Four Ways to Approach Efficient Warehousing

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This white paper is targeted at small to medium sized (SMB) wholesale distributors and manufacturers. It is intended to help business owners and executives provide answers to questions such as:

- Are you spending too much on your warehouse processes?
- Would you like to explore new ways of increasing your bottom line?

This is a warehouse technology and process selection roadmap, giving SMB distributors insight into initial investments that they can afford. Additionally, it outlines an upgrade path with incremental investments that result in greater operational sophistication and savings.

Why now?

Analysts are predicting double-digit growth in the SMB warehouse management software market-space through 2005. We can most likely attribute this growth to several market driving catalysts:

- Tier-one market saturation
- The commoditization of wireless technologies and PDA devices
- The .NET evolution and the development of open inter-software communications standards
- The availability of low-cost reliable database software
- Major retail's pursuit of RFID to replace the barcode in warehousing, distribution and stores
- Lower total cost of ownership

Tier-one Market Saturation – The Fortune 1000 have all purchase WMS applications. Because the customers are literally "running out," technology vendors are now focusing on delivering scaled down solutions to the mid-market.

Commoditization of Wireless and PDA devices - Consumer adoption of the wireless 802.11b/g standard has shifted the industrial market for wireless technologies into the mainstream. The same holds true with PDA devices. Many companies are currently using wireless PDA type devices connected to their local area networks to bring real-time computing and increased productivity to the workplace. Industrial wireless PDA devices for warehousing and distribution differ from their consumer grade counterparts to accommodate requirements for improved battery management, integrated barcode scanners, durability and easy keyboard input.

The .NET Evolution – Installing "bolt-on" warehouse solutions to standard business applications is now cost-effective, more user friendly and is a common occurrence due to the evolution of interface standards. They have allowed developers to focus more energy and time on developing complimentary features and functions.

Reliable Database Software – Mission critical applications like warehouse software can now be implemented on cost effective, "safe" database platforms. Applications like Microsoft SQL have outpaced rivals DB2 and Oracle in the SMB market because of low cost of ownership, robustness of architecture, low-cost hardware platform, security and up-time. Microsoft SQL can now be installed with Small Business Server in under twenty minutes and runs effectively without a database administrator.

The Wal-Mart effect – Major retail is driving vendors to comply with technologies like barcode and RFID to reduce supply chain costs. Barcodes allowed Wal-Mart to eliminate accuracy problems and to streamline processes while minimizing human interaction with the data collection process. In constant pursuit of additional savings from their supply chain, Wal-Mart settled on RFID technology to further shave precious seconds per transaction. Products can be automatically identified anywhere within the supply chain without pallets being broken down or being stopped for scanning.

While saving Wal-Mart many millions of dollars in supply chain costs, barcode and RFID technologies represent an additional cost burden to manufacturers and distributors unless leveraged to their own advantage. The same product codes that are required by Wal-Mart can be used to automatically and accurately identify products within the vendor's distribution center.

Lower total cost of ownership – In addition to the aforementioned technologies and market conditions, software value has increased substantially over the past decade. The cost per feature is at an all-time low. Many warehouse automation technologies have matured enough to offer robust, out-of-the-box software providing quick implementation methodologies at a reasonable price.

The cost of outfitting a warehouse employee with a solution that includes wireless PDA devices represents between 2.5% and 25% of employee burdened costs in the first year, not including the asset value of the infrastructure and the tax implications of asset depreciation. Technology-based tax incentives may be available in countries looking to affect workforce productivity.

Companies implementing warehouse automation solutions can expect productivity increases in the first year that result in a return on investment (ROI) in as little as 6 months. Of course, the rate of ROI depends on the size and scope of a technology purchase and how it is put to use.

Strategies Pyramid

In light of the proliferation of WMS in the SMB market, we suggest the following pyramid as a model to consider when formulating your own strategy for implementation. This model allows you to start small, think big, and step up your savings over time while keeping business disruption at a minimum.

We selected a pyramid structure because as you ascend the pyramid, each layer of technology represents process improvement and cost savings over the previous layer. Companies may elect to skip stages in the pyramid. The appropriate approach for each company depends on organizational resource availability, tolerance to change over time and requirements that will define the scope of the solution. This paper describes the different levels of possible incremental investment.

Stage 1 – Current Process Automation

Stage 2 – Business Process Re-engineering

Stage 3- Infrastructure & Business Process Re-engineering

Stage 4- Integrating Warehouse Automation Equipment in to business processes

Stage 1 -Current Process Automation

The first level of the pyramid allows you to maintain your current processes and still realize significant improvements to your bottom line. By simply automating current processes with barcode data collection devices and software, manufacturers and distributors can dramatically increase the accuracy of inventory and order shipments.

