WMS (Warehouse Management Systems)

How to choose the best for you warehouse.

Presented by Angel Plou
WMS. How to choose the best for your warehouse

30 Sept 2005

Agenda

- WMS. Definition and main features.
- WMS Landscape
- Different solution for a warehouse.
- SILO, the WMS from EDS
- Case Study: Telefonica
- Summary
## IT Technology in the Logistic environment

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<td>WMS</td>
<td>Warehouse Management System</td>
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<td>SCM</td>
<td>Supply Chain management</td>
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<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<td>Electronic Data Interchange</td>
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<td>B2B</td>
<td>Business to Business</td>
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<td>Application Service Provider</td>
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<td>BoB</td>
<td>Best of Breed</td>
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<td>RFID</td>
<td>Radiofrequency Identification</td>
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<tr>
<td>LGV</td>
<td>Laser Guided Vehicle</td>
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WMS definition

WMS : Warehouse Management System

“Application able to manage all the activities related to receiving, storing and shipping materials to and from production or distribution locations in a warehouse”
WMS processes coverage

Inbound Processing
- Receipts
- Identification / Labeling
- Customer Returns
- Transfers
- Outside Processing

Internal Processing
- Storage
- Replenishment
- Picking
- Packing
- Inspection
- Counting
- Added Value Operations, e.g.
  - Sequencing
  - Assembly
  - Optimization

Outbound Processing
- Customer Shipments
- Labeling
- Vendor Returns
- Transfers
- Outside Processing
Logistic Value Chain and WMS

Logistics Value Chains as an Integration Between Procurement, Manufacturing and Distribution

Manufacturer Supply Chain

Logistic Value Chain and WMS
A warehouse is not a so complex installation....

Really?
WMS Logistic Areas under control

- Reception and Identification zone
- Quality control Zone
- Stock Areas
  - High-rise Automatic warehouses
  - Miniload
  - RF aided (narrow aisle)
  - Block zones
- Picking zones and replenishments
  - RF aided
  - Pick to light
  - Paternoster
- Packing, Shipping Areas
- Production
- Special zones (kitting, value added tasks)
- Track Gates Area

Henkel Logistic Center (Barcelona)
AS/RS: Automatic Storage/Retrieval System

- Characteristics
  - Increase storage capacity with 9 to 15 height racks
  - Quicker access to locations (improve warehouse performance)
  - Process Automatization
  - 99,99 % Accuracy
Miniload

- Characteristics
  - Increase storage capacity with 20 to 30 height racks
  - Increase the number of references to be storaged.
  - Accuracy and improvement on manual picking operations
  - Continue Inventory control
  - Commonly used for low movers
How to choose the best for your warehouse

30 Sept 2005
Robotic Picking

- Characteristics
  - Improve performance on order preparation
  - Optimize transport utilization
  - Safer Preparation
  - Savings on preparation processes
Aerial Rail

- Characteristics
  - Aerial movement of pallets without disturbing operations
  - Move product from different logistic areas
  - Quicker and safer than manual movement
  - Layout modifications are usually expensive
RF Materials Movement

• Characteristics
  – On-line order preparation management
  – Accuracy on preparation
  – Improve Resources optimization in the warehouse
  – Management of discrepancies on line.
  – Traceability across the operations.
  – Replenishment management on-line
Recogida por Radiofrecuencia

- Características
  - Facilita proceso de preparación del pedido
  - Gestiona incidencias on-line
  - Facilita la identificación de paquetes para envío a Cliente Final
  - Aumenta la Fiabilidad del envío
10.7 Lectura de Etiquetas de Forma Automática

Características
- Fiabilidad del Proceso
- Aprovechamiento y mantenimiento de la Información a través de la cadena de Suministro.
- Automatización de Operaciones repetitivas
- Rapidez y eficiencia en la utilización de elementos mecánicos
10.8 Picking a persona

