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Mobility and Real Time Event-Driven "Order to Store" Fulfillment

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Bob Heaney

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In November and December of 2011, Aberdeen Group surveyed 134 warehousing professionals for a benchmark report called *Fulfillment Excellence and Dynamic Event Warehousing Come of Age* that was published in January 2012. That report explores the pressures that distribution companies are facing and the plans they have to address their challenges in the coming months. This Sector Insight focuses on the 110 Mobil Dynamic Event Processing Users that were part of the January 2012 Report. We examine these Mobile Dynamic Event Processing Users and their event-driven processing needs. We look at the capabilities they have and the technologies they rely on to ensure their operations are efficient and providing value to their customers. It explores best practices and examines case studies where interactive solutions and mobility are enhancing the "Order-to-Store" fulfillment process for companies that have moved away from paper-based systems.

Event-Driven Processing Trends

From the January report, the predominant pressure users are experiencing is the need to *reduce warehouse operating expenses while optimizing resources*. Over 94% of all distribution companies are looking to either enhance existing or implement new dynamic and interactive warehouse processes. Across a broad spectrum of options ranging from Auto ID and RF to mobility that includes voice technologies, an amazing 83% of the 110 Mobile/Dynamic Event Processing Users plan to invest in more real-time, hands-free interactive technologies. Thirty-five percent (35%) of them plan to do so within the next 12 months. The goal is both to reduce batch and paper-based processing and to upgrade legacy voice systems. These steps will serve to improve real-time, dynamic processing and reduce costs. This will allow for better management of labor, and help achieve ROI expectations. We also uncover the connection between warehouse complexity and volume required for true 'event driven processing'. Today's complexity often requires more interaction with the workforce and a need (or desire) to manage labor tasks by integrating more mobile / interactive technology and voice capability into picking or replenishment operations.

Key Strategies - Integration of Order/Delivery Flows and Labor Efficiency

The Best-in-Class and All Other companies (see sidebar for definition/ Performance) have differences and similarities in the strategic actions they take. Companies were asked to select the top two actions (see Figure 1 below). In today's store-connected supply chain, effective *dynamic event*

Sector Insight

Aberdeen's Sector Insights provide strategic perspective and analysis of primary research results by industry, market segment, or geography

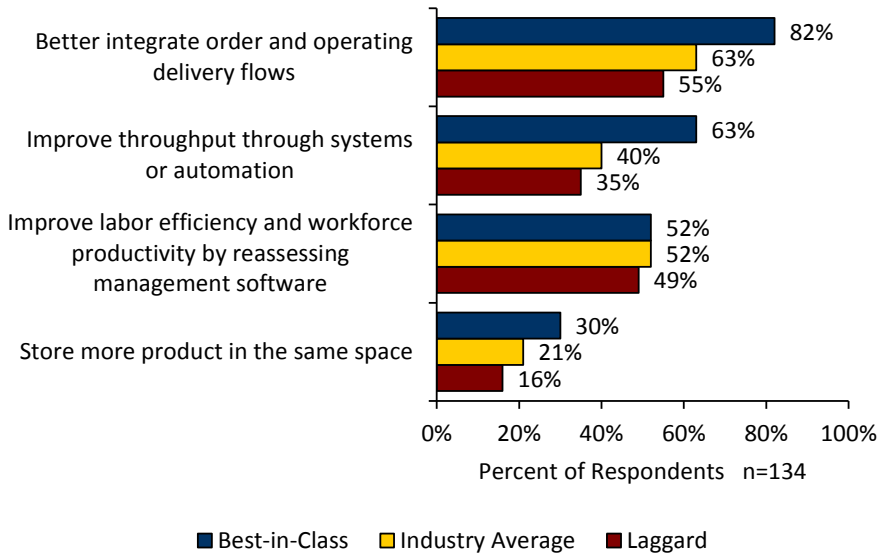
Sector Definition

This document is focused on the Dynamic Event Processing Users- a total of 110 companies out of 134 latest WMS survey.

