

**USAID GLOBAL HEALTH
SUPPLY CHAIN PROGRAM**

Procurement and Supply Management

**GS1-enabled Automatic
Identification and Data Capture
Generic (AIDC) Standard
Operating Procedure (SOP)
Booklet**

SOPs providing high-level guidance on AIDC-enabled transactions for Purchase Order Arrival, Putaway Receipts, Change Inventory Part Location, Product Shipment, and Physical Inventory Count



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ACRONYMS

AIDC	automatic identification and data capture
EDI	electronic data interchange
ERP	enterprise resource planning
GDSN	GS1 Global Data Synchronization Network™
GLN	Global Location Number
GTIN	Global Trade Item Number
PMD	product master data
PMDM	product master data management
PO	purchase order
SKU	stock keeping unit
SOP	standard operating procedure
VR	virtual receiving
WMS	warehouse management system



INTRODUCTION

The Automatic Identification and Data Capture (AIDC) Standard Operating Procedure (SOP) Booklet is intended as a sample set of SOPs needed to support the design, development, and deployment of barcode data collection systems that provide real-time data capture in active warehouse management operations, and which support GS1 standards. These SOPs focus primarily on using barcode labels applied by manufacturers in alignment with GS1 standards in response to commercial trends, regulatory mandates, and/or procurement requirements.

While this Booklet mainly speaks to existing GS1-standardized barcodes for AIDC functions, it also includes scenario-based guidance for instances when the manufacturer has not applied GS1-standardized labeling and how those exceptions may be managed.

This Booklet provides five examples of SOPs that represent core warehouse management functions, including:

- 1. Purchase Order (PO) Receiving**
- 2. Putaway Receipts**
- 3. Change Inventory Part Location**
- 4. Order Shipments**
- 5. Physical Inventory**

The examples are guided by past AIDC implementations and presented as generic samples that may be starting points or guides other implementations can use to build their specific SOPs.

Creating these SOPs usually begins early in the design of an AIDC solution, which can include data capture hardware and software and integration with a host warehouse management system (WMS) or enterprise resource planning (ERP) system. By the time the new system is being tested, the SOPs are being refined to support the testing and training efforts on the new system. Note that an SOP for handheld device login is required to start each process, but is not included as part of this resource as the SOP will be device-specific.

While these five examples represent the core WMS processes, other supporting processes may be designed into the barcode data collection software that operates on handheld devices. These may include part or inventory location inquiries, cycle counting, scrap transactions, and label printing and can be documented similarly to support a country's specific deployment.

The SOPs in this Booklet use business process diagrams focused on the user's experience operating the handheld device to perform the prescribed WMS transactions. Swim lanes in the flow diagrams represent various actions taking place:

- A. Center Lane: The process the user is following on the handheld device;**
- B. Left Lane: Any supporting activities that may be needed by the user or to be conducted by the user;**
- C. Right Lane: The real-time interactions between the software operating the handheld device and the ERP system.**

The business process steps are numbered, and the table following the business process diagram describes each step from the user's perspective.

Key processes as they relate to ERP functions should be informed by the technical design of the software integration but stay at a level relevant to the user/operator of the handheld device.

Guidance on Reusability

Descriptions and supporting business process flow steps are concise and generic to enable reuse within and across different operating environments. Specific language and context can be added/adjusted to fit the country's environment (e.g., ERP/WMS-specific features and functions, or country-specific business processes). SOPs are user-centric to support training and testing and can be validated during user acceptance testing.

Guidance on Exceptions

Every business process will have exceptions and nuances that need to be catered to ensure sustainability and scalability of successful ERP/WMS interaction/integration with the selected AIDC solution. Country-specific business rules and controls, and how product master data is stored and managed also requires consideration. It is important to implement and continuously manage process support and operator tasks key to helping users manage common process exceptions. For example:

- Managing both GSI compliant and non-compliant product
- Operating with incomplete master data with interventions needed specific to the resident system(s)
- Managing differences in PO information
 - ✓ Is the PO in the system when goods arrive?
 - ✓ Are there specific procedures for partial receipts?
 - ✓ Are there unique values to be captured upon receipt (e.g., manufacture date)?
- GTIN to SKU mapping differences (many-to-one vs many-to-many)
- Variance in implementation models
 - ✓ Phased by product category
 - ✓ Prioritized by geography of manufacture
 - ✓ Phased by depth of distribution network

STANDARD OPERATING PROCEDURES



Purchase Order Arrival

Introduction

This SOP represents a generic PO arrival transaction using an AIDC system with barcode scanning devices integrated with the WMS to perform transactions in real time. Generic terms *italicized and highlighted in blue* can be replaced with user-specific terms. Additional editing and changes to the flow diagrams will be needed to create country-specific SOPs.

Overview

SOP for Register PO Arrival provides instructions for using the *handheld device* to perform PO receiving of GS1-labeled product and non-labeled product. A prerequisite SOP for logging into the *handheld device* is required for performing this operation.

Business Process Flow – GS1-Labeled Product

The business process flow in Figure 1 below shows the process for receiving GS1-labeled products. Note that a PO can contain both GS1-labeled products and non-labeled products. For non-labeled products, use Process B.