- Características:
  - Aumenta la productividad del proceso.
  - Mayor fiabilidad de las operaciones.
  - Disminuye los tiempos muertos por desplazamiento de las personas.
  - Mejora la ergonomía del Puesto de trabajo.
  - Realiza inventarios permanentes.
• **10.9 Picking Convencional**
  - Método alternativo a la RF, en el caso de problemáticas en las que el Picking sin Papel no se rentabiliza.
  - Utilizado para servir pedidos con cantidades unitarias.
  - Control de la Lista de Contenido.
  - Generación de Etiqueta identificativa.
  - Cálculo volumétrico de las cajas.
WMS Characteristics

WMS main features
✓ Real time control oriented.
✓ State of the art technology integration.
✓ Consistent information and processes.
✓ ERP connected.
✓ Flexible to include new requirements.
✓ Robust and full time operative.
✓ Modular built including parameterisation.
✓ Standardized product delivery.
✓ Traceability along the warehouse.

Is your WMS delivering best in class performance
• Can you handled Multiple Orders Simultaneously ?
• Does your inventory accuracy exceeds 99% ?
• Do you give Customers a Totally Reliable Delivery date ?
• Can your Numbers Identify Changes that most Impact performance ?
• Can you balance the workload on each Section/Zone in the Distribution centre ?
• Do you Pack Items to Simplify Downstream Partners tasks ?
• Can you and your customers do single scan receiving ?
# WMS Functional Level on a Logistic Business

## Level 1  ERP or SCM applications
- Sales
- **Global Stock Control**
- Material Purchase orders
- **Providers orders control**
- Customer orders control
- Item Master Data
- Accountability
- Production Plan
- Administration
- EDI
- Human resources

## Level 2  WMS
- Reception and Location
- Stock Management
- Order
  - Volume Control
  - Order Classification
  - Material Flow Control
  - Operation Optimisation
  - Classification
- Replenishment
- Local Inventories
- Expeditions
- RF management

## Level 3  Control and Monitoring System
- Conveyors
  - Boxes Flow Control
  - Monitorización
  - System Control
- Cranes
- LGV

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WMS. How to choose the best for your warehouse
WMS Architecture Diagram
Agenda

- WMS. Definition and main features.
- WMS Landscape
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WMS Landscape

✓ The market of WMS applications is highly fragmented with a lot of regional solutions implemented locally and not supported outside the region.

✓ ERP/WM module are basic and technology integration inside these modules requires a high degree of expertise in the ERP module, in the technology connectivity and in the business itself. People with high expertise level are difficult to find. This modules are not allowed to manage complex warehouses and usually requires expensive add-ons.

✓ WMS solutions, usually not include any option to manage automatic zones, so very often is required to buy specific solutions for this kind of areas.

✓ There is a trend for the enterprise to continue IT standardization started with ERP to other kind of solutions like WMS.

✓ 3 PL´s are looking in Logistic arena for an IT partner to share the requirements of this kind of solutions, in order to be able to save cost and react quickly to new requirements coming from the market.
## SCM / WMS Landscape

### Table 18: SCM total revenue share by application segment, 2004–2009

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Source: AMR Research, 2005
# Table 1: SCM vendors ranked by 2004 SCM revenue (incl. est. '05 growth)

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WMS. How to choose the best for your warehouse

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Source: AMR Research, 2005
3PL’s Main Challenges (example 1)

3PL’s have increased dramatically the number of different solutions and providers of WMS solutions based on the number of business they have reached. They are looking for a more standard IT platform to make savings, be able to offer new services and leverage facilities and users.