- √ **43**% - Original manufacturer
- √ **30**% - Distributor/Wholesaler
- √ **19**% - 3PL
- √ **15**% - Other
- √ **14**% - Retailer
- √ **10**% - Freight Forwarder, Customs broker
- √ **6**% - Supplier Manufacturer / Supplier

management is of key importance when synchronizing warehouse activities with store orders and delivery requirements. Eighty-two percent (82%) of the Best-in-Class companies (as defined below) are seeking to integrate order and delivery flows to help achieve better labor efficiency and get product accurately delivered at the right time and place.

Figure 1: Top Two Actions in Store-Connected Fulfillment



Source: Aberdeen Group, January 2012

Companies that have real-time and interactive visibility to orders and workloads can more easily balance their workforce across work functions and zones. They can flex their full and part-time staffs across the peaks and valleys that occur across the day, the shift, or the week. They can also measure, manage and incentivize their workforce through the dynamic real-time visibility they have to individual labor productivity - a priority for 50% of the companies, Figure 1.

Survey results show that the firms enjoying Best-in-Class performance shared several common characteristics compared to All Others. They were:

- 45% more likely to improve perfect order rate by improving pick accuracy and on-time shipments
- 33% more likely to support task interleaving dynamically (switching employees between functions - picking, replenishment, etc.)
- 24% more likely to know the contents of every bin in the warehouse in real-time
- 19% more likely to confirm through scan or voice the location of put-away goods in real-time

It is clear that the Best-in-Class companies are more engaged, placing from 1.3-times to 3-times the emphasis on leveraging, balancing, and optimizing

Best-in-Class Performance Metrics (Jan 2012) n=134

√ **97.8%** perfect order rate delivered to customers complete / on-time

√ **3.7% decrease** in warehouse labor costs per unit handled vs. last year

√ **2.6% decrease** in actual warehouse operating cost vs. budget YTD

√ **3% to 9% percentage point advantage** in the 2cost metrics (Best-in-Class vs. Others) while sustaining the high 97.8% perfect order metric

Note: The Best-in-Class are the top 20% of performing companies, followed by the Industry Average are the middle 50% of aggregate performance scorers, and the Laggards are the bottom 30% of aggregate performance scorers

labor and delivering goods to their customers accurately and on-time. Having this focus helps insure that these companies can quickly adjust to constantly changing volumes and mix, which results in reduced labor costs, and highly accurate picking, shipping, and deliveries.

The examples from the following case studies illustrate today's growing complexity of operations by area from cooler, to case, to "each picking." It stresses the benefit of a *closed loop order-to-delivery solution* that utilizes in-store delivery scanning and validation. These advanced and complex product flows create a need for more dynamic and flexible processes and more real-time/mobile technologies within the warehouse. The move from paper-based picking to mobile, scan, and voice-capable picking, is a technology option that companies, from simple to complex, should explore to address the various challenges within their facilities.

We further illustrate the challenges and opportunities of labor and event management in the next two sections. In these sections we look at the journey two convenience store operators took to deploy Turnkey Dynamic Event Processing and Mobility Solutions to replace obsolete legacy voice and paper-based systems.

Henry's Foods Converts to Dynamic Picking Validation and Workforce Management, Improves Picking Accuracy and Efficiency

Since its beginnings in 1929, Henry's Foods has expanded and diversified from candy and tobacco products into a full line of food service, paper and wholesale groceries throughout Minnesota and parts of four bordering states, including Eastern North Dakota, South Dakota, parts of Wisconsin and Iowa. The company operates out of a 165,000 square foot modern warehouse with over 600,000 cubic feet of freezer space in Alexandria, MN. It is now in its fourth generation of ownership, having moved from a one-man operation to over 175 employees.

No stranger to advanced technology, Henry's Foods has been utilizing voice picking in its warehouse for the past 12 years. Recently, in a move to improve picking accuracy while maintaining high levels of employee labor productivity, the company began replacing its voice picking system with a new multi-modal system. The new system is an event-driven, hands free picking solution, involving a wrist worn Motorola touchscreen computer, ring scanner, and mobile printer for real-time label printing. "The new solution comes from ProCat, a turnkey integrated solutions provider that utilizes touchscreen Wireless Multi-Modal (WMM) wrist units from Motorola Solutions. We're in the process of converting our entire picking workforce of 48 order selectors over to the new system. The conversion has been surprisingly simple," said Brian Eidsvold, 4th generation Owner and VP of Operations at Henry's Foods.