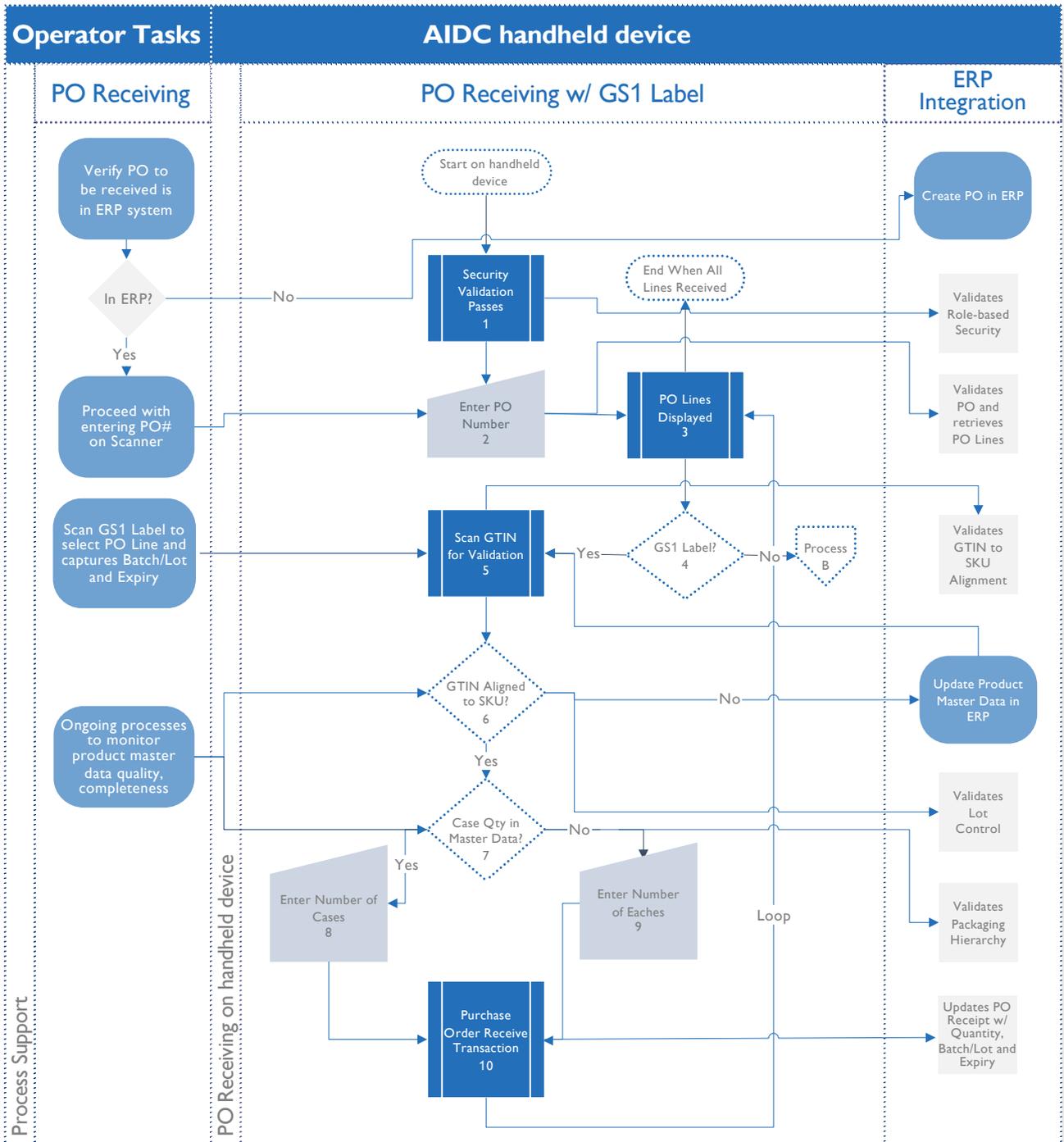


Figure 1 - GS1-Labeled Product

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation	See SOP for <i>handheld device Login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and determine the user warehouse location and default barcode printer.
2	Enter PO Number	The user selects the <i>Receive PO</i> menu option and enters a valid PO number to be received. The <i>ERP system</i> validates it is a valid PO and retrieves the PO information.
3	PO Lines Displayed	The <i>ERP system</i> retrieves the open PO Lines available to be received and displays PO, PO Lines, PO Release, <i>SKU/Part Identifier</i> , Qty Received, Qty Remaining, and Unit of Measure (UOM).
4	GS1 Label?	The user determines if the item to be received has a GS1 label containing the Global Trade Item Number (GTIN), Batch/Lot ID, and Expiry. If Yes, proceed with this process; if No, go to Process B.
5	Scan GTIN for Validation	The user will scan the GS1 label, and the system will verify the GTIN against Product Master Data in the <i>ERP system</i> to retrieve the PO line for the specific <i>SKU/Part Identifier</i> .
6	GTIN Aligned to Stock Keeping Unit (SKU)?	If the GTIN is not aligned in Product Master Data (PMD) to the <i>SKU/Part Identifier</i> , the user is required to contact the <i>Product Master Data Management (PMDM)</i> team to update the GTIN. If the GTIN is aligned, the <i>ERP system</i> validates if the product is Lot Controlled and captures the Batch/Lot and Expiry information from the GS1 label.
7	Case Quantity in Product Master Data?	After the <i>ERP system</i> validates the GTIN for the <i>SKU/Part Identifier</i> , it will validate if the packaging hierarchy is established to determine that Case Quantity Net Content is defined in Product Master Data. If Yes, proceed to next step; if No, the user is required to contact <i>PMDM</i> to update Case Net Content for the product.
8	Enter Number of Cases	After the <i>ERP system</i> validates the GTIN for the <i>SKU/Part Identifier</i> and Case Quantity, the user will be prompted for Number of Cases to be received. Note that Case Quantity must be for the quantity representing the specific Batch/Lot and Expiry if this is a Lot Controlled product. If the shipment is across multiple Batch/Lots, receive these in separate steps.
9	Enter Number of Eaches	If the shipment includes additional units not in cases, or if Case Quantity is not captured for the product, the user is prompted for Number of Eaches to be received. Note that Each Quantity must be for the quantity representing the specific Batch/Lot and Expiry if this is a Lot Controlled product. If the shipment is across multiple Batch/Lots, receive these in separate steps.
10	Purchase Order Receive Transaction	The <i>handheld device</i> will send the receiving transaction to the <i>ERP system</i> to perform the receiving transaction. Continue to the next Batch/Lot for this PO Line or to the next PO Line until PO Arrival is complete.

Business Process Flow – Non-labeled Product

The business process flow in Process B below shows the process for receiving non-labeled products. Note that a PO can contain both GS1-labeled products and non-labeled products. For GS1-labeled products, use the primary process, above.

