

The Active Data Warehouse:

Where Agile Retailers Win by Capitalizing on Time

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Executive Summary

- > Using your data warehouse to become a more agile retailer means giving back time and focus to your people and moving the business from being reactive to being proactive.
- > By applying effort to innovation and differentiation rather than to routine execution, the agile retailer capitalizes on customer interactions.
- > Operational Intelligence enables all associates, from the store sales associate to the Merchandising VP, to work together with each role connected to others and as part of an evolving set of business processes that are at the heart of building an agile enterprise.

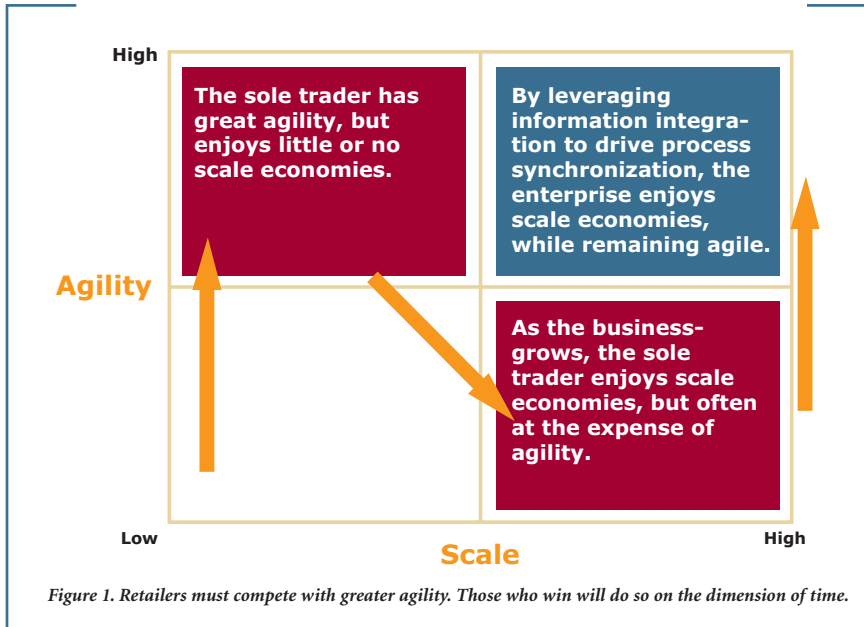
Winning the Wallet of the Option-Rich Consumer

Using integrated business information to grow revenue by driving more agile and intelligent retail operations

The proliferation of shopping alternatives across categories and channels and the prevalence of everyday low price strategies make it more difficult to retain loyal customers and to protect margins. Con-

sumers have many shopping options and can trade off price, features, convenience, and increasingly – time. Disaggregation in retailing has moved from theory to fact, and retailers now compete not only with each other, but with the many ways in which discretionary dollars can be coaxed from the consumer's wallet. Every customer interaction is an opportunity to sell and must be both a success and a learning experience for the retailer.

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Successful retailers orchestrate complex businesses in hundreds of locations, with thousands of products and ever-expanding customer bases in multiple channels. The right product, right place, right price, right time model is no longer sufficient to ensure survival in today’s retail marketplace. In contrast to this reactive model, successful retailers are increasingly those who, relative to their competitors, can deploy **predictive** forecasting. This enables them to outthink, outmarket, outsell, and, ultimately, outsmart their competitors. The retail mantra of newness sells is no longer enough. Sensitively identifying and cost-effectively responding to more accurate customer segments and individual customer preferences will build sustainable differentiation based on customer relevance, not just best price.

A simulation exercise conducted by consulting firm Marakon Associates demonstrated that a company that accelerates its decision-

making pace by 50% would double the company’s value in just five years.

Agility Versus Capacity

The natural cycle of managing retail inventories has typically been daily or even weekly. Retailers planned to be in stock on those items they expected to sell and replenished based on what they sold. Scale meant that large multi-outlet retailers leveraged economies of scale to buy at relatively lower prices, while amortizing costly infrastructure investments efficiently across a network of stores.

