ARC White Paper

BY ARC ADVISORY GROUP

NOVEMBER 2001

Cross-Enterprise Trade: A Breakthrough Opportunity for Managing the Supply Chain

Supply Chain Process Management

This year we have had a number of examples of well-known companies suffering substantial financial setbacks because they either lacked real-time supply chain information or the ability to respond rapidly to changing supply chain circumstances. Perhaps the two best recent examples are Cisco and Nike. Cisco wrote $2.2 billion off its third quarter Statement of Operations as an "excess inventory charge." Nike, in a public spat with its lead Supply Chain Management supplier, said that its new system's inability to react to changing demand cost it about $100 million in third quarter sales.

Both of these companies have been leaders in the trend toward outsourcing substantial portions of their supply chain to contract manufacturers and third party logistics partners. Yet their recent stumbles highlight a critical need for information systems that can quickly connect an enterprise with its outsourced partners to create an efficient and streamlined commerce network. This need is not necessarily going to be met by the "usual suspects," planning solutions that are focused on activities within the "four walls" of the enterprise. Traditional planning vendors have been slow to deliver applications that can manage inventory and information across heterogeneous information systems in an extended supply chain.

Optum's TradeStream is an example of a new kind of solution that addresses these issues. This solution is called Supply Chain Process Management (SCPM).

Historically, companies have done a far better job managing their internal supply chains than their extended supply chains, with a focus on transactions rather than cross-enterprise business processes. Yet, in an age where Internet connectivity has the potential to revolutionize collaboration among trading partners, an internal focus will no longer do. To date, supply chain processes have been linear and static rather than dynamic and based on continuous improvement. Both information and material flow sequentially from point to point, with blind spots between enterprises that cause information latency. Managing an extended supply chain in "batch-time" is a sure road to extinction. All companies need more dynamic supply chain systems, ones that deliver real-time information to the point of decision. This need, however, is particularly acute for companies that have decided to focus on core competencies and have outsourced substantial portions of their value chain.

Optum's TradeStream is an example of a new kind of solution that addresses these issues. This solution is called Supply Chain Process Management (SCPM). SCPM presents radical new opportunities for managing supply

chains that simply were not practical even two years ago. Within the field of Supply Chain Management, we have been talking about concepts like visibility, velocity, and collaboration for several years. In reality, visibility has been limited, velocity has been far more focused on internal cycle times than on value chain performance, and collaboration has been shallow. SCPM provides a framework for real-time, extended value chain visibility and decision support that truly enables velocity.

SCPM solutions are real-time, decision support software applications that combine extended supply chain visibility, alerts, and alert resolution decision support. In the SCPM context, visibility refers to the ability to monitor supply chain metrics or events across a supply chain network, something extremely difficult to achieve because of the number of disparate systems that store relevant information. Many companies don't even have visibility within their own "four walls." For example, it's not uncommon to have multiple instances of ERP applications, and many can't even see across the functional silos within their organization. The challenge is far greater and more complex when considering multiple, heterogeneous organizations, each with their own unique blend of technology and business process.

The Perfect Order Metric is an order:
- Delivered on time
- Undamaged
- With the right Value Added Services
- In the proper quantities
- With no unauthorized substitutions
- That is billed correctly

As companies move toward dynamically matching supply to demand, their focus increasingly centers on the order fulfillment process. The focal point of Optum's TradeStream SCPM solution is the customer order. Customer orders initiate work orders, production orders, orders for raw materials, carrier requests, and financial settlement activities. With the Optum solution, these order fulfillment activities are tracked across a company's network of suppliers, internal resources (manufacturing plants, warehouses, field service operations), and service providers and correlated at every stage of the fulfillment process to the customer order. SCPM cuts across multiple business processes, such as logistics, manufacturing, and customer service, as well as across multiple business partners, such as suppliers, carriers, and customers.

