

## White Paper



### A re-look at inventory classification for superior e-shopping experience

A Strategic Perspective of what needs to be visible at front-end for better performance

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#### Abstract

Slow e-commerce websites are becoming a major cause for concern, as e-commerce traffic continues to rise exponentially in the retail industry, world over. This paper addresses the scalability challenge using a differentiated inventory visibility strategy. This would eliminate the need to maintain inventory positions for all the items sold in the website resulting in quantum improvements in performance and a much improved website shopping experience for the end customer.

## Background

Forrester report<sup>1</sup> forecasting on US e-commerce shopping patterns estimates a current level online retail sales (FY2007) of \$175bn in the US with a 5-year growth projection to \$335bn (FY2012). Business-to-consumer (B2C) e-commerce continues its double-digit year-on-year growth because of shifting sales patterns from conventional avenues like stores to online channels. This is even more pronounced since online shoppers have been found to be less sensitive to real or perceived adverse economic conditions than the median US consumer in terms of volatility of spending vis-à-vis economic climate.

However this growth comes at a cost. There are already widespread worries around increasing customer dissatisfaction from slow online shopping websites. The reasons span the entire fulfillment cycle. The result? High shopping cart abandonment which mostly translates to store abandonment as well.

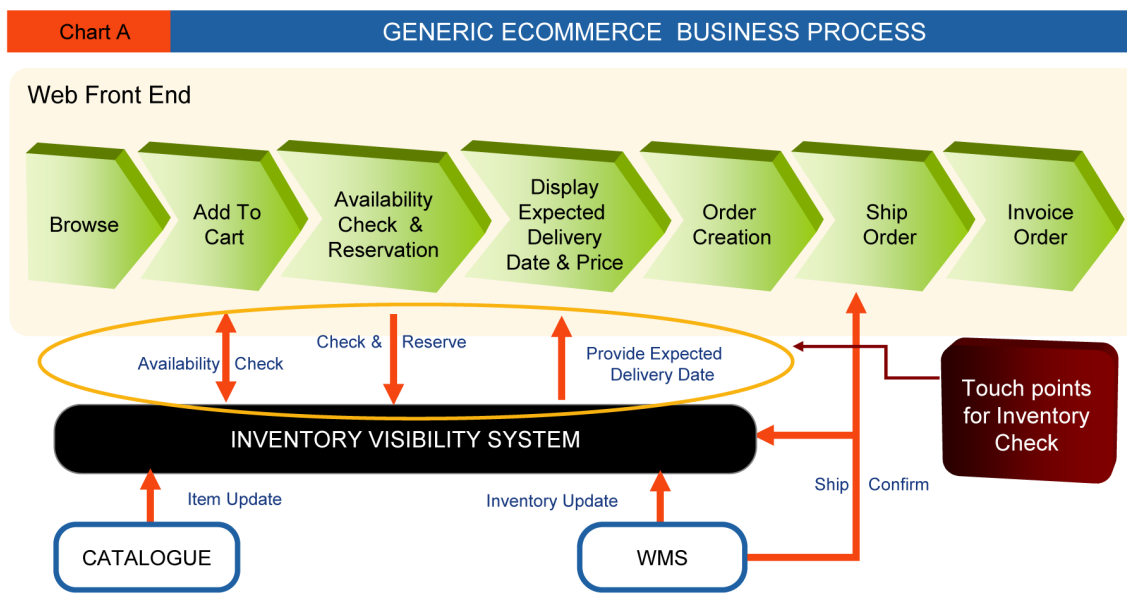
A study by Global Millennia Marketing<sup>2</sup> shows that long checkout process as one of the top reasons for shopping cart abandonment with 44% of users citing this. With inventory check emerging as the key bottleneck within the fulfillment process, retailers have been forced to re-think their inventory availability strategies to achieve faster web browsing without compromising on assured on-time deliveries. Their problems have been compounded by the fact that the sum total of product variants offered by these websites translates to over a million SKUs whose fulfillment complexities need to be managed at the back-end.

Until now, online retailing businesses had metrics built around the primary focus area of on-time delivery. In fulfillment terms, this resulted in one of two sub-optimal scenarios, the upload of the entire inventory picture into the e-commerce front-end or the shopper making synchronous inventory checks from the browser for each item in the cart. The trade-off with this design approach has been an exponential increase in the load on websites and the resultant shopper frustrations with longer and unreliable order taking cycles. Reliability or Performance? This has become a “*catch 22*” situation for retailers.

This paper takes a fresh look at optimizing these two constraint variables (fulfillment accuracy vs shopping cart performance) by adopting a differentiated strategy for inventory visibility. We feel that our approach built around the principles of ABC classification of inventory and redesign of Available-to-Promise (ATP) rules and inventory refresh frequencies would lead to quicker response time at the web front end and significant decline in abandonment cases.

## Traditional E-Commerce Ordering Process Flow

Chart A demonstrates the generic life cycle of an e-commerce order.