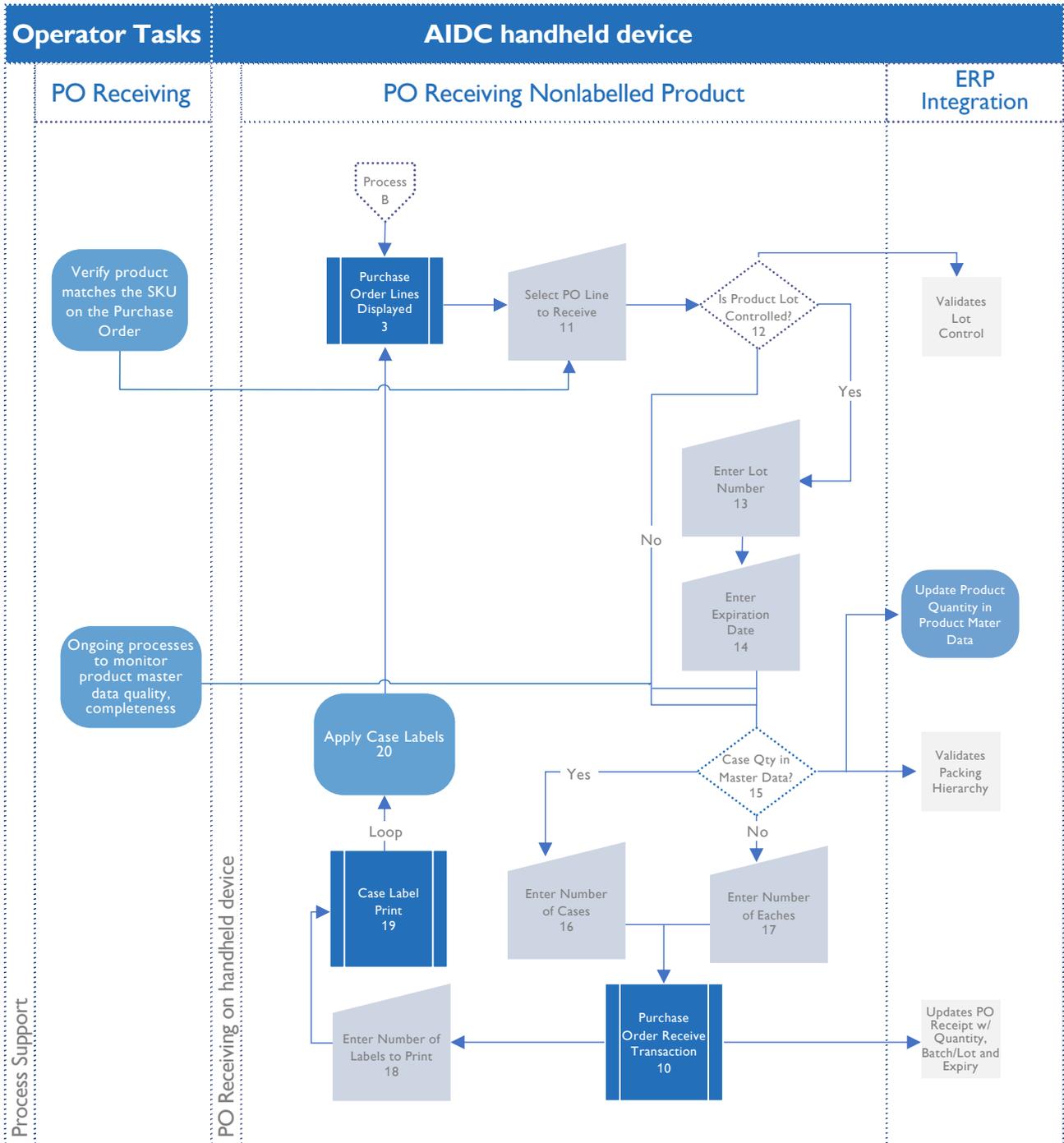


Figure 2 – Non-labeled Product

Business Process Flow Steps

BP Step #	Step Name	Step Description
3	PO Lines Displayed	The <i>ERP system</i> retrieves the open PO Lines available to be received and displays PO, PO Lines, PO Release, <i>SKU/Part Identifier</i> , Qty Received, Qty Remaining, UOM.
11	Select PO Line to Receive	The user will select the PO Line to be received
12	IS Product Lot Controlled?	The <i>ERP system</i> will validate if the product is Lot Controlled. If Yes, proceed to step 13; if No, proceed to step 15.
13	Enter Lot Number	The user will enter the Batch/Lot ID for the quantity to be received.
14	Enter Expiration Date	The user will enter the Expiration Date for the quantity represented by the specific Batch/Lot ID.
15	Case Qty in Master Data?	The <i>ERP system</i> will validate if the packaging hierarchy is established to determine that Case Quantity Net Content is defined in the Product Master Data. If Yes, proceed to next step; if No, the user is required to contact PMDM to update Case Net Content for the product. If Case Quantity is not valid for this product, proceed to step 17.
16	Enter Number of Cases	The user will be prompted for Number of Cases to be received. Note the Case Quantity must be for the quantity representing the specific Batch/Lot and Expiry if this is a Lot Controlled product. If the shipment is across multiple Batch/Lots, receive these in separate steps.
17	Enter Number of Eaches	If the shipment includes additional units not in cases, or if Case Quantity is not captured for the product, the user is prompted for Number of Eaches to be received. Note the Each Quantity must be for the quantity representing the specific Batch/Lot and Expiry if this is a Lot Controlled product. If the shipment is across multiple Batch/Lots, receive these in separate steps.
10	Purchase Order Receive Transaction	The <i>handheld device</i> will send the receiving transaction to the <i>ERP system</i> to perform the receiving transaction. Continue to the next Batch/Lot for this PO Line or to the next PO Line until PO Arrival is complete.
18	Number of Labels to Print	The user will be prompted for Number of Labels to Print, which contains barcode and human-readable information, including the <i>SKU/Product Identifier</i> , Batch/Lot ID, and Expiry Date.
19	Case Label Print	The <i>AIDC system</i> will print the number of Case Labels specified; the <i>handheld device</i> will loop back to PO Lines for this PO until all PO Arrival transactions have been completed for this PO.
20	Apply Case Labels	The user will apply the case labels to the non-labeled products before putting them away in the warehouse.

Putaway Receipts

Introduction

This SOP represents a generic Putaway Receipts transaction using an AIDC system with barcode scanning devices integrated with the WMS to perform transactions in real time. Generic terms *italicized and highlighted in blue* can be replaced with user-specific terms. Additional editing and changes to the flow diagrams will be needed to create country-specific SOPs.

Overview

SOP for Putaway Receipts provides instructions for using the *handheld device* to perform the putaway transaction for receipts of both POs and inter-warehouse shipments. The putaway transaction uses GS1 labels with GTINs assigned by the manufacturer or GS1 labels using the *internal product identifier* affixed at receiving. A prerequisite SOP for logging into the *handheld device* is required for performing this operation.

Business Process Flow – Putaway Receipts

The business process flow in Figure 3 below shows the process for Putaway Receipts.