TradeStream manages customer orders and all the associated internal and external transactions and processes. A purchase order from a customer can trigger a number of transactions in a company with an outsourced supply chain. At one company, ARC found that a purchase order initiates as many as eleven related messages and transactions. Purchase orders for the components not on hand, commitments from suppliers to deliver the components within a certain time frame, and Advanced Ship Notices are sent between the

manufacturer, the suppliers, and the lead logistics provider in a prearranged, choreographed information flow. If exceptions occur, such as a delayed shipment, that can set off another flurry of messages to resolve the problem.

σ (Sigma)	Defects Per Million	Success Rate
6	< 4	99.9997%
5	233	99.977%
4	6,210	99.379%
3	66,807	93.32%
2	308,537	69.2%
1	690,000	31%

A Statistical Definition of Six Sigma

ARC is excited about SCPM in general, and TradeStream in particular. One Optum client ARC has interviewed estimates that the combination of TradeStream, partner, and process changes will allow them to reduce inventory levels by $2 billion. At a conservative 5 percent carrying cost, this represents $100 million in savings. While it is true that TradeStream is not solely responsible for these savings, it is also true that such dramatic reductions could not occur without such a solution. One indication that these inventory reductions are occurring on schedule is that the company has been able to reduce the number of Distribution Centers by 80 percent.

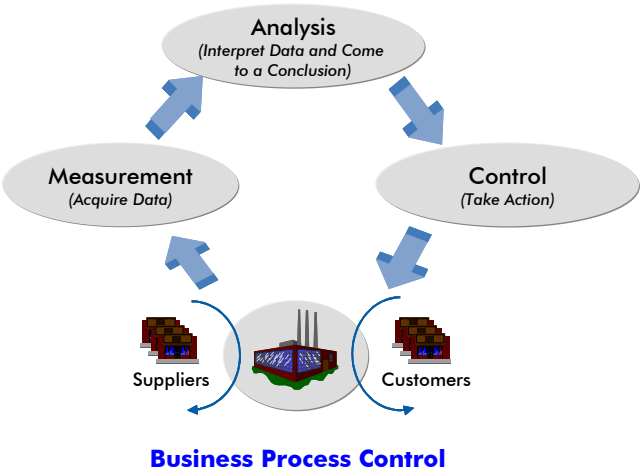
SCPM does two important things for companies. First, SCPM can help realize the tremendous potential of improved supply chain management. Efficient supply chains are **lean**; they carry little buffer inventory. Efficient supply chains are also **dynamic**; they react quickly to match supply and demand. The risk associated with lean and dynamic supply chains, however, is that unexpected disruptions can mean that promises to customers are not met. The power of SCPM is that it provides a tool to effectively manage exceptions and resolve challenges, while facilitating more advanced forms of extended supply chain collaboration. Secondly, SCPM will facilitate Six Sigma Fulfillment and Cross-Enterprise Trade. The next sections will describe these ideas in more detail.

Six Sigma Fulfillment

Six Sigma is a continuous improvement methodology with statistical underpinnings. It has been historically used within the realm of manufacturing to dramatically improve product quality while greatly reducing costs. Six Sigma has been a key weapon used to provide competitive advantage for companies like General Electric and Allied Signal. These companies have saved hundreds of millions of dollars (the cumulative total at certain compa-

nies may be in the billions) while simultaneously improving customer satisfaction.

While Six Sigma is usually seen as being focused on internal quality processes, its potential as a driver of competitive advantage is even greater when it is used to drive continuous improvement in extended supply chains. While it is true companies compete on quality, customers define quality more broadly than just product quality. From a customer's point of view, quality also is based on companies living up to their delivery and service commitments. As a result, Six Sigma Fulfillment is gaining increased attention from analyst groups and market-leading, Tier 1, companies.



Companies that have engaged in Six Sigma believe that they have gotten far more value from their efforts when the key metrics are defined from the customer's point of view. When applied to logistics and fulfillment, the best measurement is the perfect order metric. A perfect order is an order delivered on time and undamaged, with the proper value added services done correctly, in the quantities ordered with no unauthorized substitutions, that has been billed correctly.