Smaller, but more agile retailers have successfully competed when they targeted niche areas with the aim of addressing the unserved needs of consumers based on customer intimacy rather than scale efficiency. However, smarter retailers,

Dimensions	Traditional Alerting	Actionable Alerting
Timeliness	On time	Ahead of time
Depth of Data	Typically related just to the current problem, without contextual comparison	Current data integrated with past-comparables to provide the right content <i>and</i> the right context
Breadth of Data	Typically driven by a <i>specific</i> operational alert	Holistic alerting – looks at combinations of data across the enterprise
Thresholding	Typically predefined alert thresholds embedded as preset business rules	Role-based, dynamic business rules fully integrated with business processes and workflow
Actionability	Alerts are not tailored to the specific role	Alerts are orchestrated around one or more roles to support collective action
Scope of Decision	Tactical	Strategic <i>and</i> Tactical

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notably the very biggest ones, are increasingly learning how to enjoy the best of both worlds by progressively adjusting their technology investments to understand and respond to customer needs with ever-increasing agility.

Winning in Near Time

Speed and agility are not just about reacting to issues as they occur. More importantly, it's about predicting issues before they occur and preempting action wherever possible. The best approach is to prevent problems in the first place by anticipating and avoiding them.

Imagine gaining back the time your organization invests in responding to problems and focusing that time on the customer. Imagine preempting those problems. What's that worth in terms of customer retention, sales, and margin? Winning with time is about never failing to satisfy each and every customer on the dimensions of product, value, and service. It's about creating an environment where their loyalty is strengthened every time they shop with you.

The Intelligent Retail Enterprise

Retailers have made huge investments in technology over the past two decades. These investments usually fall into two categories, operational systems and business intelligence. Operational systems have improved the accuracy, speed, and expense structure of routine operations while

Christmas Future ...???

It's Tuesday, the 22nd of December, at 1 p.m., in the Dallas office of Tim Burton, replenishment expediter for Foodways stores. Tim is carefully monitoring the sale of 14-pound turkeys today. Sales, which are visible to Tim by item, by store, by customer basket, within five minutes of each sale, are performing as expected on frozen turkeys, but sales of fresh turkeys are higher than expected in the Chicago area.

An alert appears on Tim's desktop to tell him that not only are turkey sales in North Chicago significantly above plan, but that a higher proportion of basket sales with fresh turkeys is also highly linked to the sales of Christmas trees in two stores where a coupon has been offered with turkeys to promote tree sales. Tim is very aware that, while fresh turkeys are a high margin item before Christmas, they are almost worthless post-Christmas ... who wants a turkey the day after Christmas?

Tim decides to take action. He first runs a query to determine whether there are nearby stores where fresh turkeys are selling below plan, whether a nearby distribution center has turkeys on hand, and whether upcoming deliveries to the affected stores can be intercepted and adjusted – right now.

Tim also runs a query to determine whether to switch the promo for trees from fresh to frozen turkeys for North Chicago stores only, and what the expected volume increase would be on both frozen turkeys and Christmas trees.

The availability of Christmas trees in the affected stores is taken into account as an additional constraint in determining the optimal promo price, and an additional discount for targeted customers through e-mail and cell phone text messaging is factored in. The promotion is generated, the new price and offer is transmitted to the selected stores, and targeted offers are e-mailed to selected customers, price labels and/or electronic price changes are transmitted to the stores within 30 minutes of the decision.

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providing the ability to scale. Business intelligence has provided associates with the means to analyze performance, recognize trends, and has enhanced their ability to make decisions as they plan and execute.

Today, we see the emergence of Operational Intelligence. The goal is to empower existing business processes and then, from that, determine the information infrastructures that would enable more effective business process changes to follow. This is a more pragmatic approach that interjects greater intelligence into the existing processes, allowing these to evolve in response to greater empowerment of front-line associates. It's institutionalizing the collective intelligence within your enterprise and pervasively integrating it into your daily operations. There are four key attributes of operational intelligence that we can discuss:

Information Recency

Leveraging information from recent operational feeds ensures that front-line decisions are based on relatively fresh information, and thus provide the greatest relevance to the customer and to the company. However, this does not mean that data are always loaded in near real time, it means using data whose recency is proportional to their usefulness. The most useful time may be one minute ago or one hour ago. It all depends on the business context and on how much of the value is delivered in that one hour versus one minute.

Information Integration

Information from the data warehouse and other sources, such as operational systems, may need to be brought together at any given moment to make the best possible decision. New service-oriented architectures make it easier to combine new operational data and historic data to create a composite view that really drives operational effectiveness.