Before wireless mobile computing, warehouse related information was communicated in "batch" to the business system through the use of paper, pencil and data entry at a stationary warehouse terminal. Instead of carrying around paper and a pencil, warehouse staff can be equipped with PDA's to record functions performed in the warehouse. Simply "mirroring" current processes with wireless PDA devices is the premise for Stage 1 of the strategies pyramid.

The benefits of going paperless include:
Better data for the enterprise

- **One time data entry** – Rather than handling data twice (pencil and paper, then data entry into the terminal), scanning facilitates data entry at the time warehouse activities are performed.

- **Efficient data entry** – Scanning barcodes is much more efficient than writing data on a piece of paper. The time required for data entry, sending paper orders to the warehouse, searching for misplaced paperwork and filing and maintaining paper documentation are all eliminated. This alone can result in significantly increased efficiency and cost savings both in labor and paper-related expenses.

- **Accurate data entry** – Scanning barcodes eliminates data entry errors. Furthermore, every step through the warehouse can be interactively verified using barcode and RF technology. This ensures a high level of accuracy in filling orders, product check-in,

putting away products into the correct locations, and accurate replenishment of pick-bins. Costs associated with shipping, receiving and inventory errors can be virtually eliminated.

- **Timely information and integration of warehouse data into the ERP System –** If data is captured at the time that processes are performed, the system can provide real time information back to the enterprise. At a minimum, the warehouse solution requires software that allows sales/work orders, purchase orders and inventory information to flow seamlessly between the warehouse and ERP system as processes are performed.

  Electronic data transfer between the warehouse and ERP system also ensures timely and accurate data for invoicing, purchase order payment and inventory tracking and management, all without manual keyboard data entry.

Optimized inventory management

- **Improved inventory accuracy** - Inventory carrying costs have an important effect on business viability. Inventory accuracy can reach approximately 99.9% when inventory is tracked using barcodes and RF handheld inventory functions. Inventory accuracy is ensured by scanning and validating locations and product barcodes.

- **Reduce your safety stock** - With the higher levels of inventory accuracy, a business can expect to diminish the quantities of required stock on hand and the carrying costs of that extra inventory, while at the same time maintaining adequate stock levels to fulfill orders.

- **Improve inventory counting efficiency** - Warehouse software should facilitate ongoing cycle counts, reconciled with financial data in real-time. This is an enormous benefit to the warehouse because the warehouse does not need to shut down operations. Performing regular cycle counts reduces the frequency requirement of full inventory counts and the cost associated with closing down the warehouse and the additional staff needed to perform the count.

Improved warehouse efficiency

- **Eliminate searching for lost products!** - With real-time inventory, wireless devices can accurately direct the order fulfillment process by ensuring that pickers travel to the correct pick–bin locations. Searching for product is eliminated and accuracy is ensured by scanning and validating locations and quantities.

- **Reduce picker walk time!** - The typical warehouse solution sequences item picking to minimize walk time throughout the warehouse thereby reducing travel time, even if the business system does not have bin locations.

- **Monitor warehouse activity and order status in real-time** - Using real-time wireless data collection equipment and software to record and store activity records in

a database, a warehouse solution can provide visibility into warehouse productivity, activity and trends.

This visibility can be on-line, presented in real-time or through reporting that looks at both current and historic data. Effective use of the data can positively affect the warehouse's ability to forecast resource requirements, recognize and remedy productivity problems, track errors and monitor customer issues.

Improved customer service

- **Improve your service level** - Order fulfillment time can be significantly decreased. Many companies need to improve cycle time to meet customer's growing expectations for same day, or rapid shipment.

- **Eliminate order shipment errors** - Reducing errors in order fulfillment and shipping not only lowers the monetary cost of errors, but keeps customer satisfaction and return business levels high. Order accuracy of 99.9% can be achieved.

- **Improve your fill rate** - The ability to fill orders completely, thanks to an accurate, automated inventory management facility lets you keep those sales. You won't loose customers because you can't fill their orders.

- **Provide your customers with improved visibility** - Keep your customers updated with real-time information about order status. This information is always available to your customer service staff, on-request and without delay.

- **Meet tough customer demands** - Wal-Mart can be a demanding customer. A system can be used to facilitate compliance requirements such as adopting specific labeling, or tracking lot and serial numbers. Using a solution like a WMS can automate compliance with greater ease and more cost-effectively.