Because fulfillment involves numerous, co-dependent steps, a company and its key trading partners can successfully perform each step with a success rate that tops 90 percent individually, and still find that total perfect order success rate is less than 60 percent. In dynamic supply chains, the constraint is not the weakest link in a supply chain; aggregate performance, cycle times, and ultimately service levels are cumulative. Customer service levels depend upon the quality and speed of each step in the process.

ARC believes that many companies operate at the miserable and grossly unsatisfactory level of 1 Sigma when it comes to the perfect order metric, with few companies operating at 3 Sigma or better on this key metric. Six Sigma is a discipline to identify and eliminate defects in operations. When applied to the order fulfillment process, the potential is enormous. Better service can open new revenue streams; fewer errors mean less waste and inefficiency; and better asset utilization can yield higher margins.

Cross-Enterprise Trade

The goal of Supply Chain Process Management is control of Cross-Enterprise Trade. Cross-Enterprise Trade involves coordinating and synchronizing supply chain and fulfillment activities across multiple partners within a value chain. Achieving this involves **Measuring, Analyzing**, and then taking **Control** – the same steps that have traditionally been used to manage internal business processes. Cross-Enterprise Trade now requires that this basic Six Sigma methodology be extended to include a company's key trading partners. The process begins by defining goals in a way that allows for **measurement**. **Analysis** consists of identifying the statistical measures surrounding the key metrics (and related sub-metrics) and determining the leading sources of deviation. Taking **control** means eliminating those sources of variation one by one. The measure-analyze-control triad helps managers understand their processes, where variability can exist, and the causes of those deviations.

The Measure-Analyze-Control methodology operates at the planning level to set goals: the parameters within which a process is expected to operate. At the execution level, another methodology is needed to insure that those goals are met. This methodology is another triad: **monitor**, **manage**, and **synchronize**. Enterprises must have the ability to **monitor** the flow of goods, in real-time, with either proactive alerts or the ability to view activities on an ongoing basis from a role-specific portal. With proactive visibility and role-specific decision support, a company can then effectively **manage** the order fulfillment process across partner organizations. Trading partners then coordinate activities to **synchronize** value chain performance and achieve Six Sigma Fulfillment. This combination of these two methodologies – one that allows high but attainable performance goals to be set, and another that helps insure these lofty goals are met on an ongoing basis – is at the heart of Cross-Enterprise Trade.

Trying to manage dynamic supply chains while also outsourcing key supply chain functions is a very difficult proposition. It cannot be done without a platform that allows for distributed command and control. The command and control must be distributed, because in different scenarios different managers at different companies in the supply chain become the commander. Distributed command and control is enabled by complex choreographed information workflows.

For example, certain extended supply chain activities like merge-in-transit, have been great in concept, but unworkable in practice. Advanced transportation optimization engines have determined that if a number of less-than-truckload (LTL) shipments could meet at a merge point within a few hours, be merged into a truckload, and then sent out for delivery, substantial amounts of money could be saved. It is far less expensive to ship truckload (TL) than less-than-truckload. These practices have not worked because the LTL shipments have too often not hit the merge point on time. Instead of saving money, companies have ended up spending extra money on expedited shipments. Now with SCPM, we have the tools available to discover the sources of variance in deliveries, correct them, and then save substantial sums of money by being able to engage in advanced Cross-Enterprise Trade.

Bilateral Information Exchange

Enabling Cross-Enterprise Trade requires Bilateral Information Exchange in real-time. The information exchanged must allow companies and their trading partners to execute the fulfillment chain: to make commitments, manage day to day events, have forward visibility into potential problems, and resolve problems quickly (ideally before they occur). There has always been information exchange in our value chains. Historically, however, it has been far from real-time. The technological challenge is compounded by the fact that critical data and information can be found distributed around a value chain in a multitude of applications and databases. The imperative is to have the information available to people or systems that need it, when and where they need it. This implies a deep understanding of the context – or business processes – behind the request. In other words, business process requirements determine information requirements. These processes in turn must be synchronized in multiple dimensions across enterprise boundaries.