Information Availability

Ensuring the necessary information required supporting a transaction or a decision is available whenever needed at the point of decision. This information content may not necessarily be the most recent, but the key is that it should be available on demand, anytime, anyplace, to support business operations.

Operational Alerting

This uses the power of technology to proactively drive business processes by actively alerting associates or customers about issues that need early or immediate attention, based on reaching specified threshold conditions. It is when this work is done within the data warehouse itself that the optimal efficiencies and responsiveness are achieved.

In reality, these capabilities play out in retail in two major areas:

- > **Reacting to customer's needs and/or generating sales opportunities while the customer is still engaged in a shopping expedition** where you have

the opportunity to infer that mission from the first such purchase and actively influence subsequent purchases before the shopping expedition ends. This could be at a series of sales points in a department store or at concessions in a superstore or hypermarket. It could be suggestions, coupons, discounts – whatever adds value for the customer and increases sales for the retailer.

- > **Reacting to unexpected variations in supply or demand** allows the opportunity to cost-effectively correct the problem before the next natural cycle of replenishment takes place. For example, an out-of-stock condition is detected in a store, and the manager is alerted to check if merchandise is in the store but not on-shelf, or has been placed on the wrong shelf, or is hidden behind other merchandise.

Imagine continually focusing your best merchandising, marketing, distribution, and store associate on every SKU in every store for every customer visit. Imagine treating every store, every SKU, and every customer as if they were your only one. As the intelligent retail enterprise is realized, this will be the new paradigm.

By monitoring business events, analyzing them in the context of historical performance, and responding with automated decisions, you'll be exploiting the perpetually presented, fleeting opportunities to

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satisfy customers, often without human intervention or error. By embedding intelligence in your operations, you'll be competing with agility, differentiating yourself from the competition, and winning with time throughout the retail value chain.

Customer Management

Nothing drives customer retention and comparative store sales like the quality of individualized attention that your customers receive when they visit your stores. Service provided to customers by your sales associates varies greatly based on an associate's respective experience and competencies.

Equally, with customers, the service received often varies dramatically based on their familiarity with your stores, their shopping frequency, and the extent to which they've developed individual relationships with your sales associates.

Applying the intelligent near-time retail enterprise to customer management is all about using detailed sales history in the context of near-time customer interactions to consistently provide extraordinary service. It's about optimizing customer dialogue. Properly executed, the intelligent retail enterprise will make every sales associate a star performer and every customer a VIP as they progress through

every facet of a relationship strengthening shopping experience. This is accomplished by providing customer-facing sales and service associates with tools that support tailored marketing to each customer based on understanding their historical preferences and interest in current items.

Once the customer swipes their customer loyalty card, the best sales associate for their needs is notified the customer is ready to be served. And your sales associates are prompted with selling suggestions based on previous purchases and current stock. Armed with this approach, retailers can:

- > Increase average transaction size for repeat customers by 10-15%.
- > Execute individually tailored promotions to specific customers while they're still shopping based on buying patterns, affinity purchases, and overall purpose of the store visit.
- > In unassisted shopping environments, your customer walks through your store and is notified, via wireless device, of individually customized promotions.
- > Customer-specific promotions are instantly made available for that customer at the cashier to ensure a speedy checkout.

Key Facts

- > Forty percent of the time that customers visit the grocery store, one or more of the items on their shopping list is not available on the shelf. Even more frustrating to retailers, 33% of the time that merchandise is not available on the shelf, it is sitting in the stock room where it cannot be sold.
- > A study of consumer behavior indicates that when faced with out-of-stock conditions, 16% of customers will buy a different size/type; 37% will buy a different brand; 9% won't buy any; 21% will buy their preferred brand elsewhere; 17% will return later.
- > By accelerating the frequency of sales/inventory/forecasting analysis to hourly and intelligently alerting store personnel and operational systems, applying near-time intelligence to demand chain management provides the agility required to dramatically reduce the incidence or impact of stock-outs.

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Demand Chain Management

With the intelligent, real-time retail enterprise, there is no need to lose sales anymore because you lack the agility to respond to trend merchandise sales or effective promotions.