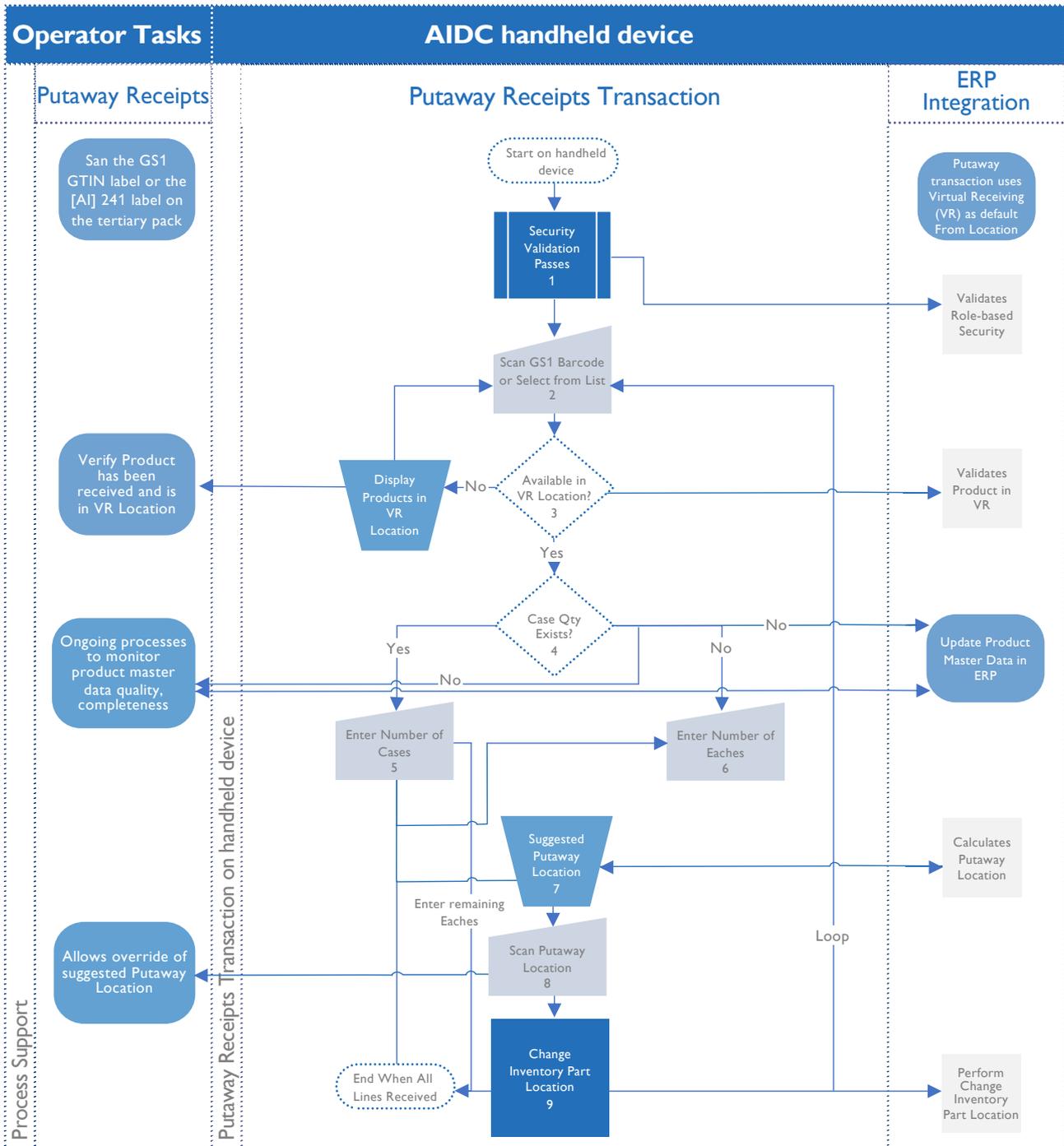


Figure 3 - Putaway Receipts

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation	See SOP for <i>handheld device login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and locate the user warehouse and default barcode printer.
2	Scan GS1 Barcode or Select from List	Scan the GS1 barcode label to validate part is available to be transferred from Virtual Receiving (VR) Location. If not, user will be presented with a list of available parts to be putaway.
3	Available in VR Location?	If the part is not available in VR Location, the user will be presented a list of available items to be putaway and can select from list. The user should validate that the part scanned has been received in the <i>ERP system</i> , which will make it available in the VR Location.
4	Case Quantity Exists?	After the <i>ERP system</i> validates the GTIN for the <i>SKU/Part Identifier</i> , it will validate if the packaging hierarchy is established to determine the Case Quantity Net Content. If Yes, proceed to next step; If no, the <i>handheld device</i> will prompt for Number of Eaches (Step 6).
5	Enter Number of Cases	After the <i>ERP system</i> validates the GTIN for the <i>SKU/Part Identifier</i> and Case Quantity, the user will be prompted for Number of Cases to be putaway. Note that the Case Quantity must be for the quantity representing the specific Batch/Lot and Expiry if this is a lot-controlled product. If the shipment is across multiple Batch/Lots, put these away in separate steps.
6	Enter Number of Eaches	If the putaway quantity includes additional units not in cases, or if Case Quantity is not captured for the product, the user is prompted for Number of Eaches to be putaway. Note the Each Quantity must be for the quantity representing the specific Batch/Lot and Expiry if this is a lot-controlled product. If the putaway is across multiple Batch/Lots, put these away in separate steps.
7	Suggested Putaway Location	After the <i>ERP system</i> accepts the putaway quantity, it will send the Suggested Putaway Location to the <i>handheld device</i> .
8	Scan Putaway Location	The user will scan the selected putaway location. Note the user can override the suggested putaway location, and the <i>handheld device</i> will prompt the user to "Override Suggested Putaway Location? Y/N."
9	Change Inventory Part Location	The <i>handheld device</i> will send the putaway transaction to the <i>ERP system</i> to perform the Change Inventory Part Location transaction. Continue to the next putaway task or end.

Change Inventory Part Location

Introduction

This SOP represents a generic overview of actions taken to Change Inventory Part Location within a warehouse using an AIDC system with barcode scanning devices integrated with the WMS to perform transactions in real time. Generic terms italicized and highlighted in blue can be replaced with user-specific terms. Additional editing and changes to the flow diagrams will be needed to create country-specific SOPs.

Overview

SOP for Changing Inventory Part Location provides instructions for using the handheld device to perform internal part movements using From and To location transactions. The part movement transaction uses GS1 labels with GTINs assigned by the manufacturer or GS1 labels using the internal product identifier affixed at receiving to perform the specified quantities and destinations needed to Change Inventory Part Location. A prerequisite SOP for logging into the handheld device is required for performing this operation and taking necessary steps for Putaway in accordance with SOP.

Business Process Flow – Change Inventory Part Location

The business process flow in Figure 4 below shows the process for Changing Inventory Part Location.