The problem until now is that many companies collaborating with Tier 1 partners have tended to rely on applications such as Enterprise Resource Planning (ERP) that are focused on internal operations rather than on synchronizing a value chain. Furthermore, when data is pulled from ERP systems, it is not a real-time representation. Execution data is often sent up to ERP systems in batch files only once a day. EDI transmissions are also not real-time; they are often batch transmissions based on a predetermined schedule. It is not uncommon, for example, for companies to receive an un-

expected shipment before the EDI Advanced Ship Notice arrives. Finally, collaboration with Tier 1 partners has historically relied on point-to-point connections that have been expensive to create and maintain. We need to move more toward integrating with Execution rather than with ERP systems. Furthermore, the trend is toward using the Internet to gather real-time information from Wireless, Embedded, PDA, Barcode, and RF devices.

When dealing with smaller value chain partners, communication is frequently based on email, phone, and fax. This communication may be fine for initiating an order, but frequent status checks can result in lost productivity. Additionally, each trading partner has varying degrees of technical sophistication. Therefore, it is important that we provide a mechanism that allows them to participate, both technologically and financially. At its simplest, this bilateral exchange may require a smaller or low-tech company to enter information into an Internet portal.

Without real-time information, value chains respond slowly, and too many people end up working on the wrong things. Real-time information exchange permits quicker reactions to pertinent information and makes it easier for value chains to deal with the unavoidable deviations and exceptions inherent in the fulfillment process. What is needed is the real-time convergence of data, workflow, and business rules to transform data into information and intelligent action. For Cross-Enterprise Trade, the stream of information required includes real-time order, inventory, and shipment information.

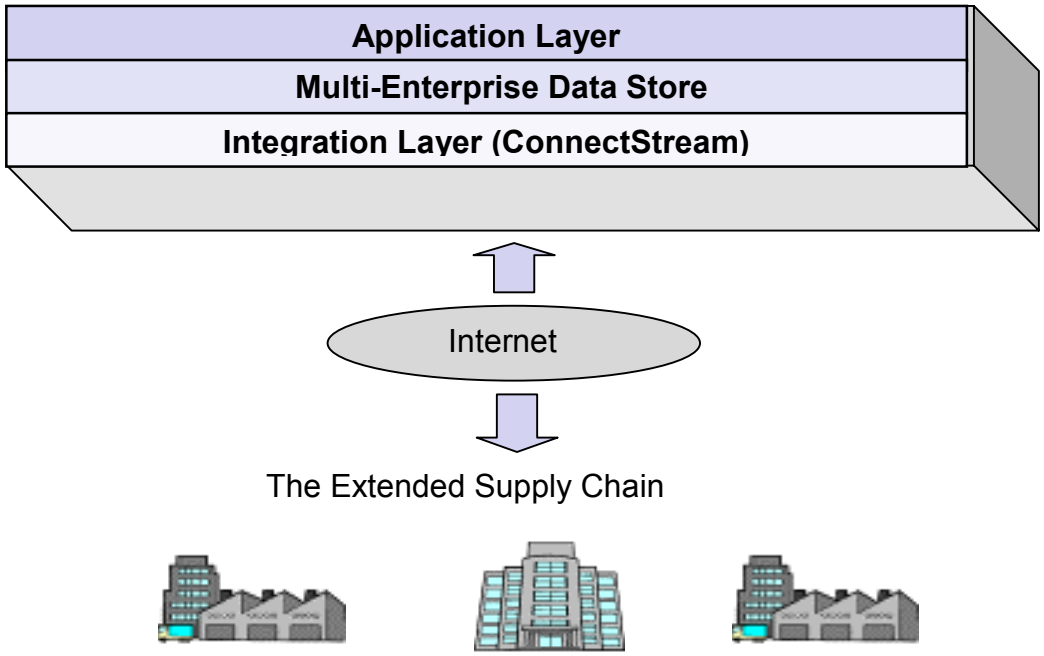
The SCPM Superstructure

Supply Chain Process Management solutions are built using technology and architecture components that have come of age in just the last few years. This new solution permits the facilitation of Cross-Enterprise Trade in a way that was not possible just two years ago. The advent and worldwide acceptance of the Internet have provided an affordable means to share information in real-time. Furthermore, workflow, data transformation, alerting engines, and data mining tools – which can all be embedded within SCPM – have greatly improved.