- > Dramatically improve on-shelf availability by predicting stock outs and shelf gap conditions before they occur.
- > React to stock outs and shelf gaps as soon as they're projected or realized with replenishment alerts to the store or warehouse.
- > Ensure that the right substitute merchandise is placed on the shelf if a stock out cannot be avoided.
- > Reduce lost sales due to stock outs by 20-25%.
- > Respond to critical assortment replenishment.
- > Set requirements and update forecasted demand based on intraday sales.

Increased visibility to sales and dynamically reforecasted demand for new item introductions or fast moving products can give your supply chain a full day advantage in responding to unexpected demand and improve your in-stock position for these items by 30-40%.

Supply Chain Management

As retailers have implemented niche supply chain applications and adopted Just-in-Time (JIT) inventory management practices, the industry has come a long

Tomorrow's Book Buyer?

Mrs. Smith is in the mood for a good mystery, but doesn't have anything specific in mind. She comes into Books For You to browse. As she enters the store, she inserts her loyalty card into a kiosk, which accesses her details and recent purchases. If she is a high-value customer, the store manager may be alerted at that point to come to the sales floor to welcome Mrs. Smith to the store personally.

Mrs. Smith looks around the store, and then inquires as to whether there are any new books in the mystery book section. The associate may trigger an inquiry on the data warehouse and inform Mrs. Smith that there is a new book by one of her favorite authors (in fact, at a kiosk, Mrs. Smith could initiate this herself). The system may also know that she has previously purchased mystery novels that are based in England, and the associate may thus be prompted to draw Mrs. Smith's attention to an author she hasn't selected before, but who has written a new novel whose plot is centered in London.

At the checkout, Mrs. Smith may receive a special offer based on her purchases, with an offer for another book by the new author she selected.

way in improving supply chain flexibility and reducing inventory levels.

The intelligent retail enterprise will take these advances to another level by:

- > Maintaining a centralized repository of every supply chain transaction as it occurs in near real time.
- > Viewing all supply chain transactions in the context of dynamically updated demand signals and plans.
- > Immediately and intelligently reacting to conditions that suboptimize inventory position, logistics efficiency, or demand response by automatically initiating or revising supply chain transactions, such as POs, store transfers, or transportation methods/timing.
- > Alerting associates to address opportunities that cannot be resolved automatically, such as calling vendors or logistics providers.

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Less Analysis, More Action?

It's midday in The Yonkers, NYC, and the store manager has just finished producing sandwiches for the busy lunchtime snackers in a multi-department supermarket, part of a large national chain. Sandwich demand varies from day to day, month to month, season to season and may be affected by other factors, such as the weather, temperature, sports events, traffic conditions, or strikes. In addition, the products bought with the sandwiches may vary. On a hot day, it's water or sodas. On a cold day, coffee is favorite.

The store prepares the sandwiches in-house, daily, using a variety of ingredients – bread from the bread department, tomatoes, pickles, onions, mushrooms from produce, condiments, and coffee bags from other departments.

The challenge is to ensure all the ingredients are available in just the right proportions for the type of sandwiches being prepared, as well as ensure the affinity items, such as coffee and sodas, are also available. If one ingredient is missing, the whole sandwich line may be sunk. If too many sandwiches are made, with a shelf life of one day at best, then the level of waste may be significant – not to mention the cost of wasted labor.

Lunchtime in Yonkers is three hours ahead of LA. So if a pattern of changes in the volume and type of sandwich bought in Yonkers differs from what was expected, it's too late for Yonkers, but not too late to change the mix for LA. While some factors may be local, some are national, and the business has learned to see patterns of correlation between the sales mixes in similar stores, wherever they are located.

Now, it's midday in El Segundo, and based on selective basket analytics run on the lunchtime baskets on the East Coast, the manager of the El Segundo store has received a message alerting him to reduce sandwiches containing mushrooms today. Apparently, a news scare about poisoned mushrooms hit the wires around 10 a.m. in NYC, and more than 22% of sandwich shoppers asked to leave mushrooms out of their sandwiches. The projected impact on El Segundo adjusted the local sandwiches with mushrooms to around 12% less than originally forecast. The manager instructs the deli department accordingly.

