Removing Cost *from the* Supply Chain

by Ram Viswanathan

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Extended supply chains, Virtual Corporations, Extranets, Electronic Bonding, Electronic Commerce -novel ideas or buzzwords? A bit of both. There has been a lot of activity in the last year on these topics.

The idea of cooperation and effective communication between businesses that buy and sell products and services from one another is not a new one. EDI has been around for years. There may be differences of opinion as to the extent of its success compared to initial projections, but the concept of linking systems and processes between organizations has gained a strong foothold with EDI. The evolution of EDI has also been paralleled by advances in business process reengineering, as businesses started to realize the potential of eliminating redundant, non-value-added activities and introducing value- added processes. An example is ERS (Evaluated Receipt Settlement) to handle payments as opposed to the standard three-way matching of purchase orders with invoices and material receipts.

Background

Electronic Commerce (EC) has two main sets of followers- those that concern themselves primarily with business-to-consumer interactions and those that deal with business-to-business interactions. EC, within the context of the latter, is an evolution of EDI, in many respects. Many believe that business-to-business commerce is the Internet's "killer-app". As the constraints of EDI became clearer, the need for improvements in the sharing of information began to be felt. Simultaneous advances in technology and the explosion of the Internet as a major infrastructural enabler have provided significant momentum to the design of newer processes. Moreover, changes in the socio-political and legislative landscape (especially in the telecommunications and health care industries) have further accelerated these efforts. The following chart compares traditional EDI with emerging trends in Electronic Commerce.

Transformations are taking place along the following lines—newer processes, newer technologies, and newer organizational relationships. Standards and "de-facto standards" are beginning to appear. But the changes taking place are so rapid that often there is no time for even de-facto standards to emerge. There are a number of consortia and working groups that are attempting to define standards. To mention just a few, there are standards being developed for:

- Achieving greater collaboration between trading partners in a supply chain (Retail/Consumer Products industry);
- Electronic bonding between incumbent and competitive local exchange carriers

(Telecommunication industry); and

- Developing seamless links between health care providers, insurers, and hospitals (Health Care industry).

Discussing each such development at length is outside the scope of this article. Rather, the rest of this article looks at one of these applications—that of collaboration in the supply chain.

Traditional EDI vs Emerging EC Trends

Factor	*Current State*	*Evolutionary Trends*
Processing Systems	Batch	Real-time, Interactive
Trading Partnerships	Largely static	Dynamic
	Long establishment cycle	Quick establishment cycle
Standards	X.12, EDIFACT	Buried/layered with IETF (HTTP, S/MIME, FTP)
Mapping/Translation	Labor-intensive, Visible	Automated/Transparent
Architecture	Mainframe, Client/Server	Internet-based
Transport	VAN-based	Internet, Extranet-based
Integration	Loose	Tight
Interfaces	Complex	Simple, Open, Intuitive
Access	Custom applications	Ubiquitous

The Collaboration Opportunity

For years the retail industry has led the revolution in efficient ordering, supply and replenishment of products through initiatives such as Quick Response (QR) and Vendor Managed Inventory (VMI). The objectives of these efforts have been to streamline the supply chain and take costs out of the distribution and logistics operations. The primary technology used to accomplish these objectives has been EDI. Both by definition and practice, EDI is a 'data exchange' mechanism where one organization sends a packet of information over the wall to another organization and vice versa.

If the processes are tied closer together, 'end-to-end integration' from sourcing to manufacturing to distribution becomes possible (See **Figure 1**).

The Dynamics of Forecasting

There are several functions at different points of the supply chain that can potentially benefit from collaborative processes. Forecasting sales is one example. Currently, the replenishment forecasting involves the retailer predicting what the future sales are going to be for a specific product, based on previous sales, category strategy and events such as store openings/closings. On the manufacturer's side, forecasting is performed with a forecasting engine using an algorithm and input from a pre-determined set of parameters such as demographic studies, consumer behavior etc. and specific to an industry/product line. Events such as promotions, distribution center (DC) /plant rearrangements have cause significant deviations to projected sales. Even though point-of-sale (POS) information has begun to be shared with the manufacturer for the manufacturers to be able to better plan their production (and in certain instances perform VMI), for the most part, information, especially event-based such as promotional and seasonal planning, demographic studies and new product plans remains within strict organizational boundaries.

How often have we gone to our favorite store to look for an item for which we have a manufacturer advertised coupon, only to find that the product is not available at the store? Why? Perhaps because that the retailer did not have sufficient time to plan for the replenishment of stock. Studies have shown that lost sales to the retailer due to items being out of stock is three to four percent of total sales. The manufacturer takes a bigger hit—five to six percent of total sales as the consumer often buys a competitor's product. (Source–Retailer's Operating Data, Coca Cola Retail Council Independent Study, 1996). If information is more promptly exchanged between the retailer and the manufacturer:

- Retailer's out-of-stock situation improves and so does his revenue position;
- Manufacturer gets to move and sell his product and enhance his revenue position; and