Stage 2 – Business Process Re-engineering

The second level of the pyramid lets you go beyond current process automation, allowing you to evaluate your current warehouse processes and make improvements. This strategy assumes that you wish to maintain your current physical infrastructure, but are willing to modify warehouse processes to optimize productivity.

The benefits of business process re-engineering include:
Improve picking effectiveness
Implementing an effective picking/packing strategy can dramatically increase the number of lines picked per day. A unit pick warehouse can see picking productivity improvements by as much as 700%.

- **Reduce picker travel** - A significant amount of a picker's day is spent traveling to and from pick locations to gather products on each order. Because paper-based

processes are limited in how workloads can be distributed to the picking team, WMS implementation provides a valuable opportunity to reduce the amount of travel required per order line picked.

- **Improve workload management** - Optimally, workloads should be gathered by pickers, who start the pick path with an empty cart or pallet, and return full. The most successful workload is one that travels the shortest distance to fill the cart. In most paper-based warehouses, pickers gather limited quantities, one order at a time. Picking multiple orders at a time and re-balancing the existing warehouse into ABC ranked zones should help the average pick and pack warehouse fill up carts while reducing the mileage per workload.

- **Improved picking speed** - Because every warehouse is different, each distribution centre needs to find suitable picking/packing strategies. Batch, wave, simultaneous/sequential zone, pick and pass, and product picking are examples of different types of picking styles that can be employed by a WMS to increase workload effectiveness. In any given environment, it may be necessary to implement a variety of picking methods to correspond to different order compositions, product sizes and warehouse layouts.

- **Eliminate the order checking function** - Most warehouses that use warehouse management software to re-engineer the picking process can eliminate the checking function altogether. The result is a significant labor cost savings and faster order fulfillment. Many warehouses experience enormous capacity increases with their current staff.

Improve receiving accuracy and efficiency

Accurate, efficient receiving is the right way to begin the warehousing process. The right product, received accurately is then available to promise or to ship against backorders. An efficient receiving process means that product is checked-in faster which results in shorter vendor lead times and less inventory requirements.

Receiving incorrect products or quantities turn into inventory errors down the line; pickers grab the wrong product, customer service promises what they don't have and additional inventory needs to get ordered to compensate for the mistake.

- **Electronically receive against open purchase orders** – Lots of time is spent reconciling actual receipts against paper purchase orders. Using a handheld computer, a warehouse solution can effectively receive any product in any sequence against any purchase order and be capable of reconciling electronically.

- **Receive product against purchase orders in any sequence** – Much time is spent matching product against purchase order lines. Using a mobile device, receiving efficiency can be dramatically improved by automatically matching in the background.

- **Receive multiple purchase orders simultaneously –** Multiple orders are frequently received simultaneously. A trailer pulls up or a UPS shipment arrives. In a paper based environment, receipts must be segregated and reconciled against their individual purchase orders. An effective solution increases receiving efficiency by allowing a receiver to receive multiple purchase orders simultaneously.

- **From dock to stock faster –** When receiving multiple purchase orders, the amount of inventory to be received can be overwhelming. An effective solution will allow multiple receivers to receive multiple orders simultaneously so that product can be moved into stock quickly. The net result is faster availability for sales orders and reduced vendor lead times.

Improve pick-bin replenishment effectiveness
Dramatic warehouse performance can be realized through automated, managed pick-bin replenishment.

In a paper-based pick and pack warehouse, much time is spent replenishing pick locations based on the assumption that pickers need to pick as much product as the assigned pick locations can hold. Stock handlers walk through the pick locations and arbitrarily decide how much product is needed to fill pick locations to their maximum capacity.

- **Manage pick locations better** - An effective replenishment strategy will fill the right bins with fast moving product and leave dead stock where it belongs, in the high bay racking until they are required. In most warehouses, the demand created for the top 5% of products exceeds pick location capacity on a daily, if not more frequent, basis. The bottom 5% may not move in a year, or even less frequently. The result is that pickers walk past locations full of dead stock to reach to empty locations where fast moving product should be on hand.

- **Eliminate pick-bin stock-outs** - The lost productivity when a picker runs into an empty pick location is only part of the replenishment challenge in the typical paper-based pick and pack warehouse. Replenishment and picking share similar challenges;

- **Improve stock handler effectiveness** - Stock handlers cover large areas of warehouse, only partially filling their pallets because they are picking products to satisfy the orders left short when pickers run into empty bins. Replenishment activities are typically reactive, resulting from a lack of organization when gathering product from overstock and filling the pick locations. Business process re-engineering helps to smooth out this procedure by better analyzing pick location demand and driving workflow so those pallets get filled as efficiently as possible.