Never miss a cross-docking opportunity. Your distribution network is actively updated with incoming shipment status and optimizes the outbound schedule based on transportation availability, critical store replenishment requirements, and pending allocations. Leverage RFID

tagging data in your enterprise data warehouse to provide near-time visibility to the location of key items as they travel from receiving dock to checkout counter. Provide customers and merchants with near-time status on special order items. Don't ever lose merchandise in the stock room again. Provide SKU/Store level POS

data to your suppliers every few minutes. For Vendor Managed Inventory (VMI) products, suppliers can respond to variable demand as it unfolds throughout the enterprise. Enable your VMI partners to respond better to demand variations and keep shelves properly stocked.

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Store Operations Management

Applying technology to store operations has historically been constrained by the volume and granularity of data, as well as the level of connectivity the stores have had to centralized computing resources.

With the advent of affordable telecommunications, scalable data warehousing technology, and wireless devices, the intelligent near-time enterprise can now support store level operations.

Utilizing detailed history of store sales and inventory transactions as a baseline, the intelligent retail enterprise can analyze what is happening in its stores on a dynamic basis, and alert managers or personnel to perform actions when required. Alerts can direct personnel to perform actions, such as cycle counting, shelf substitutions, scheduling changes, shelf labeling, or fraud intervention.

- > Identify and take action on fraudulent activity before the customer or associate leaves the store by analyzing individual POS transactions as they occur.
- > Identify customers returning merchandise not purchased in the store. Detect situations where it appears that a customer and cashier may be in collusion. Reduce POS and customer fraud by as much as 50%.
- > Flex store staffing and skills based on the current day's selling trends and historical performance.

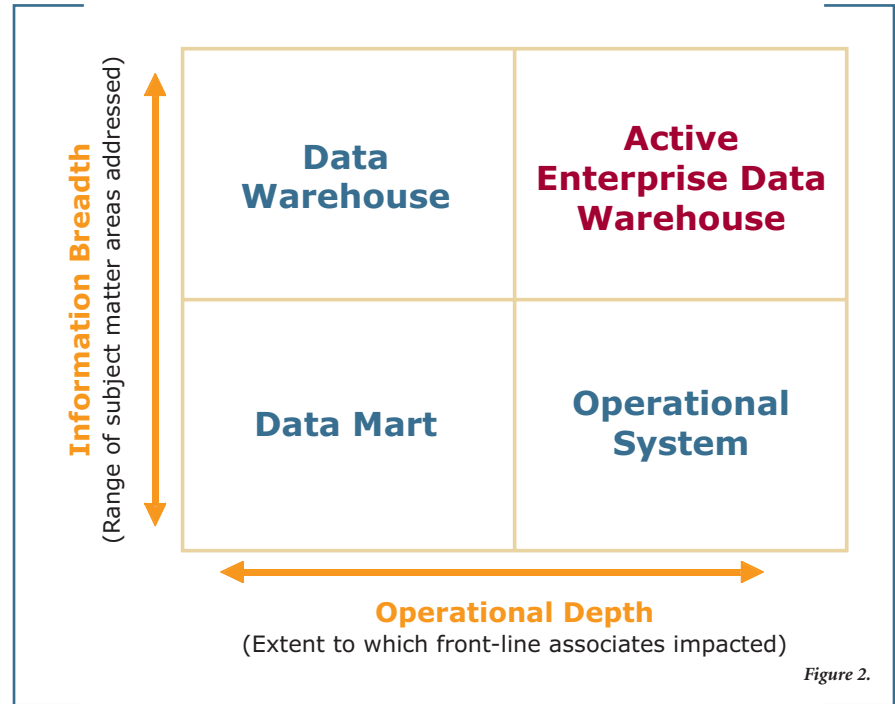


Figure 2.

- > Reforecast and schedule staff for the evening shift based on hourly sales patterns, historical sales, staffing, and promotional activity.
- > Complete your sales audit process just moments after your stores close every day.

Acceleration Versus Transformation

The intelligent near-real-time (or near-time) retail enterprise will present myriad opportunities to enhance profit through increased agility. Some of these

opportunities will emerge by accelerating the pace at which detailed information is analyzed and reacted to; taking processes that currently run on fixed schedules and executing them on a more dynamic basis. In most processes, however, there will come a tipping point, where speed to insight, coupled with rapid response, enables an entirely new way to operate. These transformational opportunities will have greater financial impact; however, both acceleration and transformation characterize the agility unleashed by the intelligent near-time retail enterprise.