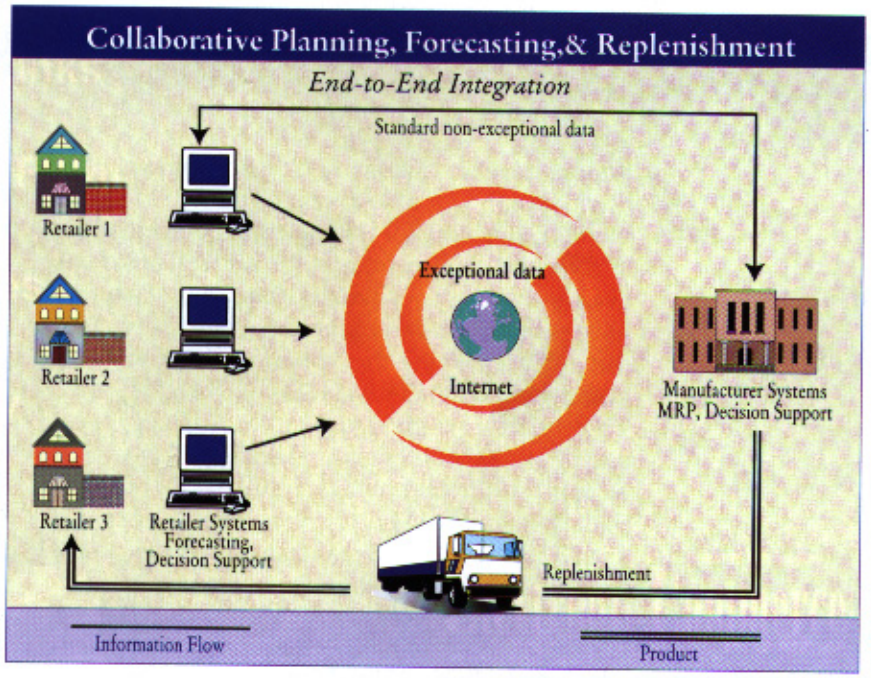

Figure 1

- Consumer gets the right product at the right time for the right price at the right place.

While out-of-stock situations cause lost sales, another dynamic that works in the reverse manner is that of manufacturers over-producing and carrying excess inventories to be prepared to meet sudden spikes in demand. If there is timely availability of critical information (often event-based), carrying such excess inventories can be avoided. A resulting reduction in the inventory all across the supply chain has the potential to save several billions of dollars.

Up-front joint planning, joint information sharing, and joint forecasting can drive efficient Material Requirement Planning (MRP) and manufacturing on the manufacturer side, and efficient replenishment on the retailer side.

Collaborative Planning, Forecasting and Replenishment—VICS Initiative

A manual trial, last year between Wal-Mart and Warner-Lambert involving Listerine showed that collaboration was able to reduce up to two weeks worth of inventory for Listerine. Encouraged by the successful experiment, and the above considerations in mind, major retailers and manufacturers have begun to define collaborative processes under the auspices of the the Voluntary Inter-Industry Committee of Standards (VICS).

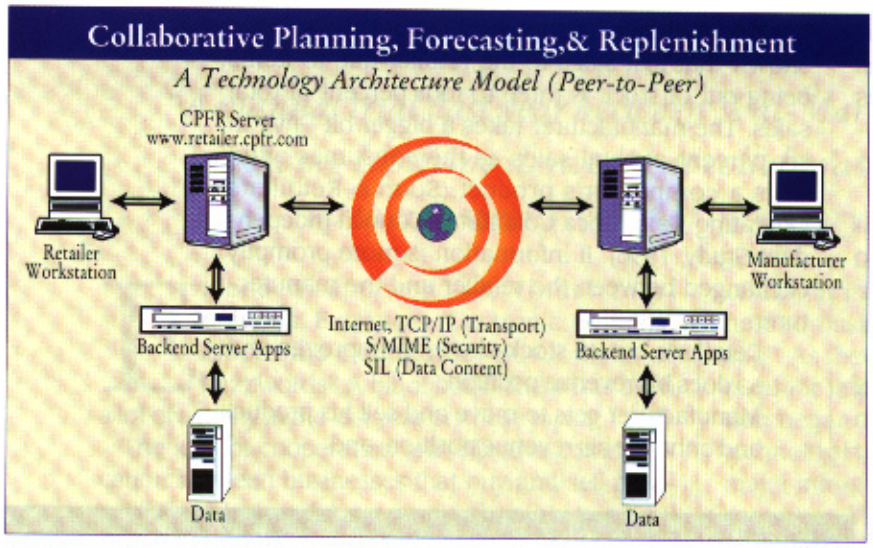

Figure 2

The mission of the Collaborative Planning, Forecasting and Replenishment committee within VICS, is to improve the partnership between retailers and manufacturers through co-managed processes and shared information. The Committee will define a set of frameworks for processes and technologies for collaboration.

Collaborative Planning, Forecasting, and Replenishment (CPFR) is a technologically-enabled process that allows integration of the demand and supply side processes through common procedures, measurements, and data models. As the name suggests, this will result in more effective business planning, demand forecasting, and replenishment of stock throughout the supply chain.