Within the order life cycle, inventory is checked at two points, first when the shopper makes an item choice (“Add to Cart”) and later during item confirmation (“Availability Check and Reservation”). Consequently, these two workflow steps end-up being the most time consuming processes for the online shopper.

In terms of inventory policies, websites currently use the following rule:

- Inventory is assumed to be 'Available-to-Promise' if present in any of the warehouses (All Distribution Centers (DCs) – Regular or Drop Ship). This check happens during the “Add to Cart” phase.
- Inventory can be reserved against the order only when available at the warehouse from where it can be shipped.

In this approach, all orders/order lines have to undergo mandatory inventory check at the back-end, forcing capture/update of inventory position for each and every item.

## Classification of Inventory: Which inventory needs visibility the most?

Traditionally the basic principle governing inventory management has been the ABC Analysis, which in turn is loosely based on Pareto's 80-20 rule.

ABC Analysis is used to classify inventory into A, B and C class items. Once classified, inventory management of these items would be governed based on the class it belongs to, with class 'A' items getting most of the attention and class 'C' items the least. Applying this principle to the above order processing flow, we would recommend that only those select critical items classified as class 'A' undergo the entire order promising process including multiple inventory checks. The rest of the item requests can then be promised via a shorter processing cycle without the need to have real-time inventory refresh.

The ABC Inventory Visibility classification system would thus group items according to parameters like sale frequency, item value or a similar relevant equivalent as per business rules of the online retailer. For instance,

- Class-A** High value goods/ make-to-order items with low demand like furniture, jewelry, custom-made consumer items and high-end electronic goods. None of these items can be substituted with an equivalent and hence this class of inventory requires both inventory check and reservation. Items where demand history does not exist (eg: new product introductions) or demand spurts occur due to promotional events would get classified in class-A inventory list.
- Class-B** Medium value, medium demand items like certain electronic equipments, cameras and apparel. Typically, these cannot be substituted as the customers would be brand sensitive in their choices. Inventory check needs to be done but reservation may be optional.
- Class-C** Low value items with stable demand pattern like milk. This category lends itself to substitution as it is not particularly brand sensitive. Inventory can be assumed to be infinite and hence does not need to be tightly controlled.

**Chart B** **INVENTORY CLASSIFICATION TEMPLATE**

Inventory Item Classification	Demand	Value	Inventory Level	Substitutable	Visibility Strategy
A	Low	High	Low/ Nil	No	Inventory Check with Reservation
B	Medium	Medium/High	Medium	No	Inventory Check Only
C	High	Low	High	Yes	No Inventory Check

For instance, an online apparel retailer may not have the demand pattern for the current season's range and hence would find it difficult to predict the demand. However, demand for older designs would be stable as well as predictable and hence, sufficient inventory can be maintained. Hence, business can choose to classify standard designs as Class-C items and the new designs as Class-A or B depending on the past experiences. Additionally, certain exclusive designs where inventory is limited can also be categorized as Class-A. Also, common items like socks and headbands can be assumed to have infinite availability.

Each class of items calls for a different strategy in terms of inventory visibility which is carried out at an item line level.

*Class-A* For all Class-A items, the front end (order entry application) would mandatorily availability to the customer. check the back-end inventory visibility system (order fulfillment solution) for each item before confirming an order inventory reservation would also be carried out to ensure

*Class-B* For Class-B items, a near real-time inventory availability snapshot would be made available at the front-end to enable immediate checks during checkout process via scheduled refreshes from the back-end system. If the available value at front-end for a particular item is lower than a set threshold, then a real-time system call is made to the inventory master for checking availability. These thresholds can be sub-category or item specific. Reservation would be optional.

*Class-C* items can be easily substituted; hence inventory picture need not be maintained either at the front end or at the inventory visibility system, thus deeming these items to be always available. Whenever service of an item is stopped, the catalogue master is updated directly. By foregoing inventory capture, a substantial reduction is achieved in the inventory synchronization load at the front end, given the fact Class-C items typically form the majority of items sold.

This classification system helps in building the balance between maintaining and synchronizing huge inventory picture and ensuring accurate inventory information.

A Key aspect here is the inventory classification itself and for this, we recommend using the analytics system typically used for parsing through web-traffic data at the front-end be used as the primary input. Periodic updates to the classification based on the trends from the analytics engine can be uploaded to the back-end fulfillment solution in real-time.

