

VISIBILITY

Tactical Solutions, Strategic Implications



Year 2002 Report on Trends and Issues in Logistics and Transportation



Cap Gemini Ernst & Young, Georgia Southern University and the University of Tennessee are pleased to present this report drawing from the results of our 2002 research on trends and issues on supply chain, logistics, and transportation. This report marks our 11th annual examination of the topics that challenge managers on an on-going basis in the conduct of their business.

The changes in the economic climate since our 2001 report, "Transforming Logistics: A Roadmap to Fulfillment Excellence," could not have been more profound. No one could have predicted the terrorist attacks, or the extent to which the economy would soften, or the corporate governance issues that continue to impact our business environment. Many CEOs have begun to realize that visibility in the supply chain is a critical element in achieving world-class excellence.

The findings of our 2002 study indicate that top management is one of the most frequent requestors' of supply chain management information. They—like their supply chain managers—are attempting to gain visibility in real time such that they can better meet the needs of an ever-demanding customer while at the same time reducing costs internally. While the economy may have slowed, the drive for more adaptive and responsive supply chains has not abated. It is the adaptive, responsive supply chain that can simultaneously attain greater effectiveness and efficiency.

One of the key learnings from this year's study is the need for them to more fully understand the impact that their day-to-day initiatives have on their business. In many cases these initiatives are "point solutions" which are not integrated with the rest of the company's infrastructure. Point solutions that are not integrated will not—in the long run—help the firm grow, or help it systemically change how it competes in the global marketplace.

Our earlier research found that six key drivers are essential for companies to achieve world-class excellence in logistics and supply chain management. The one question that seemed to arise continuously since the introduction of the six drivers was, "Is any one particular driver more important than the others?" In other words, firms were asking us where do they start, and how could they leverage the drivers to reach the adaptive supply chain end state more quickly. The findings of our 2002 research suggests that visibility is the driver that enables a business to create new and dynamic capabilities that in concert with its supply chain partners allows them to operate as a single "virtual" entity.

This report is written for top management as a call to support the effort that is necessary to develop the integrated drivers of logistics and supply chain management that will enable the achievement of the business' strategy. As noted earlier, our research indicates that the effort must center on visibility. We do not endorse a single, best method for creating this visibility, or where to start. Each approach must take into account a business' unique strategy, culture and environment. Each approach must consider what is in place, as well as what visibility modules are available from suppliers, logistics and transportation providers, as well as customers.

This research and resulting report would not be possible without the continued support of the study's participants. We would like to thank these professionals for taking time to share with us their expertise and insights.

We hope you find this report helpful as you continue the process of devising, reviewing, and improving supply chain management initiatives within your company. They all should be evaluated against the end-goal of an adaptive cross-enterprise supply chain; one whose key enabler is the concept of visibility, explored in the following pages.

Sincerely,



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Visibility: Tactical Solutions, Strategic Implications

Our 2002 study, *Visibility: Tactical Solutions, Strategic Implications*, is an analysis of current trends in logistics and supply chain management. Based on survey responses from more than 365 logistics professionals, the study emphasizes the benefits of creating visibility in the firm through key supply chain processes.

Results of the study have been arranged in three sections. The first section, *Six Drivers of Adaptive Supply Chain Excellence*, briefly examines six key characteristics that drive a transformation to greater efficiency in supply chain, logistics and distribution processes. These drivers:

Collaboration, Optimization, Connectivity, Execution, Speed, and Visibility

are the benchmarks we used to evaluate the progress of our survey participants in achieving logistics excellence. Of these, our research has led us to the conclusion that visibility is the accelerant for creating adaptive supply chains and the lynchpin for leveraging a company's transformation. Through true visibility a business is able to move more quickly in its quest to achieve excellence in the other five drivers.

The second section of this report, Supply Chain Event Management, provides a model for understanding the key fundamentals of building visibility in the organization. The model starts with building key tactical capabilities that provide the operational data needed to make strategic decisions in a complex and changing environment. This section will also report on the current status of the six areas that comprise supply chain execution management. These are: extended connectivity, intra-enterprise visibility, exception-based alerting, performance metrics, event-based response, and enabled control.

Finally, we conclude with our Point of View, which highlights the authors' perspective on the results of the past year and offers recommendations for the future. This year the Point of View is presented on two dimensions—the managerial perspective and the academic perspective. Each of these perspectives provides an assessment of the current state, and more importantly, suggests future direction for achieving the desired end state in logistics and supply chain excellence.

Research Methodology

This year's study offers a basis for assessing the degree to which companies are creating visibility within their businesses, as well as within their extended supply chains. This research helps us to identify where visibility gaps or inefficiencies exist, and often suggest how they may be solved.

Some 365 logistics and supply chain professionals participated in this year's study. In addition, several national and multinational companies were studied to better understand how they are working to achieve greater visibility, and the benefits they will derive from these initiatives. This analysis allowed us to more fully explore the implications of visibility, both at the tactical and strategic level.

Participant Profile

Aggregated as a profile group, half of the companies who responded have annual revenues under \$1 billion (50 percent), while those with annual sales of \$1-\$3 billion accounted for 22 percent of the sample. 28 percent of those firms sampled have sales greater than \$3 billion. Compared to last year, there was an increase in the number—and percentage—of firms with revenues greater than \$1 billion completing the survey. Previous analysis has indicated that revenue base significantly differentiates firms in terms of

logistics and supply chain strategic initiatives. In general, "larger" firms are noted for taking the lead in developing and growing innovative capabilities in logistics and supply chain management. In many cases, it is their financial wherewithal that enables them to amass the critical resources.