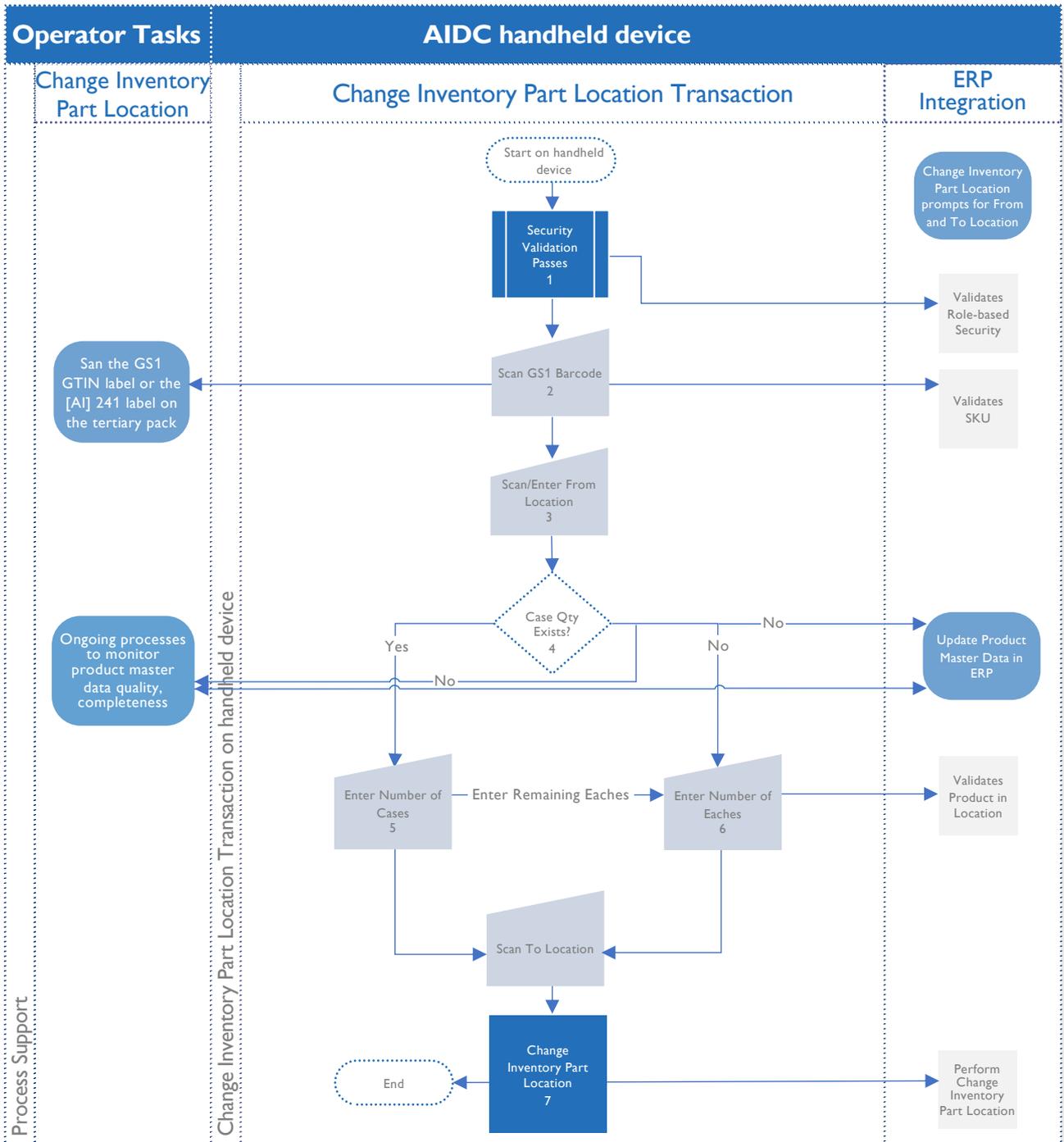


Figure 4 – Change Inventory Part Location

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation	See SOP for <i>handheld device Login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and locate the user warehouse and default barcode printer.
2	Scan GSI Barcode	The user selects Change Inventory Part Location from the menu on the <i>handheld device</i> and scans the label to confirm item GTIN (01) or internal part number (241). The <i>ERP system</i> validates this SKU for the Inventory Part Location change.
3	Scan/Enter From Location	When the SKU appears after scanning the barcode, <i>enter/scan the From location</i> so the <i>ERP system</i> has documented where the item was originally located.
4	Case Quantity Exists?	Upon scanning the From location, determine whether the SKU's Case Quantity exists.
5	Enter Number of Cases	If a Case Quantity exists, enter the number of cases to the <i>handheld device</i> .
6	Enter Number of Eaches	If the <i>handheld device</i> does not display a number of cases, enter the number of Eaches instead. Entering the number of Eaches will work to update the master data in the <i>ERP system</i> .
7	Scan To Location	Upon entering the quantity of Cases or Eaches, scan the To location so that the new Location of the Part is documented into the <i>ERP system</i> .
8	Change Inventory Part Location	Upon scanning the To location, the perform Change Inventory Part Location is complete and finalized in the <i>ERP system</i> .

Product Shipment

Introduction

This SOP represents a generic Pick/Pack/Ship transaction using an AIDC system with barcode scanning device integrated with the WMS to perform transactions in real time. Generic terms *italicized and highlighted in blue* can be replaced with user-specific terms. Additional editing and changes to the flow diagrams will be needed to create country-specific SOPs.

Overview

SOP for Pick/Pack/Ship provides instructions for using the *handheld device* to perform shipments of GS1-labeled product and non-labeled product. The process includes identifying shipment packages with a License Plate to associate picked and packed items, the Picklist Packing process, and the Box Match process to match the License Plate with the Shipping Label. A prerequisite SOP for logging into the *handheld device* is required for performing this operation.

Business Process Flow – Preprint License Plate

The business process flow in Figure 5 below shows the process for Preprint License Plate