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On-Shelf Availability: The Active Data Warehousing Tipping Point

Figure 3 illustrates how the process of optimizing on-shelf availability is transformed by applying intelligence on an hourly basis. Typical replenishment systems review sales and inventory on a daily or weekly basis, and generate replenishment orders to the distribution center once a reorder point is reached.

As systems capability evolves from weekly to daily replenishment reviews, the process is accelerated, but it's still the same process. As the activeness of data warehousing capabilities is accelerated to hourly, a tipping point is reached where the process can be driven differently by directing store stock room personnel to replenish shelves before they're empty. If there is no stock in the store, they'll be alerted to substitute the item that has been historically proven to generate the most substitution sales in that specific store. Agility and time will be on your side and will be reflected in revenues and customer satisfaction.

Tooling for Agility

An active data warehouse (ADW), which enables the intelligent near-time retail enterprise, is an extension of the enter-

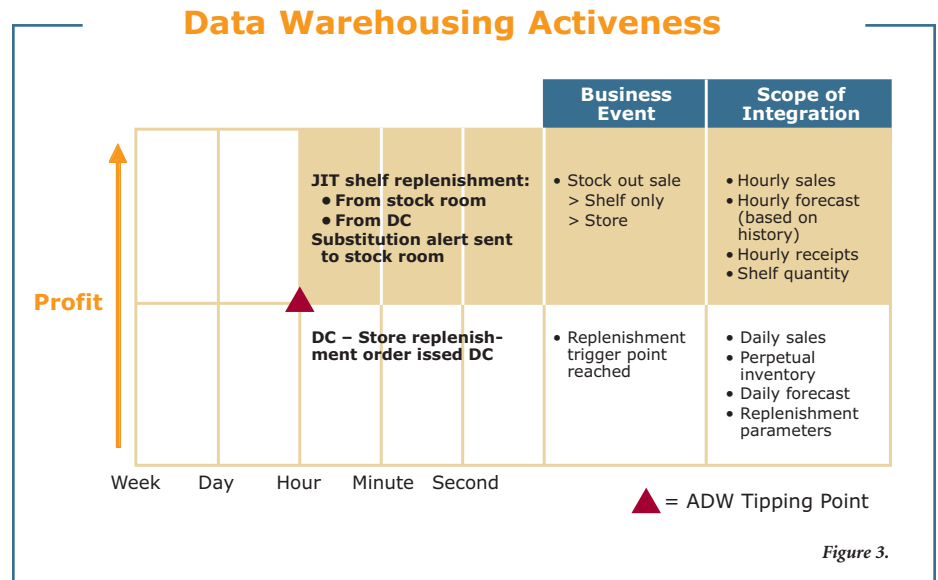


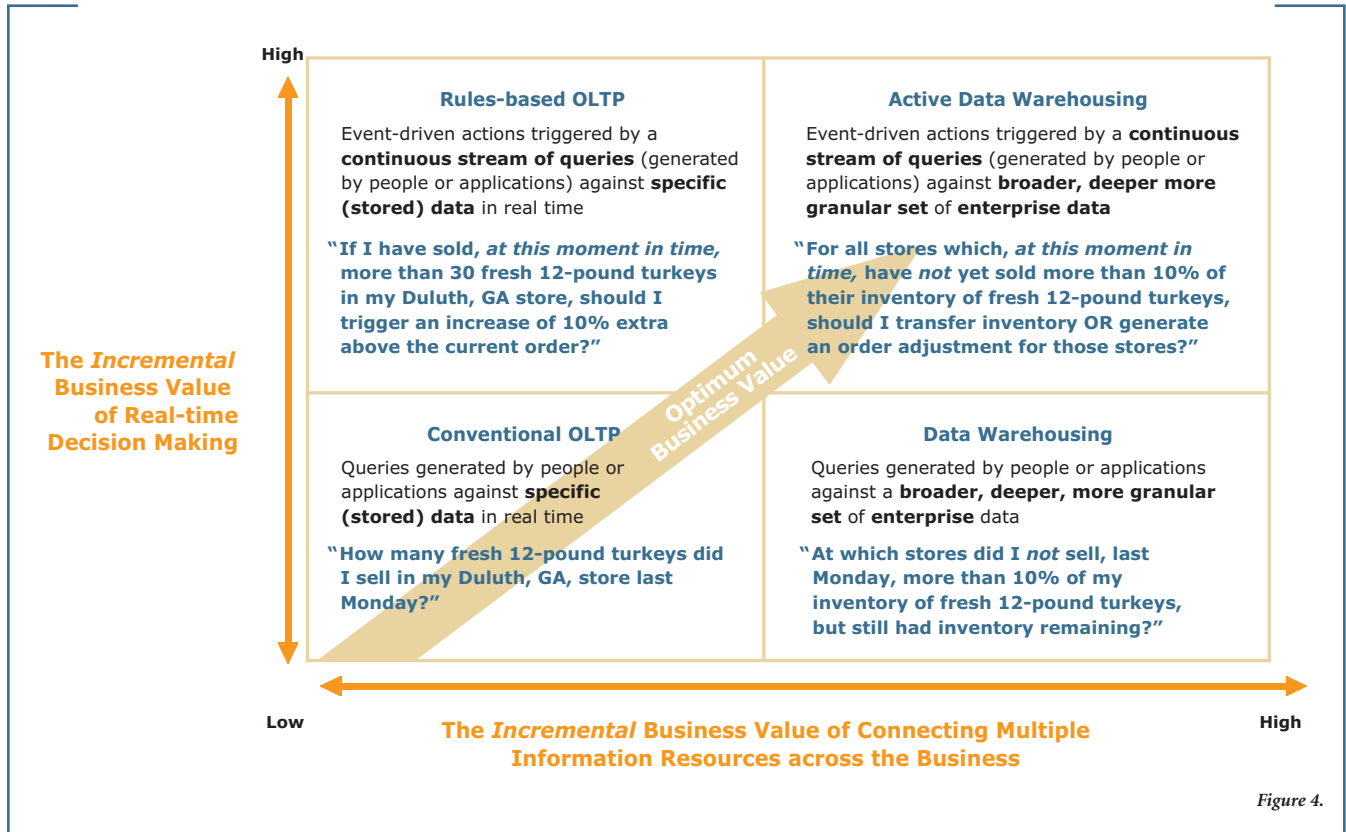
Figure 3.

prise data warehousing capabilities which many leading retailers have already achieved. Detailed transaction history is the foundation of an ADW architecture. The analytical capabilities offered by this infrastructure are further leveraged by responding to near-time business events as they occur, completing complex analyses upon demand, and alerting people or systems to take action. What makes this different from the traditional use of data warehousing technology for business intelligence is that an ADW is a closed loop system. Events are analyzed as they occur, and intelligent decisions are promptly initiated. Closed loop systems allow an organization to automatically

respond to opportunities with agility, often without the need for human intervention.