"We would like to enable task interleaving in the split case-picking module - to be able to dynamically float across picking, stocking, cycle-counting, etc."

~General Manager / Managing Director, large office supplies retailer

Old Process and Changes under New Turnkey Solution

The actual picking process was not changed significantly across the various pick areas, but what is different is the accuracy of the one-to-one case and item scanning and validation on the 10,000 products. Every item gets scanned and computer validated as it is picked. In the old "legacy voice process" all picking activities were confirmed via voice using check digits and were subject to mis-picks. The new wireless multi-modal (WMM) devices direct the worker to each pick location via the display screen and/or a voice prompt. Each pick is validated by scanning the item barcode. This process of one-to-one pick and scan verification has led to a much higher level of accuracy. "Our aging voice system always had an accuracy challenge. We learned about our new picking solution from a company that we share ideas with. After we saw the multi-modal device operating and understood the high accuracy that it produced we wanted it for our operation. We wanted to go to a turnkey solution that would maintain our labor productivity while reducing mis-picks and error rates. Scanning real-time is providing the one-to-one validation that we needed," said the VP in justifying the new system.

With 10,000 total items and over 60,000 individual picks a night, orders are picked in sequence across numerous picking zones. The company ships about 35 truck routes each day and a typical route has 12 to 15 stops or orders. For each stop there are a variety of zones and the process varies somewhat depending on the various pick areas.

In the freezer and cooler areas, items are picked to cart or tug based on truck route and stop. The new WMM picking system has a display that indicates the picking location for each item and the quantity of cases and "each picks" for each order. A belt worn printer produces real-time labels that are applied to individual cases as the order selector travels from one picking location to the next. Once a cart or tug is complete it moves outside the cooler to a staging area where items are moved onto pallets by route and stop sequence. These pallets are then moved directly to the correct truck and loaded by route and stop sequence.

In the dry areas of the warehouse, items are picked from rack locations and flow racks and placed into totes that ride conveyors to one of two merge points. The North side of the warehouse has seven zones and seven conveyors, each of which terminates at one merge point. As an order selector processes each order 1) they are directed by the display unit in route and stop sequence, 2) items are scanned to confirm each case or item picked, and 3) labels are printed for each carton or tote in real-time. “While the multi-modal devices are voice capable, our pickers have found the display screens to be easier to use and faster than the voice prompts. Our pickers choose not to use the system’s voice feature," says Eidsvold. Completed cartons and totes move on to the take away conveyor to the North merge point. Order selectors in the other zones pick any complementary product that the legacy warehouse management system has grouped together in route and stop sequence and the labeled cartons/totes are moved to the North merge point.

There are six additional zones with conveyors on the South side of the warehouse that terminate at the second order accumulation merge point. The worker at each merge (North and South) will have a merge sheet detailing how many bundles will come from which conveyor line and will read case labels to sort them. Grouped by route and stop, the products are then moved to the appropriate trailer through conveyors that expand into the truck where, in combination with the freezer product, they comprise the full order for each sequenced stop.

Real-time Order Processing and Workforce Tracking System

The new turnkey integrated picking solution provider supplies the multi-modal wrist units and the wireless label printers along with the servers and wireless infrastructure to communicate between the on floor activities and the legacy warehouse order management (WMS/OMS) and ERP systems.

At Henry's Foods, the legacy WMS/OMS system aggregates the orders from the independent stores and puts them into the 35 multi-stop truck routes. When all of the picking for a store order has been completed, a file with the relevant information including item, quantity picked, picker ID, and container ID is transferred from the new picking system server back to the legacy WMS/OMS system for invoicing. Because the multi-modal units and printers are bidirectional and fully interactive, as orders are completed and labels are applied real-time information about each order is maintained by the system. The application can send messages and alerts to individual devices or workers by zone and there are a wide number of dashboards and reporting capabilities including individual employee productivity metrics that are accessible. Having this information allows for real-time balancing of workers across zones throughout the day or during a given picking cycle. "The dynamic real-time information that we collect not only ensures that there is a one-to-one validation of each item picked, but also gives us detailed individual employee progress and productivity reports. Once we have fully converted our picking operations we intend to move to an incentive-based pay program facilitated by the system. Not only will picking be tied to a goal by zone, but individual actual worker productivity will be there in the future," said the VP in describing the future plans.