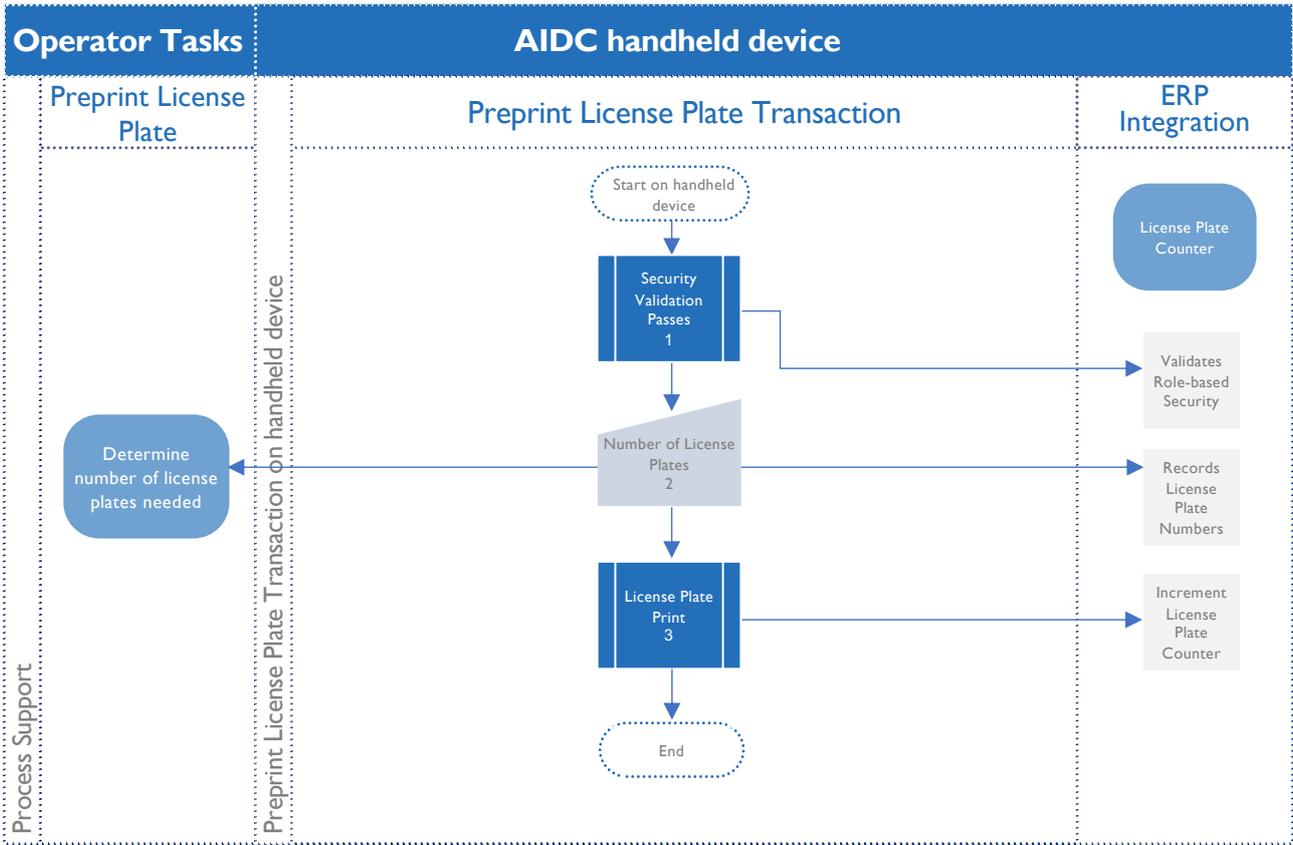


Figure 5 - Preprint License Plate

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation	See SOP for <i>handheld device Login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and locate the user warehouse location and default barcode printer.
2	Number of License Plates	The user selects the <i>Preprint License Plate</i> menu option and enters the number of license plates to print.
3	License Plate Print	The <i>ERP system</i> prints the number of License Plate Labels entered by the user and increments the License Plate Counter.

Business Process Flow – Picklist Packing

The business process flow in Figure 6 below shows the process for Picklist Packing. Here the operator is picking items for shipment and placing the items in a license plate-labeled box to identify packaging contents. Note complete cases of product also receive a license plate indicating the content of the case.

