WMS vs. WCS vs. WES

Presented by:
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Agenda

• WMS, WCS and WES Defined
• Day in the Life of an Order
• Standard Interface Architecture
• Case Studies
• Questions
What is a WMS?

• A highly specialized business application that’s purpose is to control the flow of inventory into, within and out of a company’s distribution center (DC)
  – Four Walls
  – Between Multiple DCs
  – Enterprise Visibility

• WMS knows where all orders/inventory is at all times (Four Walls)
A Real Time Environment

- Verify Receipts
- Ship to Customers
- Track Inventory
- Allocate Orders
- Balance On-Hand Amounts
Supporting a Real-Time Environment

Most WMS incorporate:

- Wireless Data Terminals (RF Devices)
- Bar-Coded Pallets, Cases, and Item Labels
- Radio Frequency Identification Tags (RFID)
- Conveyor Systems / Material Handling Equipment
- Voice Enabled RF Devices
What is a WCS?

• A Warehouse Control System (WCS) is a real-time integrated control solution that manages many types of automated equipment: conveyor, sorters, cameras, ASRS, pick to light, carousels, print and apply

• WCS exchange real-time communications (milliseconds), command processing, discrete equipment signals, and the optimization of material (multiple UOML: units, cartons and pallets)
What is a WES?

• Warehouse Execution Systems optimize and balance how work is performed on automated equipment

• Warehouse Execution Systems dynamically allocate orders based upon WCS inputs (machine language)
WMS vs. WCS vs. WES

Analogy

WMS (Brain)

WCS (Central Nervous System)

Tilt Tray Sorter
(Bones)

ASRS
(Bones)

Conveyor
(Bones)

5 Senses:
Sight
Sound
Touch
Taste
Smell

Machine
Control
Input & Output

Feed Back Mechanism

WES?
Warehouse Management Systems

- **Do Not** control machine language (ladder logic and PLCs)
- **Do Not** control machine controls (starters and motors)
- **Do Not** control Put to Light, Sorters, Conveyors, Print and Apply and ASRS
- **Do Not** track carton level LPNs on automation equipment
- **Do Not** provide a GUI (ACAD) layout of your automation system
- **Do Not** dynamically allocate or balance orders and replenishment inventory across an automated facility (typically no integration to automated equipment)
Warehouse Control Systems

- Do Not interface with your ERP (typically, there are exceptions)
- Do Not hard allocate inventory in reserve or forward pick locations
- Do Not support wave management strategies
- Are Not your inventory of record (Four-Walls inventory)
- Do Not support extensive cycle counting and physical inventory processes
- Do Not support labor management and allocation
- Do Not support transportation planning and shipping execution
Warehouse Execution Systems

• **Do Not** manage all inventory locations within 4 Walls *(typically, there are exceptions)*

• **Do Not** support Transportation Planning and Shipping Execution *(typically, there are exceptions)*

• **Do Not** support extensive cycle counting and physical inventory processes
# WMS, WCS and Now WES Functionality

## The Crossover

<table>
<thead>
<tr>
<th>WMS</th>
<th>WES</th>
<th>WCS</th>
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<tbody>
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<td>• Transportation Management Integration</td>
<td>• Shipping Management</td>
<td>• Fixed Scanner Integration</td>
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<td>• Order Management Integration</td>
<td>• Replenishment Management</td>
<td>• Machine Control Integration</td>
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<td>• ERP Integration</td>
<td>• Small-Parcel Manifesting</td>
<td>• Mobile Scanner Integration</td>
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<td>• Advanced Receiving</td>
<td>• Non-Automated Pick Management</td>
<td>• In-Line Print and Apply</td>
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<td>• Management Reporting</td>
<td>• Voice Data Capture</td>
<td>• In-Line Weight and Motion</td>
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<td>• Reverse Putaway</td>
<td>• Inventory Management</td>
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<tr>
<td>• Slotting</td>
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**WMS**

- Transportation Management Integration
- Order Management Integration
- ERP Integration
- Advanced Receiving
- Management Reporting
- Reverse Putaway
- Slotting

**WES**

- Shipping Management
- Replenishment Management
- Small-Parcel Manifesting
- Non-Automated Pick Management
- Voice Data Capture
- Inventory Management
- Pack Sorter Management
- Shipping Sorter Management
- Automated Pick Management
- Pick-to-Light Management

**WCS**

- Fixed Scanner Integration
- Machine Control Integration
- Mobile Scanner Integration
- In-Line Print and Apply
- In-Line Weight and Motion
WMS, WCS & Now WES Convergence

WMS
- User Interface
- Manage Inbound POs & Receiving
- Host Interface
- Inventory, Storage & Location Management

WES
- User Interface
- Equipment Communication & Control
- Host Interface
- Manage Outbound Orders & Shipping
- Dynamically Manages Activity Execution
  - Receiving, PutAway, Replenishment, Picking, Packing, Shipping
  - With Automated Equipment (Conveyor, Sorter, ASRS, MultiShuttles, Robots)

WCS
- User Interface
- Equipment Communication & Control
- Host Interface

Lines are becoming blurred
Day in the Life of an Order (Pre-WMS)
WMS to WCS Orders/Carton Data Flow

1. WMS sends carton info to WCS
2. Carton is scanned by scanner
3. Scanner sends scan data to PLC
4. PLC sends scan data to WCS
5. WCS informs WMS that scan occurred
6. WCS looks up carton in database
7. PLC tracks carton to divert destination
8. PLC attempts to divert carton to assigned lane
9. PLC sends WCS status of divert
10. WCS sends WMS status of divert
FIND YOUR WOW
Ladder Logic to GUI
Sample Operational Dash Boards

Zone Pick Summary Chart

Pack Ship Summary Chart

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System Performance KPIs

Statistics by Zones

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## Monitoring and Alerting

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Day in the life of an order (with WES)
Standard Interface Architecture

ERPM/HOST

Interface Layer (Point to Point) or (ESB)

- PO Header Detail
- Receipt Detail
- Item Master
- SO Header Detail
- Shipment Detail
- Inventory Adjustments

WMS/WES

- WCS
- WES
- Shipping Execution
Case Study #1

• $800M Fashion Apparel Company
• Tier 1 WMS
• WCS Required for Put to Light and Conveyor
• However the WCS was used for discrete order picking…
• WCS assumed inventory was always in the forward pick location and did not manage, allocate or control the inventory
Case Study #2

• $4B Shoe Retailer (Highly Automated)
  • Tier 1 WMS
    • Managed IB Receipts
    • Inventory Control
    • Replenishment to the Tilt Tray
    • Forward picking for accessory items
    • Allocation
  • WCS for Conveyor and Print and Apply
    • 8 inbound lanes with 2 to 1 merge
    • Put-away loop with sortation
    • 17 outbound lanes for pool point shipment
  • Separate Controls for the Tilt Tray
Lessons Learned

• Understand what (WMS vs. WCS) and now WES does best for your business...lines are getting blurred
• Understand how the physical movement of inventory (UOM) moves through your facility
• Manual vs. automated facility
• Use a solutions architect that knows both technologies....
  • Happy Path work flows but more importantly.....
  • Exception Management
For more information

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