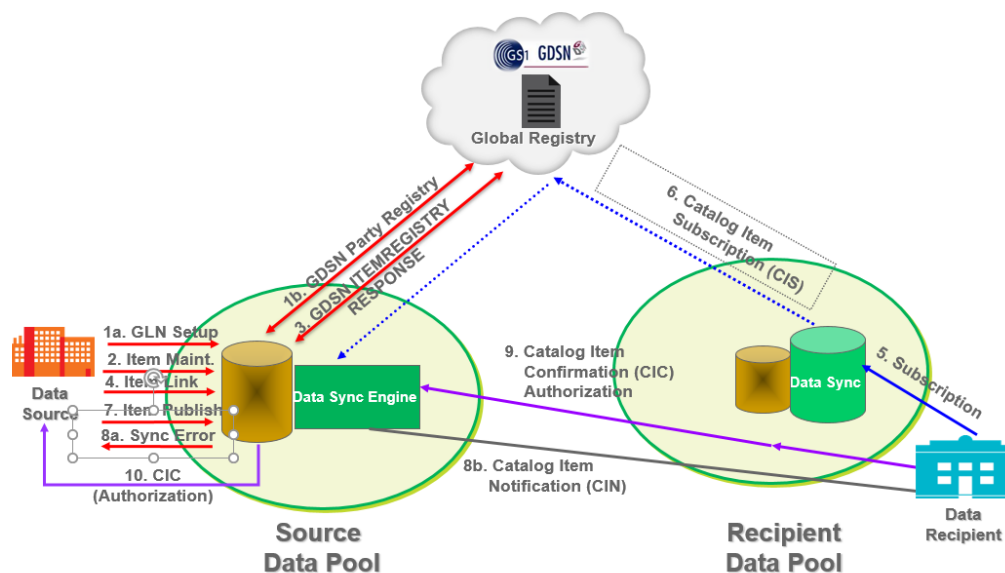
1. Suppliers and their recipient trading partners such as GHSC-PSM sign up with a GDSN-certified data pool. They request their data pool to set up their GLN, identifying their organization in the data pool's Global Data Synchronization system, such as 1WorldSync's IM system. The data pool sends a request to the GS1 Global Registry to set up the GLN within the global registry. The GS1 Global Registry sends a response message back to the data pool of the company confirming registration.
2. Suppliers assign a GS1 Global Trade Item Number (GTIN) to each level of packaging for each of their items. GTINs, related item attribute information, and any subsequent item data modifications, are loaded into the supplier data pool's Global Data Synchronization system.
3. The data pool submits a request to the GS1 Global Registry to register each GTIN under the supplier's GLN within the GS1 Global Registry. The GS1 Global Registry sends a response message back to the supplier's data pool stating that the GTIN has been registered.
4. Suppliers relate or "link" a GTINs each packaging level of an item together into an "item hierarchy" within their data pool's Data Synchronization system. For example, the GTIN for an individual blister pack would be linked to a case level GTIN that contains multiple of the same individual blister packs.
5. The supplier manually contacts their trading partner (recipient) requesting that they send a GDSN "Subscription" message through the GDSN network so that the recipient can physically receive the supplier's item information. The recipient sends a Catalog Item Subscription (CIS) request to the supplier's Data Pool. For example, GHSC-PSM would send, or set up in the 1WorldSync IM system, subscriptions for each supplier they purchase from. The GS1 standard message choreography expects that the recipient request that the suppliers send their item information to them via the CIS message. The recipient's data pool will send the CIS message to the GS1 Global Registry.
6. GS1 Global Registry notifies the source data pool by forwarding the CIS message to the appropriate data pool of the supplier
7. The data source (supplier) performs a Publication function in their data pool's Data Synchronization system, which sends their item information, including all of the linked GTINs for the packaging levels, to each designated recipient, identifying the recipient with their GLN.
8. The supplier's data pool executes a process to perform data synchronization. This means the supplier's published items are matched with the recipient's subscriptions and GS1 Standards validations are executed. If no errors occur, the supplier's data

synchronization system will create a Catalog Item Notification (CIN) message, including all published item information, and send that file through the GDSN network to the recipient's data pool. The recipient's data pool will send the CIN file to the recipient. If errors resulted from the validations, an error message will be sent to the supplier via their data pool provider's data synchronization system.