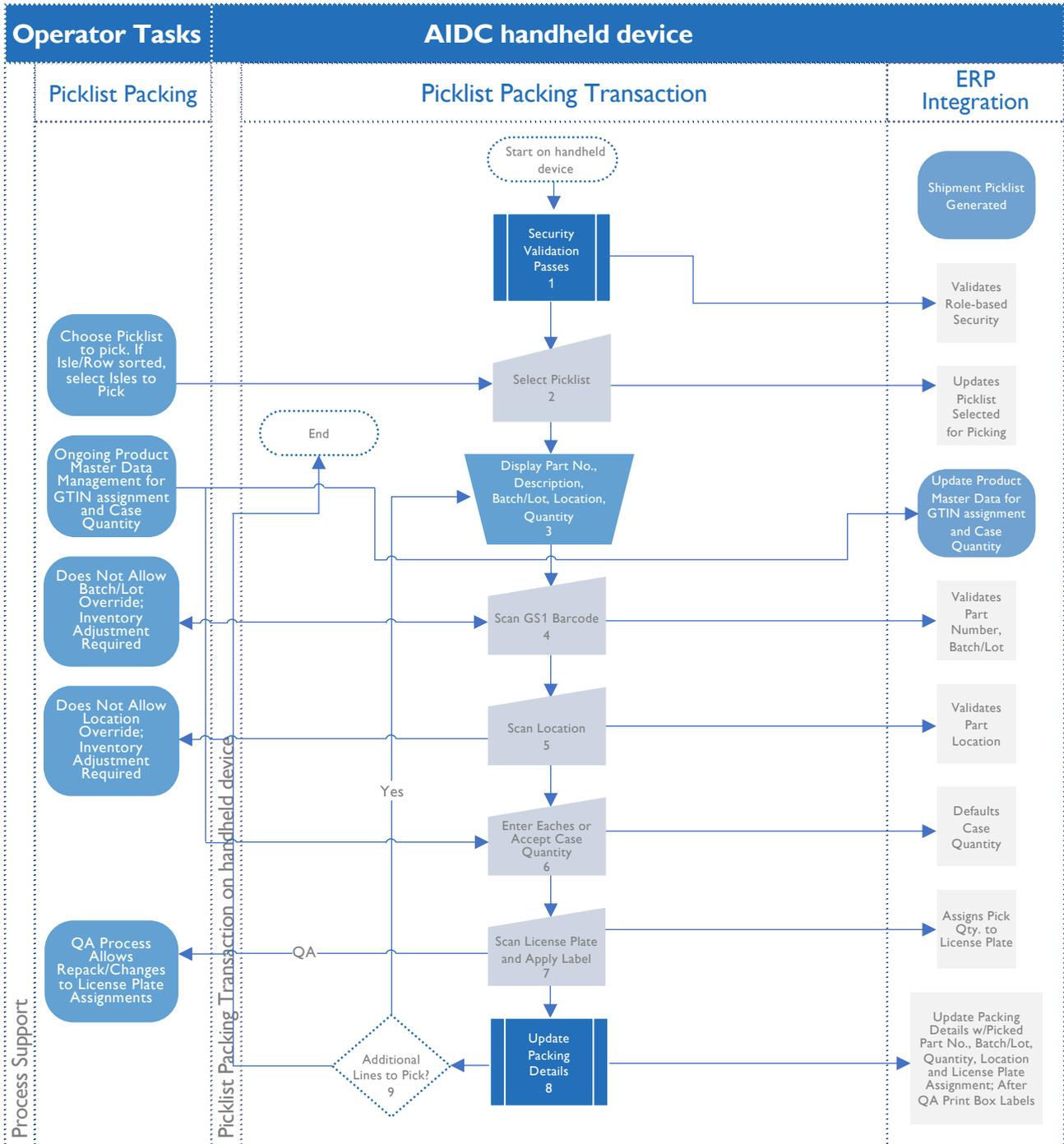


Figure 6 - Picklist Packing

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation	See SOP for <i>handheld device login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and locate the user warehouse location and default barcode printer.
2	Select Picklist	The user selects the <i>Picklist Packing</i> menu option and enters the <i>Picklist number</i> for the shipment order.
3	Display Part Number, Description, Batch/Lot, Quantity	The <i>handheld device</i> displays the Part Number, Part Description, Batch/Lot and quantity remaining to be picked.
4	Scan GSI Barcode Label	The user goes to the location and scans the GS1 label for the product stored in the location and the <i>ERP system</i> validates they have selected the correct part.
5	Scan Location Label	The user scans the Location Label on the warehouse shelving, and the <i>ERP system</i> validates the correct location is being scanned. Note: If the <i>ERP system</i> contained wrong inventory balance data for Part+Location, the user is required to request an inventory adjustment or adjust the Picklist to reflect the correct Part+Location.
6	Enter Eaches or Accept Case Quantity	The user enters the number of Eaches or accepts the Case Quantity for complete cases.
7	Scan License Plate Label and Apply Label	The user scans the License Plate Label to correlate the picked item with the packaging container. Note complete cases will each have a License Plate Label.
	Update Packing Details	The <i>ERP system</i> updates the picked quantity and associates the picked Part with the License Plate Number.
9	Additional Lines to Pick?	The user will be prompted for the next item to pick or prompt for next Picklist when order is complete.

Business Process Flow – Box Label Match

The business process flow in Figure 7, below, shows the process for Box Label Match. Here the operator is validating the picked content and applying the Shipment Label (Box N of N) to the shipment container (secondary packing), correlating the license plate-labeled box with the final Shipment Label.

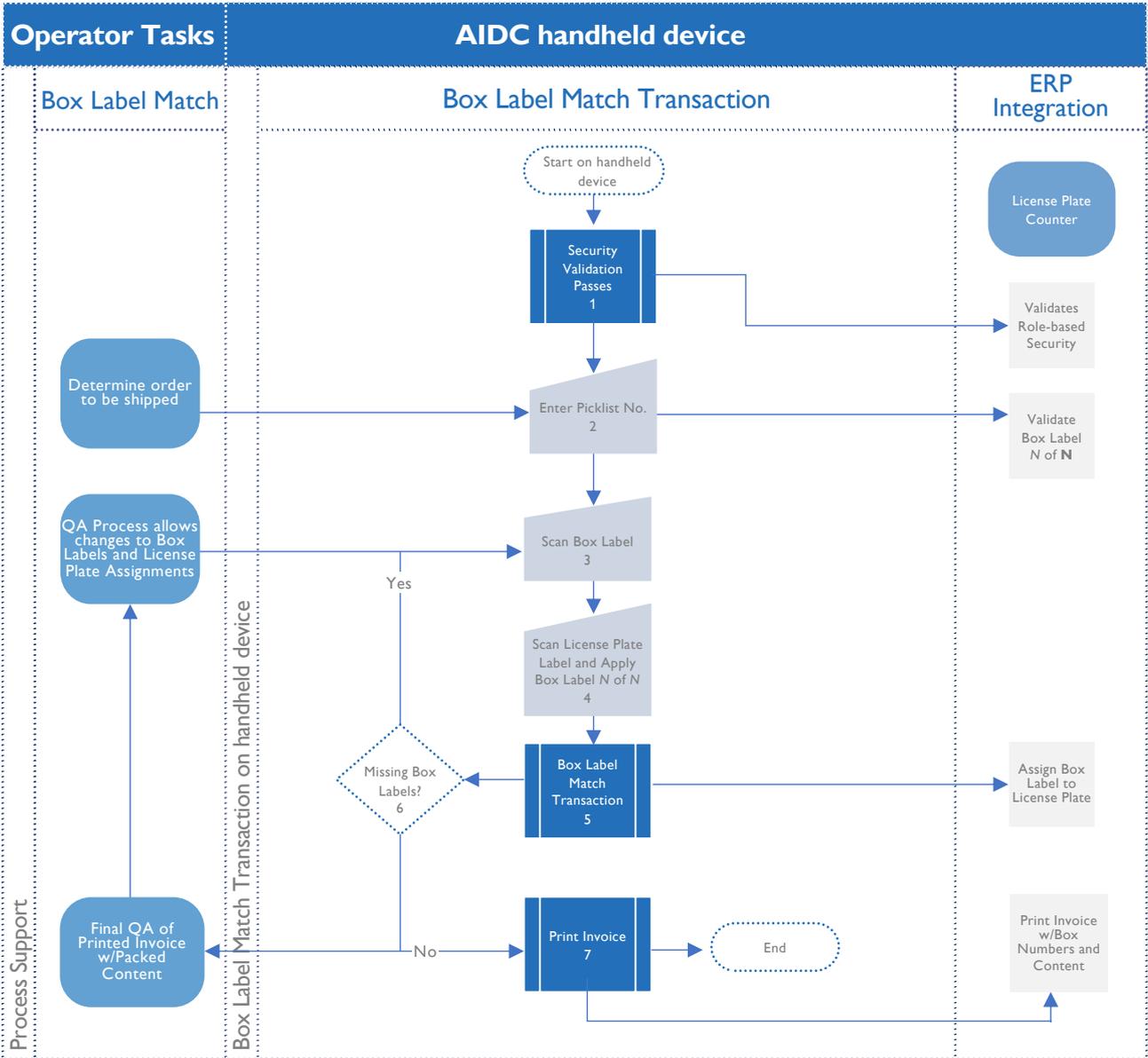


Figure 7 – Box Label Match

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation	See SOP for <i>handheld device login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and locate the user warehouse location and default barcode printer.
2	Enter Picklist Number	The user enters the <i>Picklist number</i> to match Box Labels with License Plate Labels.
3	Scan Box Label	The user scans the Box Label to be applied.
4	Scan License Plate Label and Apply Box Label <i>N of N</i>	The user scans the License Plate Label, and the <i>ERP system</i> validates that Box Label <i>N of N</i> is the correct label.
5	Box Label Match Transaction	The <i>ERP system</i> associates the Box Label and marks the line as Shipped.
6	Missing Box Labels?	If there are missing Box Labels <i>N of N</i> , the application will prompt the user to associate the License Plate Label.
7	Print Invoice	Once all Box Labels have been matched, the Invoice is printed to complete the shipment.