"Actual productivity gains alone will yield a complete payback within 1.5 years. However, it should be noted that the total event-driven functionality will yield a payback of less than a year. The workers have been very receptive to the change, and have embraced it in a fashion capable of the quick ramp-up we needed in advance of the 2010 holiday season. We also estimate that, operating under the old system, the additional seasonal volume would have incurred an additional cost of $400,000 during the holiday season alone."

~ VP Supply Chain, Large Retailer

Results and Benefits

The new picking solution has given the company the ability to improve picker productivity, make their workforce more flexible, and achieve near perfect picking accuracy along with the benefit of real-time reporting. Benefits and key takeaways from the new picking and labor management solution include:

- **Improved Hardware & Software Reliability** - eliminated the issues with software limitations and hardware device obsolescence. The proprietary legacy hardware was very expensive to replace or upgrade. The Motorola multi-modal wrist devices used in the new solution are standard equipment from the well-known manufacturer.

- **Continuous Quality Assurance Program** - the program increases picking accuracy to the 99% level or above by providing one-to-one scan verification of each and every pick.
- **Workforce Scheduling and Reporting** - the new process' real-time bidirectional tracking of employee progress and productivity is useful for balancing workers across zones and functions.
- **Expansion Plans - Individual Incentive Pay Program** - the planned incentive pay program has received preliminary buy-in from tenured and new employees and will be an ongoing key factor driving productivity.
- **Financial Benefits and ROI** - the new turnkey system eliminates mis-ships and quality issues and has increased picker productivity. 100% ROI is expected in less than 12 months.

"We are pleased with the results of our transformation to the turnkey picking and labor management solution at our facility. Without a close partnership between our management team, our employees, and our solutions provider, our goal to improve picking accuracy could not have taken place. We are now base-lining labor to new productivity levels, to support the implementation of an individual incentive program. Employee reaction has been good and benefits to date have inspired a win-win attitude of continuous improvement in our operations," summarized the VP.

Douglas Companies Gets it Right – Closes the Loop on its Store Order-to-Delivery Process through Mobile Event and Labor Management System

Douglas Companies Inc., one of the most successful convenience products distribution businesses in the mid-south region of the US, opened its doors for business in Arkansas thirty-nine years ago on July 30, 1973. Since its inception the company has grown from four employees to well over 100, serving convenience stores throughout Arkansas and the surrounding states.

In 2005, Douglas Companies completed a large expansion to its Conway facility where they consolidated their entire distribution operation, which handles around 7,300 products from freezer items to cigarettes, closing two other DCs in the process. This has proven to be an excellent decision by the company. The move has enabled Douglas to sharpen operations and become highly efficient and accurate in all phases of their business.

Steve Douglas, President of Douglas Companies Inc., has been at the helm of the company since early 2000. Steve and his sister, Susie, own the growing family business. The company's primary customers are convenience stores. Between 650 and 700 stores are serviced from the distribution center each week. As an owner Mr. Douglas is very hands-on concerning warehouse and transportation operations and is also very involved with the technology and systems that are used. Picking, which is done at night, is grouped into approximately 40 delivery routes containing 12 to 20 stops/stores per trailer. Each morning the trailers depart for their deliveries.

Receiving of inbound freight along with the associated replenishment functions are carried out during the day.

The Move from Paper-based to Interactive Event-driven Warehousing and Store Delivery

"Around 2 to 3 years ago we converted over to a turnkey interactive picking solution in an effort to move off of batch and paper-based processing. We had heard positive things about ProCat and their modules for turnkey integration in picking, loading, delivering and cigarette processing functions," said Steve Douglas, Company President. "When we first considered moving away from our paper-based system to the one-for-one scan verification, we believed it would be slower, but were quickly proven wrong. What we thought would be a one to two month conversion process went very smoothly for us -- we were completely up and running with the new system within one and a half weeks. Mis-picks and accuracy issues are now a thing of the past for us. We have been extremely pleased with the new solution," the President went on to say.