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<th>Regions</th>
<th>Germany</th>
<th>Benelux</th>
<th>Nordics</th>
<th>South east Europe</th>
<th>Asia/ America</th>
</tr>
</thead>
<tbody>
<tr>
<td>% generic public warehouses</td>
<td>22</td>
<td>17</td>
<td>36</td>
<td>90</td>
<td>24</td>
</tr>
<tr>
<td>Existing Prolog implementations</td>
<td>6</td>
<td>4</td>
<td>18</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Total Prologs implementations required</td>
<td>16</td>
<td>13</td>
<td>18</td>
<td>90</td>
<td>14</td>
</tr>
<tr>
<td>Standard</td>
<td>11</td>
<td>5</td>
<td>18</td>
<td>61</td>
<td>12</td>
</tr>
<tr>
<td>Standard</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Between 25000 and 35000 sq.m</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Greater than 35000 sq.m</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Generic Public Warehouse is defined as a multi-client warehouse that is not included in the following categories:
- factory warehouse
- automotive factory warehouse
- fully mechanized warehouse
- fashion specific
Manufacturers, between others, have increased their facilities introducing new installations. After several years they have a warehouse composed of different WMS solutions with different providers and out of date equipment, there is an option to migrate to a new platform able to manage all the different installations from only one solution.
Agenda

• WMS . Definition and main features.
• WMS Landscape
• Different solution for a warehouse.
• SILO , the WMS from EDS
• Case Study : Telefonica
• Summary
ERP versus “Best of Breed” (BoB)

Two different ways to cover Warehouse requirement.

ERP: Enterprise application able to cover most of the requirements of a company. Analyze the requirement and adapt the requirement to the ERP functionality.

BoB: look for best solutions in the market to cover an specific requirement

Compromise solution: Use ERP for the core requirements and BoB for the specific requirements.

<table>
<thead>
<tr>
<th>WMS Solutions</th>
<th>SAP oriented customers</th>
<th>Customers NOT SAP oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Purpose Warehouse</td>
<td>ERP/WM</td>
<td>WMS(BoB)</td>
</tr>
<tr>
<td>Specific purpose warehouse</td>
<td>ERP/WM +/o</td>
<td>WMS(BoB)</td>
</tr>
</tbody>
</table>
Wider market adoption commoditizes these ‘standard’ solutions and their competitive advantage diminishes over time.

**Client Benefits of adopting IT Vendor ERP or ‘Domain’ Solution**

- Competitive advantage seized by first movers and early adopters
- Later adopters have benefits of IT vendors’ learning from earlier implementations
- Adopters maintain advantage over non-adopters, but...
- Competitive advantage of adopters decreases as standard solution becomes commoditized via wider market adoption
- Most major Consumer Product companies have adopted key ERP solutions already (eg: HR, FICO, Production, CRM, SCM, etc)

*Business users are demanding new sources of competitive advantage through Information Technology*

Source: EDS client and market analysis; Gartner; Forrester
enable business users to anticipate events and to respond proactively

• **Consolidated** enterprise-level views of distributed information

- Access to *new* information:
  - Enterprise-wide data access
  - Extended-enterprise collaboration
  - Gain information from the coming RFID data ‘explosion’ (Pallet…Case…Unit)

**Implications**

• From micromanagement... to management by exception
• From transactions...to events......to indicators (that forewarn about future events)
• From hindsight......to insight.........to foresight
• Organisation productivity monitoring
• Continuous change & improvement

**Improved decision support** through personalised, targeted information – the “Right 6!”

- Deliver:
  - Right information
  - Right format
  - Right person
  - Right time

- To elicit:
  - Right decision
  - Right action(s)

Source: EDS client and market analysis; ECR; GMA; IGD; Forrester
Functional Solution on a Specific Purpose Warehouse