Physical Inventory Count

Introduction

This SOP represents a generic counting of physical inventory within a warehouse using an AIDC system with barcode scanning devices integrated with the WMS to perform transactions in real time. Generic terms italicized and highlighted in blue can be replaced with user-specific terms. Additional editing and changes to the flow diagrams will be needed to create country-specific SOPs.

Overview

SOP for Physical Inventory Counting provides instructions for using the handheld device to perform real-time transactions to measure product inventory. The Physical Inventory Count transaction uses GS1 labels with GTINs assigned by the manufacturer or GS1 labels using the internal product identifier affixed at receiving to generate Inventory Count Reports. A prerequisite SOP for logging into the handheld device is required for performing this operation.

Business Process Flow

The business process flow in Figure 8 below shows the process for Physical Inventory Counting.

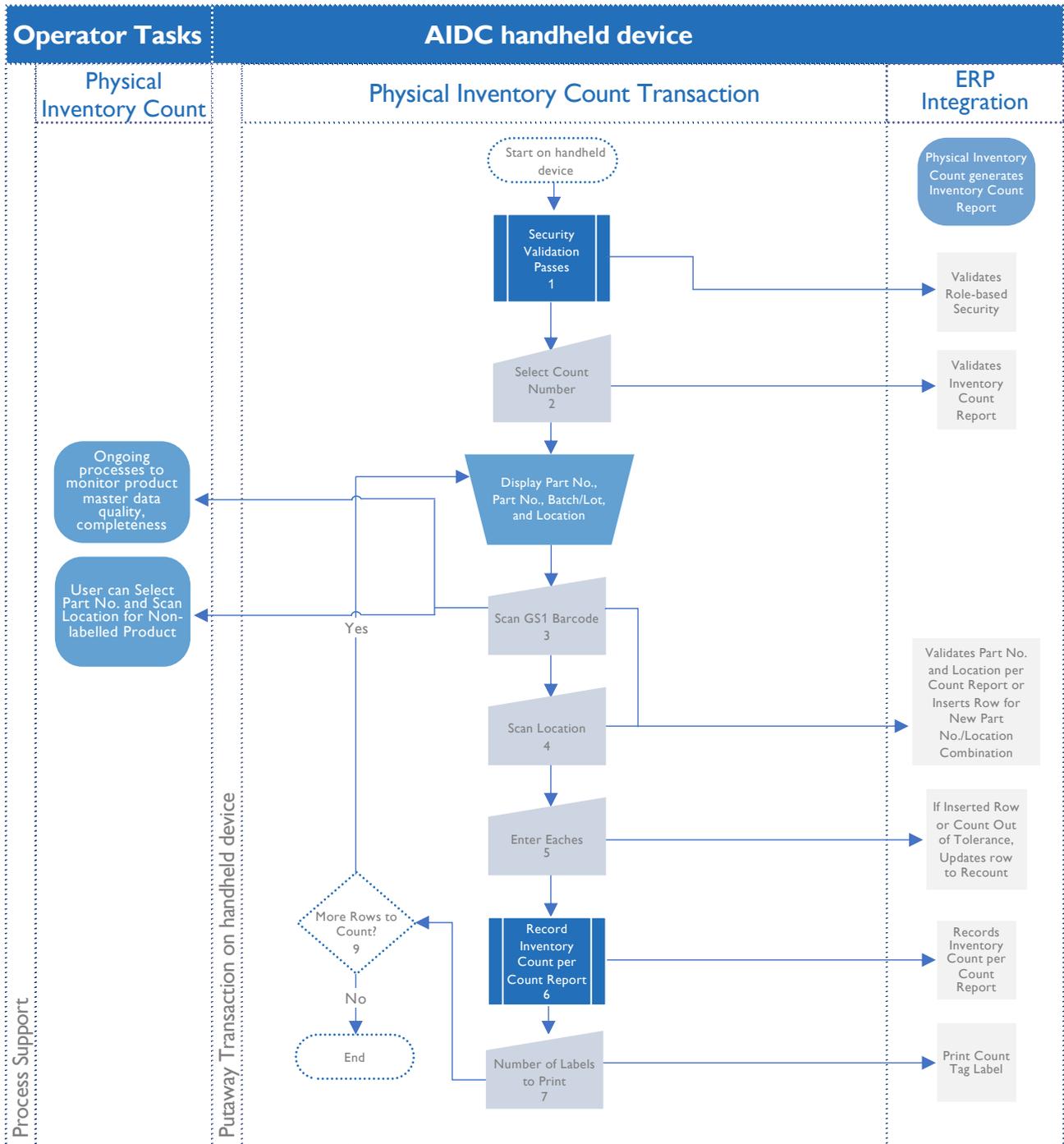


Figure 8 - Physical Inventory Count

Business Process Flow Steps

BP Step #	Step Name	Step Description
1	Security Validation Passes	See SOP for <i>handheld device login</i> . The <i>ERP system</i> will validate role-based security to authenticate user credentials, determine user privileges using role-based security, and locate the user warehouse location and default barcode printer.
2	Select Count Number	The user will be presented with a list of Count Numbers. Upon selecting the Count Number, the Physical Inventory Report generated by the count will be validated. Upon selection, the <i>handheld device</i> will display the count Part Number, Batch/Lot Number, and Location in the warehouse.
3	Scan GS1 Barcode	The user selects <i>Scan Barcode</i> on the <i>handheld device</i> and scans the GS1 barcode label of the part(s) selected for the Count Number. If the product is not labeled, the user can manually select the product Part Number and scan the Location of the part(s).
4	Scan Location	After the user scans all parts visible/physically present in the count, the user should scan the Location. This allows the <i>ERP system</i> to validate the part count against the pre-established count report stored in a table so that the ERP is triggered to insert rows for additional counts if needed.
5	Enter Number of Eaches	Enter the number of Eaches counted so the <i>ERP system</i> can calculate the <i>Count Tolerance</i> and signal for a future re-count if there are disparities.
6	Record Inventory Count per Count Report	Review the generated Inventory Count recorded by the Inventory Count Report.
7	Number of Labels to Print	After you complete your count, you will print a proprietary label that confirms this part was counted already and count has been documented. Place the label on the part (item), which indicates who completed the count, and includes the quantity counted. This will allow the auditor to see the count history on the day of Physical Inventory.
9	More Rows to Count?	If Yes, return to the processes from Step 3 onward and repeat until completion.

References & Additional Resources

To aid in building context and knowledge in these AIDC processes and use cases, it may be useful to familiarize with additional resources provided through the [GHSC-PSM Traceability Planning Framework Toolkit*](#).