While no distribution center is exactly the same and the layouts are different, the new process at Douglas Companies, utilizing the new wireless multi-modal (WMM) wrist units, is almost identical to the process that we discussed in the Henry's Foods case study. In this case, however, the modules that have been deployed cover not just picking and cigarette stamping, but also include truck loading and store delivery – where the WMM units insure trucks are loaded accurately and packages are delivered to the correct stores.

In the picking areas, items are picked and scanned in case and "each quantities" as directed on the multi-modal device display and real-time labels are printed and applied to completed totes and cases. Freezer and cooler picks are typically done to pallets. The system's real-time scanning incorporates "catch weight" validation. "Catch weight" validation allows for the scanning or entry of weight in pounds and/or ounces for items that are sold by the pound. A warning is displayed on the screen if the recorded weight for the item, say a turkey, is not within a predetermined expected range. In the old system these catch weights had to be written on paper and keyed into the system after the fact, rather than interactively and in real-time. The WMM units verify everything that is picked and update the system in real-time. A chime tone sounds as each pick is confirmed as accurate and a buzzer tone sounds when an unexpected barcode is scanned. The buzzer indicates either a mis-pick or overage has been picked. Each completed tote and case is given a unique container ID that is printed on the package label along with the route, stop, item description, and delivery information. Repack container labels also include the number of items inside the tote to facilitate the check-in process at retail. As a result of the new picking solution, accuracy is now over 99.9%

Similar to the case study for Henry's Foods, items are picked in zones in route and stop sequence and accumulate at merge points. At the merge

point, they are sorted into stop sequence and conveyed to the shipping trailer. Freezer items are placed in stop sequence on pallets before being sent to the shipping trailer. The company has made an added investment in a separate module from the solutions provider to support the truck loading process. The added module for truck loading relies on the unique label ID from the picking process. Truck loaders use the same multi-modal wrist devices to scan and verify packages as they are being loaded on to the trailers. This insures that each labeled container is in the right stop location when loaded and that all orders are complete. To complete the order picking to store delivery process, Douglas uses a delivery module from the provider that allows packages to be scanned at the point of delivery by the driver. This one-to-one verification of each item as it is picked into the container, one-to-one verification of each container as it is loaded onto the truck, and one-to-one verification of each container at the point of delivery insures accuracy throughout the entire order-to-delivery cycle and has allowed the company to eliminate four full time quality control staff.

"Today's generation of college students makes up a huge component of our workforce and we found them to be very adept at the new system. The college students who are familiar with cell phones and texting were able to be fully trained on the new system in as little as two hours. Our older workforce was slower, but working with college kids inspired them, and we accomplished the training in 1.5 weeks with good overall acceptance. Everybody agreed that the new system was much better than the old paper-based system. We have seen an increase in labor efficiency of more than 20% since we rolled out incentive based pay under the system," said the President.

Quick turnaround for customers is key. Precision in picking, kitting, and shipping is paramount so that every opportunity is a great experience for our customers.

~ Logistics / Supply Chain consultant, Metals and metal products manufacturer

The interactive capabilities of the integrated solution are very apparent in the cigarette tax stamping operation. In this module from the provider, in-line scanners are connected to the company's two cigarette tax stamping machines. This module provides one-to-one verification that cigarette cartons have been picked accurately before tax stamps are applied to the packs. The application also insures that stamps for the proper taxing authority or state are being applied to the packs. By scanning the barcodes on the bottom of the cartons, the solution validates that there is a one-to-one agreement between the cartons that are being stamped and what has been requested on the customer order. The software confirms that the total number of cartons being stamped for the order matches the total number of cartons that has been ordered by each particular store. The complexities of this system are amplified due to the fact that there are two different stamping heads on each machine which can have stamps from different taxing authorities. There is a tight synchronization between the application of tax stamps and the reporting of those stamps once they exit the stamping heads. This information allows a full audit trail to confirm that there is a one-to-one carton quality check that matches what is being stamped to each store order. All of this requires tight in-process synchronization between the specific stamps that are on the machine and ensures that the correct cigarettes are in place through each step in the process. Once again the turnkey system is interactive, dynamic, and real-

time; the in-line scanners and display screen immediately alert the operator if there is an inconsistency between the specific brand and/or quantity of cigarettes ordered as opposed to what has been scanned and is about to be stamped. This bidirectional validation and real-time monitoring of the cigarette stamping operation increases both the efficiency and accuracy of order fulfillment. The reporting required for the stamping agent as well as the taxing authority is robust and comprehensive.