9. The recipient will receive that CIN file and send a Catalog Item Confirmation (CIC) GDSN response message back for each item that was published to them. This response refers to the GTIN of the highest or largest packaging level. The recipient will collate many of these CIC messages into a single file and send them to their recipient data pool, who will in turn, send them through the GDSN network to the supplier's data pool who will send them to suppliers. The CIC message will include one of four "states" or statuses that the recipient wants to communicate back to the supplier relating to each item. The "states" and their meaning are the following:

- RECEIVED – The recipient has physically received the CIN file
- REVIEW – The recipient has received the CIN file, has reviewed the item data, and has identified discrepant information. The recipient typically includes an additional message to communicate which attribute(s) or data elements are identified as discrepant and the reason why.
- REJECT – The recipient wants to stop data synchronization on this particular item, meaning they don't want to get any future updates. The recipient will sometimes include an additional text to communicate why they want to stop data synchronization on this item.
- SYNCHRONIZED – the Recipient agrees with the information the supplier provided on the item and have ingested that information into their internal system(s).

Below is a flowchart of the process for the Global Data Synchronization between suppliers (data sources) and the data recipients such as GHSC-PSM.

Data Sync Step-by-Step Process

THE GHS-PSM PROCESS AS RECIPIENT OF GDSN DATA

SUBSCRIBING TO SUPPLIERS

Per the GDSN message choreography, for GHSC-PSM to be able to receive the GDSN data from their suppliers and integrate it into ARTMIS, GHSC-PSM will need to "subscribe" to their suppliers. This is done by sending GDSN Catalog Item Subscription (CIS) messages to suppliers through the GDSN e-commerce network. Suppliers receive these subscription messages into their GDSN solution. From a GDSN and technical standpoint, this is how suppliers are informed that GHSC-PSM has issued a request for them to publish their item data via the GDSN network to GHSC-PSM.

GHSC-PSM will use the 1WorldSync IM system to manually create subscription messages. GHSC-PSM will be subscribing to each of their supplier's GDSN GLNs. Given that the healthcare industry is still in the early stages of adopting GDSN for master data exchange, GHSC-PSM does not expect a large number of suppliers to subscribe any one time, but rather a gradual onboarding, so this manual method of subscribing is manageable by the GHSC-PSM team.

GHSC-PSM will determine the supplier's GLN via the receipt of a Trading Partner Contact form that the supplier will fill out and submit to GHSC-PSM. The suppliers will be directed to access this form via the 1WorldSync website and the GHSC-PSM landing page. The suppliers will fill this web form out with their contact information and their GLN and click on the "Submit" button. The form will be sent electronically to a GHSC-PSM email address.

Suppliers will be guided to the GHSC-PSM landing page on the 1WorldSync website via a letter that the 1WorldSync Ramp and Community Enablement group will send to them when GHSC-PSM is ready to receive the GDSN data. The GHSC-PSM landing page will also include the GHSC-PSM Implementation and Data Attribute Guides, for the suppliers to learn the steps and required information to synchronize their item data with GHSC-PSM.

GHSC-PSM will develop an integration function to receive and process a Catalog Item Subscription Response (CISR) from 1WorldSync. This message will be logged by GHSC-PSM in their internal IBM Integration Bus (IIB) system logs. The CISR will be sent by 1WorldSync responding to the subscription records set up.   The response will indicate whether the Subscription request processed successfully or had an error in the 1WorlSync IM system. If the CISR indicated an error, a notification will be sent to the IIB Administrator at GHSC-PSM.

RECEIVING GDSN DATA VIA THE CIN MESSAGE

When suppliers have published or sent their item information via the GDSN, their data pool will create a CIN message/file and send it to the 1WorldSync data pool. GHSC-PSM will receive the CIN GDSN messages from 1WorldSync, even if the suppliers are members of another data pool. The CIN message contains all of the item information and the GTIN link information that was provided by the supplier.

1WorldSync will set up a Master Subscription schedule within the IM system to run hourly 24x7. 1WorldSync will execute the Master Subscription schedule around the top of the hour. At that time, if any published items were received within that hour, 1WorldSync will run GDSN validations, but only on the data received from 1WorldSync suppliers. **Item data received from non-1WorldSync data pools is not validated.** For those item hierarchies that pass the validations, and for those item hierarchies from other data pools, 1WorldSync will send the CIN file(s) to GHSC-PSM. Each CIN file will contain one supplier's item data. As a result, GHSC-PSM can receive many CIN files if multiple suppliers have published to them within any given hourly execution of the Master Subscription schedule. Any 1WorldSync items that failed validation will not be sent to GHSC-PSM and will displayed on a 1WorldSync IM system Item Sync Exception report for suppliers to view and take action on.