The ability to scale this technology and apply it in near time makes it the right choice for retailers looking to provide a single, integrated view of data sourced from merchandising, planning, forecasting, distribution/logistics, and point-of-sale systems. Now, with an ADW, data from these core systems can be loaded, accessed, and analyzed in near time, fostering agility by providing near-time alerting to personnel and continuously executing intelligent decisions throughout the retail enterprise.

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Implementing the near-time enterprise is not a big bang systems replacement project, and can be done gradually. As different areas of the business are incorporated in the ADW architecture, a retailer will attain critical mass in terms of the data that are captured and the analytics that are embedded. Once critical mass is attained, deploying additional capabilities can be achieved with moderate

incremental effort. Over time, tooling for the intelligent enterprise will have diminishing marginal cost and increasing marginal returns.

There will be a significant human element to this retooling. Business transformation efforts have created huge operational and organizational efficiencies by speeding and integrating processes. The next

wave of transformation will focus on eliminating the human involvement in routine decision making. The key will be to automate where possible and greatly empower associates where automation is not sufficient. Both automation and empowerment will create significant labor economies and present major restructuring opportunities.

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Conclusion

The intelligent near-time retail enterprise leverages active data warehouse technology to drive greater agility and dramatically improve the ROI for investments already made in business intelligence. With an ADW, retailers can remove the disconnects and improve communication among merchants, vendors, customers, and associates throughout the day, enabling them to cohesively respond to the business events that drive increased profitability in near real time.

Gathering and integrating the collective experience of your organization enables a more timely and consistent response to new and untapped revenue opportunities – while they're still opportunities – and before your competition does it first. This is true operational intelligence.

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