CASE 1

Level 1 ERP

Level 2 WMS

Level 3 SCAT

CASE 2

Level 1 ERP/WM

Level 2 WMS

Level 3 SCAT

CASE 3

Level 1 ERP

Level 2 WMS

Level 3 SCAT

CASE 4

Level 1 ERP/WM

Level 2 WMS

Level 3 SCAT

WMS. How to choose the best for your warehouse
Advantages for Case 3

- Warehouse managed by only one application
- **Automatic zones integration** under the same umbrella (PickToLight, Shuttles, Miniload, etc.)
- Work force **Productivity managed** by an specific application.
- **Response time** homogeneous for warehouse operations.
- **Isolated** from the ERP timetable requirements (back-up, batch processes, upgrades, etc).
- **Easier to include Add-ons** (special added value functions, ABC classifications, etc.).
Case 4 - Mixed Solutions (ERP/WM - Middleware)

ERP Server

WMS Server

Transport Orders

- Storage
- Replenishment
- Movement
- Preparation
- Picking

Transport orders confirmation

- Storage confirmation
- Replenishment confirmation
- Movement order Confirmation
- Picking confirmation

Scanners

Printers

RF Terminal

Other

WMS. How to choose the best for your warehouse

30 Sept 2005
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SILO History

- **1990.** WMS experience started in Spain as a leveraged application based on GME WMS experience. First customers were Danone, Boehringer M. and Delphi.
- **1994.** EDS develops and implements an established WMS solution in Iberia, focused on complex installation. Main customers are: Opel, Henkel, Novartis.
- **1996.** This solution includes RF technology as part of the WMS options. Projects on South-America and Europe start in collaboration with other EDS groups (Molinos (Arg), Atlas (Bel)).
- **1999.** SILO wins new customers for small and large installations (Telefónica, CEAC, SSM) and is implemented to control providers malls for SILS sequencing and cross-docking areas in the automotive environment.
- **2000.** First steps are taken, to package and market SILO as an industry solution to increase EDS industry recognition in logistic arena. SILO is consolidated as a product for warehouse management system in EDS. New projects are signed in EMEA to implement this solution.
- **2001.** Warehouse experiences are extended to new market alternatives: Global Customers with different WMS requirements (3PL), Manufacturing companies with important logistic issues and so on.
- **2003 - 2005.** New projects are signed with Opel Germany and Vauxhall to include SILO as the standard solution within GME to manage automatic warehouses.
- **2003** SILO is promoted as an EDS solution within the EDS Portfolio.
- **2005.** SAAB proposal to upgrade to GME standard SILO solution for automatic warehouses. SILO sold to Coca-Cola distributors and first steps to be implemented in the States within the BPO business for Consumer Direct.
- **2005.** SILO is included as a manufacturing solution within the AIU Manufacturing unit.
SILO - The EDS WMS Solution

SILO is a WMS application oriented to work on a PULL basis and oriented to manage all the warehouse zones to simplify operations and to obtain the global highest performance.

• Conventional warehouse control with SILO Lite.
• Automatic integration with SILO Auto.
• Radiofrequency aided operations with SILO RF (802.11G).
• ERP and SILS connections via SILO Connect.
• e-SILO a window to the information from anywhere.

!!! NEW MODULES!!!
• SILO Transport. A set of tools to identify cost effective transport services from transport custom base providers (already available)
• SILO Pick to voice. New module to integrate voice aided picking operations.
• SILO RFID. New module to integrate passive tags information coming from savant software.
• SILO Slotting: A set of tools to help the warehouse manager to optimize warehouse organization and utilization.
**SILO-Auto  Mechanical Elements Integration**

- **Servidor Silo**
- **Comunication with legacy and proprietary systems**
- **Communication based on Pc connectivity**
- **Direct communication RS-232(3964R), Protocolos H1, Profibus, TCP/IP**
- **Red de PLC`s**

**• The Module allows the possibility to parameterize each installation and define different criteria in the order selection either to prioritizing Movements Optimization or material FIFO.**

**• It internally manages the logical path definition, so that in case of an event, failure or maintenance in a mechanical element, it’s able to use alternative routes to complete the Movement.**

Generates statistics about failures in the mechanical elements or the number of movements of these elements. This allows for the study of the efficiency of these elements.
SILO-Auto Visualization