Results and Benefits

All of these benefits have given the company the ability to improve labor productivity, balance their workforce dynamically, and optimize pick accuracy and efficiency in real-time. Benefits and key takeaways from the turnkey event management system and labor management solution include:

- **1.5 Week Deployment and Training** – the improved hardware and software solution was turnkey allowing college and older works alike to be fully functional in all areas within 1.5 weeks instead of the planned 2 month ramp-up.
- **Closed-Loop Accuracy of Pick, Load, Deliver above 99%** – one-to-one validation of picks of each item to container and each container to the right truck with repeat real-time validation during unload at the store has improved customer service and order accuracy to above 99.9% .
- **Electronic Reporting and Individual Labor Productivity** – the real-time data has enabled monitoring of individual employee productivity along with work area completion analytics. This was not possible on the old paper-based system.
- **Real-time Tracking and Dynamic Event Management** – the alerting of mis-picks, wrong item or carton, catch weight tolerance warnings, and mis-loaded product was not possible on the paper-based system, but is now interactive, real-time, and voice-capable.
- **20% Productivity Gains under Incentive Program** – "We instituted an incentive based pay program with target productivity levels tracked and monitored by the system. The engineers that set our standards documented a 20% productivity improvement under the new incentive based track and pay plan," said the President.
- **Expansion to Cigarettes and Store Delivery Functions** – the positive gains in accuracy and productivity in the picking areas have led to additional investments in supplemental turnkey modules and multi-modal devices for (1) the tax stamp application in cigarettes, (2) truck loading verification and (3) a package delivery validation system for the store delivery teams.

"Our number one goal is to execute for the customer and get the right product to the right place at the right time. Mistakes cost so much money and mis-picks and inaccuracies lead to customer service complaints, costs, and inefficiencies. We have realized gains of over 20% in labor productivity

Improvement Plans for Dynamic Event Processing companies, n=110

√ **100%** of Dynamic Event Processing users will be exploring **process or technology solutions** to become more Event Driven and Real-time in fulfillment

√ **78%** of respondents expect full payback on process or technology investments within 2 years

√ **26%** of respondents expect full payback on process or technology investments within 1 year or less

through the incentives based pay program that the system enables. We have also closed the loop on our 'store order-to-delivery accuracy' by investing additional dollars in the tax stamp application in cigarettes as well as the loading and delivery modules for our store delivery teams. In summary, the investment we've made in the turnkey systems and additional Motorola multi-modal wrist units has paid for itself time and time again, and our employees and customers are on-board and happy," concluded the President.

Key Takeaways and Recommendation

The complexities of today's warehouse operations are exemplified in the above case studies. As companies move toward more interactive event-driven processing, it is good to see that turnkey solutions and multi-modal technology is evolving to meet the needs of today's growing store-connected supply chain. But all companies, particularly those desiring to be leaders, need to ensure that their process and technology solutions are integrated and meet their mobile dynamic event driven processing needs. We recap the investment intensions of the Dynamic Event Processing Users in the section that follows.

Follow the Leaders - Future Investments to Increase 35% over 12 months

Current adoption percentages of technologies, which are referenced in the recent report (Table 3 from *Fulfillment Excellence and Dynamic Event Warehousing Come of Age*, January 2012) range from a low of 11% for robotics (newer technologies), to the 60% to 80% range for LMS / WMS, and the 80%+range for applications including barcodes and auto ID or Real-Time Event Processing.

Virtually all companies that are using Auto ID and scanning today (83% of the companies in our study) are considering upgrading to newer equipment, going multi-modal, or expanding into non-traditional technologies for their operations in the future. The same is true for WMS/LMS, which are extending into advanced interactive features like task interleaving, slotting, yard management, incentive based pay, and pay for performance. Refer to the case studies of the two convenience store operators, for example.