IIB will be configured to be real time. It will receive the CIN file as soon as 1WorldSync sends it. A GHSC-PSM integration will be written to handle and process the CIN file. Currently the design is being considered. However the current approach is that GHSC-PSM will receive the CIN and write the items to an instance of the GHSC-PSM catalog (non-production but environment is to be determined) regardless of whether the item already exists in the GHSC-PSM catalog or not. Therefore, GHSC-PSM will not programmatically interrogate the "Operation" of "Initial Load" or "New". In GDSN terms, Initial Load means the supplier thinks that the item already existed in the GHSC-PSM catalog. A 'New' item means that the supplier thought that this item was not in the GHSC-PSM catalog. This same process applies if the Operation is "Modify" or "Correction" in the CIN file; meaning that the supplier is subsequently sending modified item data to GHSC-PSM after publishing it.

If the supplier wants to stop synchronization on a particular item (item hierarchy) that was published previously, GHSC-PSM will receive a CIN with the Operation of "Delete" or "Hierarchy_Withdrawl". GHSC-PSM will flag that item in the GHSC-PSM catalog, because the supplier is stopping data synchronization on this item or discontinuing this item. The action of flagging the item in the GHSC-PSM catalog will reflect the date that the message was received.

The parent, or highest, GTIN in each item hierarchy will be stored in a data base at GHSC-PSM so that it can be referenced on the Catalog Item Confirmation (CIC) response that will get sent from GHSC-PSM back to the suppliers via the GDSN for each item hierarchy published. The CIC will be explained further in a paragraph below.

The value that the supplier populated in the attribute called "isOrderableUnit" will be mapped or written to the PSM Catalog. The orderable unit of measure (UOM) value in the PSM Catalog will be populated when the value for "isOrderableUnit" was set to True by the supplier.

GHSC-PSM will send a Catalog Item Notification Response (CINR) file back to 1WorldSync for each CIN file that 1WorldSync sent. GHSC-PSM will send the CINR upon receipt of the CIN files to acknowledge receipt of the CIN files.

RESPONDING TO SUPPLIERS' PUBLISHED ITEM DATA

When GHSC-PSM receives a CIN file from 1WorldSync, GHSC-PSM will immediately verify the structure of the CIN file and send a file containing the Catalog Item Confirmation(CIC) messages of RECEIVED back to 1WorldSync. This will be done for each item hierarchy received. There is a maximum of 1,000 CIC documents allowed within one CIC file.

1WorldSync will immediately send the CIC messages to the suppliers via their data pools. The RECEIVED CIC message indicates to the suppliers that GHSC-PSM received their published item(s). Each CIC document refers to the parent, or highest, level GTIN in the item hierarchy that that was received. This is the only confirmation that the suppliers will receive initially. GHSC-PSM will inform suppliers not to expect a CIC of SYNCHRONIZED. If, at a later date, an item is determined to have a data issue during review by the GHSC-PSM Catalog Team, the GHSC-PSM Catalog Team will manually create and submit a CIC with a state of REVIEW within the 1WorldSync IM. This message will be sent to the suppliers from the 1WorldSync data pool to the suppliers' data pool and on to the supplier.

The GHSC-PSM Catalog Team will modify the item manually within the GHSC-PSM Catalog before pushing it to production.

GHSC-PSM will receive a Catalog Item Confirmation Response (CICR) file from 1WorldSync for each CIC file sent to 1WorldSync. Each document with a CICR file will refer to the specific document [Id's] that were sent from GHSC-PSM and will indicate whether the CIC document processed successfully or had an error. If any errors are reported in the CICR file, a notification will be sent to the IIB Administrator.

GHSC-PSM will communicate this CIC message timing and strategy through the GHSC-PSM Implementation Guide. This guide will be on the GHSC-PSM landing page on the 1WorldSync website. The suppliers will be instructed to review this guide through the Ramp and Community Enablement process outlined in Deliverable 2.0 *GDSN Data Pool and Supplier Registration Strategy*.

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