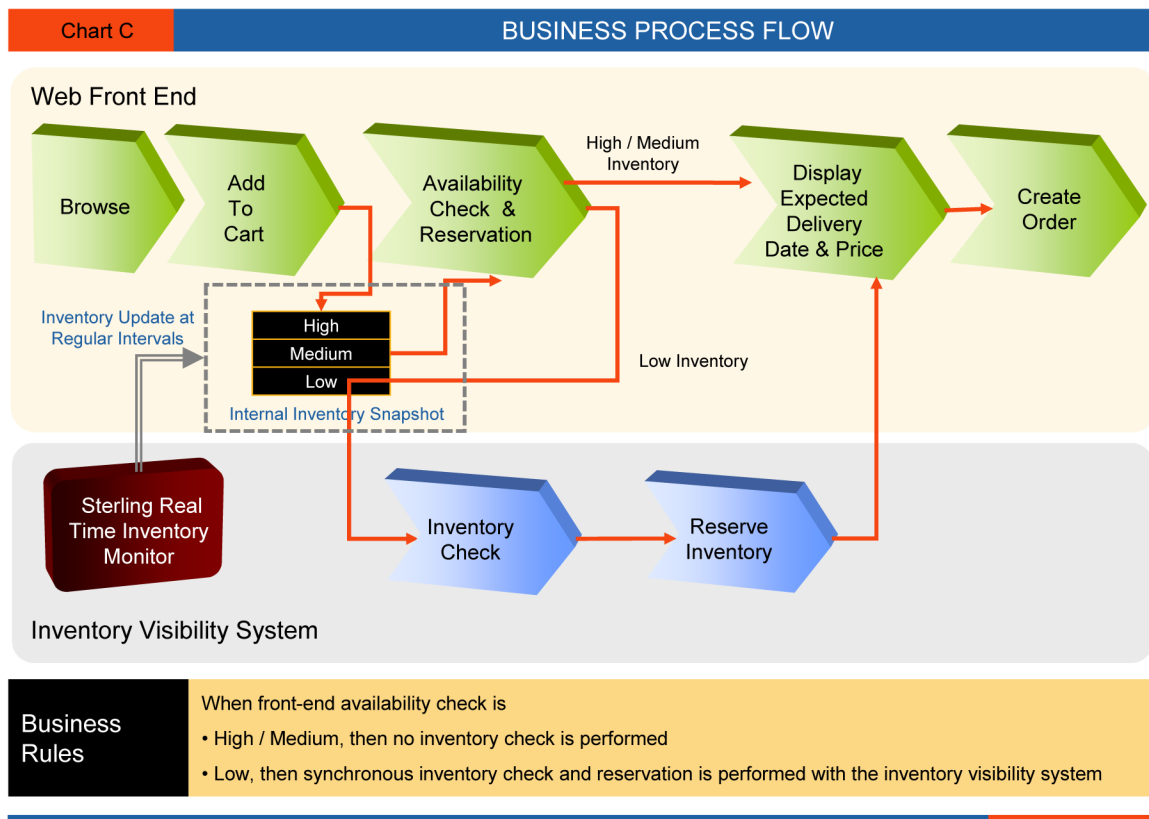
## Business Case

For an implementation at a US based online specialty retailer, Infosys integrated the customized web front-end with Sterling SCM Suite which was the order management system owning the inventory master record. The ABC inventory classification strategy has been adopted with respect to determining front-end inventory visibility.

With the product range of over a million SKUs serviced through their e-commerce site, an inventory check for all the items would have led to severe deterioration of site performance and availability. Factoring in this constraint, the following approach was taken to provide inventory visibility.

### *Inventory Visibility Strategy*

We deployed Sterling's Activity Based Real Time Availability Monitor which updates the inventory picture at the front-end at regular intervals based on the changes to supply and demand picture for each item. Different inventory thresholds (high, medium and low) were set up in the monitor such that whenever the inventory crosses any of these thresholds, the respective inventory status is published to the front end. .



For this implementation, the high and medium inventory levels were clubbed together (Class-B + Class-C) with neither inventory check nor reservation being carried out at the front end. If the inventory level equals low (Class-A), inventory check and reservation is performed prior to confirming the order. A different approach for “medium” inventory level items has not been adopted here as there were not a significant number of items falling in this category.

However, definition of inventory threshold limit became a major challenge as it can vary from one item to other. At present, Sterling Commerce SCM Suite 8.0, supports configuring common inventory thresholds for all items as part of the monitor rule setup. However, configuring individual monitoring rule for each item does not promise a good design. To a certain extent, the problem can be overcome by using finite set of monitor rules by grouping a set of items in the same threshold level (item group concept). However, an enhancement to the product for enabling the monitor to dynamically fetch the inventory thresholds for an item will provide flexibility for item based monitoring.

## Conclusion

With the amount of data growing by the day, any e-commerce system for online retailers will have to take a comprehensive approach to front-end inventory visibility by striking a balance between site performance and accurate fulfillment to realize a comprehensive user experience. With online retail store experience being a key focus area among various channels, we believe companies need to slice and dice inventory consumption patterns and feed these as an input to optimized solution design. In this context, we believe that our recommended way forward of ABC classification of items for inventory visibility and fulfillment would go a long way in balancing the twin challenges of fulfillment accuracy and online store system performance.

## About the Authors

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## Appendix

A traditional definition of “ABC Classification System”<sup>3</sup> is as follows

- “A class” inventory will typically contain items that account for 70% of total value
- “B class” inventory will have around 20% of total value
- “C class” inventory will account for the remaining 10%

Source: [www.wikipedia.org](http://www.wikipedia.org)

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