A Collaborative Forecasting Process Model

One possible model for the collaborative process for forecasting is shown in **Figure 2**. The process involves a normal, periodic exchange of forecasts and forecast related performance metrics, as well as the maintenance of item-level event calendars. Automated processes at both ends compare the forecast generated internally with the one received, and trigger any exceptions. Exceptions are identified based on predefined, relationship-specific, item-level business rules (i.e., forecast variance, low in-stock, low fill-rate, etc.). These exceptions reside on the same logical datastore whose definition is mutually defined (eventually based on a standard data model). Depending on the implementation, this may translate to the same physical database or two different ones. Exception identification also triggers additional data gathering by either the retailer or the manufacturer.

The actual collaboration begins when exceptions are identified. Either party can look at the exceptions and initiate the collaboration. The collaboration involves accessing the shared forecast data and event calendar through an Internet-enabled application. The key pieces of the technology infrastructure are a common data model, a communication standard, and a security mechanism. With a standard and published data model, different organizations can determine what type of a solution will best fit their needs. These solutions could either be custom-built or embedded within Enterprise Resource Planning (ERP) packages. As long as the solutions fit within a common set of frameworks, they would be able to interoperate.

Pilots

The CPFR Committee offers input to pilot projects under way through the joint efforts of the Committee's member organizations. One such pilot project was carried out between Wal-Mart Inc., Lucent Technologies and Sara Lee Knit Products, with the partnership and support of Ernst & Young LLP, SAP America and Sun Microsystems. As part of this pilot project, a base process was defined for sales forecast collaboration and a prototype application was built. The prototype application, invoked from a standard browser client, was built using Javascript, Netscape Enterprise Servicer 3.0

(on the server), and Livewire, that connected the application an Informix database. Other pilot projects are being considered that will demonstrate the process viability, technology viability and the business case for collaboration in specific areas and specific sectors of the retail/consumer goods industry—such as hard-lines, soft-goods, groceries, etc.

Technology

It is recognized that the technology the processes are based upon has to be open for ease of entry and adoption by a majority in the industry. Collaborative processes will be characterized by open architectures, secure communications, suitability for organizations across the industry, extensibility to multiple business operations, adaptability to existing environments, and inter-operability with different database and technology platforms.

A major technology enabler is data and language definition that will allow dynamic creation and exchange of messages. Whereas EDI provides for exchange of data based on predefined structures (the transaction sets), efficient collaboration requires an object-based approach that allows the definition of the content as part of the message. Standard Interchange Language (SIL) is an example that provides such flexibility. It can be viewed as a data dictionary (similar to the X.12 data dictionary), with SQL like procedural constructs available to prepare content definitions 'on-the-fly' that precede the content itself, in a message.

Other technology enablers are the transport and security protocols that will be used. Internet will be the predominant transport mechanism. Secure Multipurpose Interactive Mail Exchange (S/MIME) for e-mail based message transfers and Secure Hypertext Transfer Protocol (S/HTTP) for browser-based communication are possible security mechanisms.

Architecture

Three main architectural models are possible, namely- hub-and-spoke, peer-to-peer, and clearing house. The hub-and-spoke architecture will be suitable for relationships which involve the bigger of the trading partners, with a larger infrastructure acting as the storekeeper of the data, with its smaller trading partners agreeing to store data within the larger partner's domain. The peer-to-peer architecture will involve large trading partners maintaining data stores that provide trading partner specific views to each other. This type of an architecture will require synchronization schemes to ensure that the data is kept current and that the data integrity is maintained. The third model involves a trusted third party network acting as the storekeeper of the data, and managing access to its subscribers. All three models will co-exist.

Issues/Challenges

There are a number of issues that need to be and will be addressed, in time. It is important to remember that the scope of collaborative processes is not to define forecasting engines or replenishment engines, but the interfaces to these engines, across enterprises.

As in other applications, the software industry has identified the potential of collaboration and has started to develop software that addresses this need. While this is an encouraging development, most of the products currently are constrained by closed data models, and typically, a need to have the same software run at both ends of the link. Standards will help in the evolution and inter-operability of these products.

Other major challenges include agreement on common performance measures, agreement on the sharing of competitive information, legal and contractual obligations (for example: when dealing with the issue of a forecast automatically becoming an order commitment).

Summary

CPFR is quite similar to and complementary to the ECR initiative, especially when collaboration is viewed as a necessary enabler for ECR. Formalizing and standardizing the process and technology models for collaboration will accelerate the adoption and benefit-realization from ECR. Moreover, systematic collaboration can not only benefit inter-enterprise communication, it can also substantially enhance efficiency within an organization.

Please E-mail your comments to: **ecworld@ix.netcom.com** ECW

About the Author

Ram Viswanathan is a Manager in the management consulting practice of Ernst & Young LLP, St. Louis. He has more than 10 years of experience in the definition and implementation of EDI/Electronic Commerce strategies in several organizations–in manufacturing, distribution, telecommunications and the retail industries. Ram has an M.S. in Computer Science from University of Missouri, Rolla and a B.S. in Electrical Engineering from the University of Roorkee, India.