- **Better forecast bin requirements** - Advanced replenishment enables the WMS to request inventory from overstock before the products are actually required to fill sales orders. This process minimizes the likelihood of a sales/work order being delayed because pick-bins need to be replenished. Advanced replenishment uses historical velocity to anticipate replenishment requirements based on the minimum quantities of

a product that should be stored in a bin, or by the minimum number of days that a product should be on hand in a bin.

Improve shipping effectiveness
Shipping systems can be integrated in varying degrees with a WMS, and many WMS functions support and accelerate the shipping process.

- **Integrate shipping into the picking process** - Shipping labels produced at the start of the picking process and direct picking to shipping cartons can eliminate the need for a separate shipping station in some cases.

- **Rate shop for the most cost effective carrier** – Instead of having your warehouse personnel guess at the most cost effective shipping methods, a warehouse solution can automatically determine the best shipping method based on destination and service level requirements.

- **Eliminate shipping errors** – Seamless shipping integration ensures that the orders end up where intended. Eliminate shipping the wrong box to the wrong customer.

- **Attach the right documentation -** Printing packing slips, carton content labels, compliant freight labels; customs and dangerous goods documents are all required for accurate order shipment. Having this documentation integrated into the shipping process ensures that the right documents go with the right orders.

Stage 3 -Infrastructure Re-engineering

The third level of the pyramid lets you achieve productivity and profitability by optimizing all the resources within the warehouse including labor, equipment, storage, space and inventory. This strategy typically results in a revamped warehouse layout that cuts down on picking and can make huge differences in order cycle time and warehouse efficiency.

Define warehouse layout, configuration and rules
Your warehouse, and any WMS you install, will perform best if you draw up a plan that optimizes the layout of the facility based on warehouse activities, size of product and handling requirements. Sometimes, this may require outside advice or consultation. The plan should include contingencies for warehouse expansion.

Re-slotting re-defines your warehouse
Effective slotting is necessary to achieve commonality, which helps the picking process run at peak efficiency. Most companies can apply Pareto's law to their product mix- 20% of their products can be found on 80% of their orders. Actually, 10% of their products may be found on 50% of their orders.

- **Put the fastest moving products in the golden zones -** High velocity products are placed in a "golden zone" to reduce bending and reaching activity. Heavy or oversized items are placed on lower levels in the pick zone or placed in a separate zone where material-handling equipment can be utilized.

- **Some items require special handling -** Slotting sometimes involves identifying handling requirements of a product, such as 'hazmat' for hazardous material, heavy materials requiring special equipment to lift, or perishable products requiring refrigeration or freezing. Keep these items together to optimize use of special equipment or resources required for handling them.

Stage 4- Automation Equipment

The highest level of the pyramid involves the implementation of automation equipment such as vertical or horizontal carousels, “smart” conveyors and pick-to-light equipment. These systems need corresponding WMS software to optimize their operation. They can be combined with traditional RF-Based warehouse management systems to create a complete high-efficiency warehousing solution.

Automate your distribution center using carousels
With carousels, bins are brought to pickers at a fixed workstation significantly reducing travel time. Carousels can also let the warehouse store a high density of product in a smaller area.

“Smart” Conveyors
Cartons and totes can be tracked and routed through the warehouse making consolidation for shipping much more efficient. Routing happens automatically via fixed scanners on the conveyor and barcodes or RFID tags located on the cartons and totes.

Pick-to-light systems
Pick-to-light systems offer paperless picking using lights to identify bins from where picks are required. In addition to identifying the bin, the quantity for each product is also displayed.

Where do you go from here?

The benefits of a WMS have been well documented from various sources and case studies. Any warehouse can benefit from some WMS technology and processes, but the extent and timetable for implementation is up for discussion.

A business has to make clear decisions about its objectives, both long term and short term. The next step is to determine what kind of WMS technology and re-engineered processes best serve those objectives.

The plan for implementation also needs to be evaluated. Is it better to adopt WMS technologies in a piecemeal fashion, with minimal disruption or is it best to make a plan and go for it all at once? One can argue that if you are going to involve your warehouse time and staff in such an endeavor, it may be better to undertake the entire installation at once, despite the intensity.

In the final analysis, cost and ROI must be thoroughly explored and plans for WMS technology and processes must be tailored for each business. Regardless of the when and how, WMS technology must be embraced as a mean to profitability in the economic environment of today.