The big story is in enhancements or extensions of functionality to software and equipment that is already in use. More than 35% of The Dynamic Event Processing Users plan capital investments in these technologies in the next 12 months.

- They are becoming more mobile and interactive and are upgrading to newer equipment and expanding to non-traditional operations (see the case studies of the Douglas Companies bringing technology to store delivery teams, for example).
- The same is true for WMS/LMS, which are extending into advanced picking and replenishment methods like task interleaving, "catch

weight" alerting, and GTIN barcode scanning. In addition mobility solutions, which are both scan and voice capable, are moving to functions like replenishment, yard management, incentive based pay, and pay for performance.

- These companies that have made sizable investments in technology plan to further benefit from their investments by deploying untapped features in solutions they have implemented. This is expected to **result in an average 35% increase in usage of technology that is already in place in the next 12 months. 26% of these users expect full payback in the first year or sooner**.

Apply Diligence to the ROI Justifications

In general terms, regardless of company, periodic ROI assessment will be required. A clear expectation of the tangible financial benefits that the company should expect from any technology investment should be provided by the vendor or developed collaboratively with them and approved by the company. Technology investments that reduce warehousing labor costs, increase accuracy and improve on-time delivery year-over-year should create very favorable ROI calculations (see sidebar *Steps to Evaluate ROI Options*). Best-in-Class companies have been able to affect a 3% to 9% percentage point advantage in cost metrics, while sustaining the high 97% perfect order metric. Most of these companies have embraced mobile, real-time solutions and have prioritized multi-modal Dynamic Event-Driven Processing

The number of process flows required to fulfill an order increases dramatically as the complexity and volume of the distribution center increases. The ROI realized from controlling these processes can usually justify investing in more real-time, dynamic and flexible technologies such as depicted in this insight. These technologies continue to become more sophisticated and cost effective from an ROI perspective. Up to 26% of all respondents indicate that recently implemented technologies produce benefits allowing them to self-fund and fully recover the initial investment in one year. In our two case studies we saw that moving from paper to event-driven, mobile solutions yielded as low as a six-month return on investment.

Steps to Evaluate ROI options:

- √ Assess your true (actual throughput and customer) operating requirements and capacity and costs
- √ Determine the investment choices that best serve your needs and are consistent with your ROI hurdles.
- √ Examine specific costs/benefits and impacts of each option.
- √ Sequence recommendations toward options with the highest payback potential and lowest resource and capital investment first (Auto ID and LMS are good ones to start with).
- √ Begin implementation, streamline to new processes, and develop labor management and training plans to equip the workforce.

Summary

Implementing an integrated turnkey solution that utilizes new multi-modal technologies will allow companies to move from constrictive paper and label based processes to new levels of efficiency and agility in picking, replenishment, and other functions within the warehouse for a more store-connected supply chain.

For more information on this or other research topics, please visit www.aberdeen.com.

Telephone: 617 854 5200
Fax: 617 723 7897

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Related Research	
Fulfillment Excellence and Dynamic Event Warehousing Come of Age; January 2012	*Labor Management: Instill Accuracy, Efficiency, and Productivity in the Warehouse and Retail Store*; March 2010
Warehouse Management Excellence: Maximizing Resources and Efficiency; November 2010	*On-Time and Under Budget: Maximizing Profits with Efficient Warehouse Management*; December 2009
Robotics going Mainstream: Improve Warehouse Productivity and Safety;September 2010	*Warehouse Operations: Increase Responsiveness through Automation*; July 2009
International Transportation: Optimize Cost and Service in a Global Market; July 2010	*Five Key Steps to Optimizing Warehouse Management*; February 2009

Author: Bob Heaney, Senior Research Analyst, Supply Chain Management (bob.heaney@aberdeen.com)

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For additional information on ProCat:

ProCat

420 Commerce Lane, Suite 5

West Berlin, NJ 08091

Telephone 1: 856.767.8500

Telephone 2: 866.776.2285

www.procatms.com

info@procatms.com

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