Optum's TradeStream solution is a superstructure for SCPM; it overlays existing applications and platform investments.

TradeStream has three layers:

- Connectivity (ConnectStream)
- A Robust and Scaleable Database
- And an Application Layer with an engine that handles complex workflows, alerts, and decision support.



Scaleability is critical. The number of transactions and alerts that can be generated by robust SCPM solutions is truly astounding. A single order that is placed and needs to be tracked can generate internal purchase orders (POs), POs for Third Party Logistics services, strategic components from suppliers, and common components from distributors. Order changes need to be tracked and kick off a new flurry of transactions. A single order can easily initiate more than a dozen related tracking and alerting transactions. TradeStream is one of the few SCPM solutions with proven scalability. Based on our conversations with SCPM users, Lucent's TradeStream implementation offers one of the best examples of scalability that ARC can verify.

TradeStream is a hub-and-spoke architecture, which greatly reduces the complexity of serial, point-to-point connections. Another advantage of TradeStream is that it is built on a granular data schema. The more granular the data schema, the better the visibility and decision support. Finally, Optum's history as a Supply Chain Execution supplier ensures domain

expertise, a critical consideration when building complex fulfillment workflows with role-based decision support.

Some inventions change the way people live their lives; the car, television, and the Internet are examples of this. Within the realm of Supply Chain Management, Supply Chain Process Management solutions are changing the rules of the game. Prior to SCPM, there was a chasm between static planning and dynamic execution systems. SCPM will be the bridge between these different types of systems and serve as the key enabler of continuous improvement in extended value chains. The TradeStream hosted solution is a service that does not require a large upfront initial investment.

ARC Conclusions

Supply Chain Process Management solutions are real-time, decision support software applications that combine extended supply chain visibility, alerts, and alert resolution decision support. ARC believes this solution will offer great value in facilitating Six Sigma Fulfillment and Cross-Enterprise Trade. An initial study of a small sample of companies shows a strong ROI for this solution. Optum's TradeStream is one of the most robust of these new solutions and is particularly well suited for complex, extended supply chains where the goal is the seamless flow of goods and information across multiple, disparate enterprises. Optum's customer engagement methodology, which greatly reduces customer risk, is particularly praiseworthy.

The advent of SCPM presents radical new opportunities for managing supply chains that simply were not practical even two years ago. Within the field of Supply Chain Management we have been talking about concepts like visibility, velocity, and collaboration for several years. In reality, visibility has been limited, velocity has been far more focused on internal cycle times than on value chain cycle times that include partners, and collaboration has been shallow. SCPM provides the real-time, extended value chain visibility and decision support that truly enables velocity and deeper forms of collaboration.

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Definitions:

Bilateral Commitment refers to a binding commitment among all trading partners in a value chain to meet their promises.
Bilateral Information Exchange. Enabling Cross-Enterprise Trade requires secure and scalable flow of supply chain information in real-time, with binding commitment among trading partners. The information exchanged must allow companies and their trading partners to execute the fulfillment chain and allows companies to improve their processes.
Cross-Enterprise Trade. Coordinating and synchronizing supply chain and fulfillment activities involving multiple partners within a value chain.
Six Sigma Fulfillment. A continuous improvement methodology built on determining customer focused goals, defining those goals in measurable ways, measuring deviation from the core metric and associated submetrics, and driving sources of variation out of the order fulfillment operation.
Superstructure. A distributed architecture that includes technology, process, and tools that overlays exiting applications.
Supply Chain Process Management. Real-time, decision support software applications that combine extended supply chain visibility, alerts, and alert resolution decision support.

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