- SILO-Auto visualization is a set of tools oriented to facilitate the control and management of full automated installation.
  - Adapted to each layout, gives a complete view of all the parameters and status required to control and manage the performance on automatic installations:
  - Windows based, updated on user preferred time cycle
SILO-RF  Picking Strategies

Layout Parameterization:

• Picking zones Layouts
• Technology to be used in each zone (RF, Paper, Pick to Light, Voice Recognition)
• Locations classifications and order. Management of picking routes.
• Automatic replenishment between zones

• Resources Parameterization
  • Human and Technical resources definition (Pickers, RF terminals,)
  • Resources assignment to different zones including capacity.
  • Definition of tasks in each zone.
  • Assignment of resources to zones and tasks.

• Picking preparation Parameterization
  • Preparation orders parameterization
  • Identification of special criterias for preparation
SILO - Open Platform

Ad-hoc development

Package

Component Architecture

Component

Ad-hoc development
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Telefónica de España

Spain:

- Main telecommunications operator.
- More than 13 million of customers.
- 17 million telephone lines

Is the origin of the actual “Grupo Telefónica”.

- Being present in 48 countries world-wide.
- More than 70 million customers world-wide.
Telefónica de España
Logistics. Services

- Logistics consultancy and adviser for all the group
- Stock Management - Delivery control
- Warehousing - Manipulation - Distribution
- Reverse logistics (repairing, up-dating)
- Quality assurance and environment care
- Integral Stock Management
- Residues and Scrap Management
New Logistic Centre
Location

- La Coruña
- Bilbao
- Zaragoza
- Barcelona
- Madrid
- Sevilla

- > 50,000 inhabitants
- > 200,000 inhabitants
- > 600,000 inhabitants
- > 1,000,000 inhabitants
- > 2,000,000 inhabitants
New Logistics Centre
Technical Design

- Tray automatic warehouse
  5,600 locations

- Order preparation area
  15,000 Lines / day

- External area
  19,000 m²

- High bay store
  17,500 locations

- Offices
  2,600 m²

- Receiving area / Shipping
  70 routes / day
Warehouse layout
Telefonica Logistic Centre
General concept of organisation

WMS. How to choose the best for your warehouse

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Telefonica Logistic Centre
General concept of organisation (II)

- Different warehousing areas depending on physical and/or ABC classification and/or stock characteristics.
- Parallel order preparation. Implementation of Forwarding system, display use, man to goods, pick to belt, etc.
- Automatic classification by distribution routes.
- Movements managed by radio-frequency. Tracking of all articles and LIFO and FIFO algorithms application depending on articles.
- Tailor made and independent logistic centre management system, connected to a corporate one with a standard ERP system.
Telefonica Logistics Centre
Management System Structure

- Customer's order entry
- General Stock control
- Purchases

- Order entry (back-up)
- Reception and location of goods
- Stock and replenishment management
- Order system strategy
- Order preparation control
- Dispatch

- Control of displays
- Physical movements management
- Monitoring of the installation
Agenda

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Summary

- WMS are solutions oriented to manage every resource in the warehouse. From work force to mechanical elements, in order to ensure the quality of the work done as well as to reach the maximum warehouse performance.

- There are different approaches to the WMS solutions. The appropriate solution depends on the warehouse layout and flow of materials and the company orientation towards ERP or BoB solutions.

- There are many opportunities for improvement in the companies related to the WMS issues. Standardization and upgrading of current technology can reduce ongoing costs and prepare the company for the new technology coming.

- 3 PL’s are pushing new requirements for the IT solutions due to the orientation of its services dedicated to provide service to more than one customer and the necessity to create warehouses networks in the supply chain.

- Implementation of WMS solutions in specific purpose warehouses is usually a complex project, in which it is required to involve business people as well as specialist from all the different providers (engineer, IT, mechanical, RF).

- How to choose the best is not an easy question to answer.
Questions and Comments

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