The companies that participated in this year's study also command a great deal of attention in that they account for more than \$25 billion in annual spending on transportation. Collectively, they have a significant impact on current and future trends in logistics and supply chain management.

While all industrial sectors are represented in this study, manufacturers led in survey responses, comprising 58 percent of the survey sample. This is an increase of approximately 8 percent from the 2001 study. The next largest sector was Consumer Products/Retail at 17.5 percent.

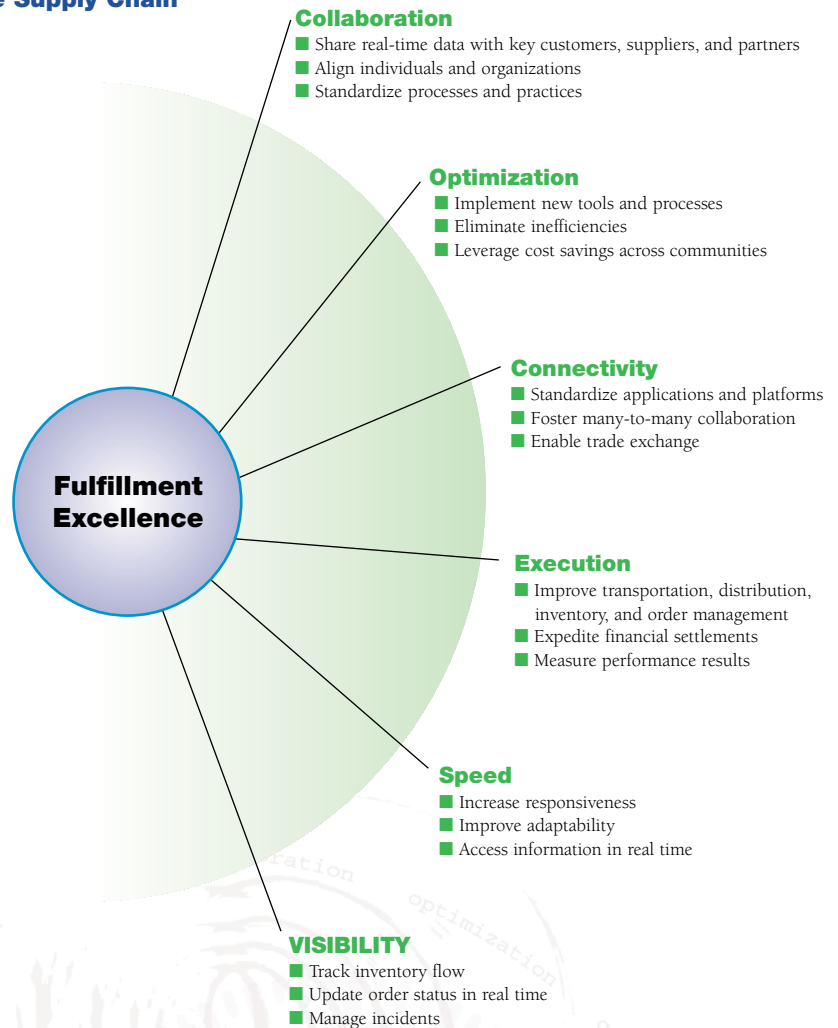
I. Six Drivers of Fulfillment Excellence

A Look Back

In our 2000 report *Logistics @ Internet Speed*, we introduced the six drivers necessary for achieving logistics and supply chain management excellence. These drivers are the key components found in adaptive supply chains. The research indicated that customer demand and technology advances would drive the implementation toward adaptive networks in order to provide greater visibility and control in supply chain, transportation and distribution activities. In the 2000 report, we predicted a continued migration toward the application service provider model (ASP), in which providers host and maintain leading software applications on the Internet, enabling firms to collaborate with suppliers and logistics partners on a common, ubiquitous platform.

The 2001 study *Transforming Logistics: A Roadmap to Fulfillment Excellence* reported a slower than expected migration toward the application service provider (ASP) model, or the implementation of newer tools and methods in the discipline. Technological advances in logistics continued, however, at a dramatic rate, and seemed unaffected by the changes in economic conditions. As we predicted in our 2000 report, the rate of alliances and partnerships among technology and service providers saw increased consolidation through 2001 and continues to date.

The Key Drivers of an Adaptive Supply Chain



The 2001 report also described the current state of supply chain management from the perspective of the six main drivers for building adaptive supply chains - collaboration, optimization, connectivity, execution, speed and visibility. We recommended that firms begin the transformation process as quickly as possible, and that the return on investment for new software tools (such as optimization, etc.) would be relatively quick and substantial.

Visibility is more than just a tactical supply chain issue; it has profound strategic implications for the entire organization.

Current Position

While each of these drivers plays a critical role in the development and sustainability of an adaptive supply chain, we believe that one driver stands out as being most critical—visibility. Visibility is more than just a tactical supply chain issue; it has profound strategic implications for the entire organization. It sustains, accelerates or enables the other drivers. Without true visibility, the firm is hindered from achieving agility in a volatile world. This lack of agility leads to sub-optimal supply chain event management decisions that often diminish a company's effectiveness and efficiency.

Visibility enables all supply chain members to easily see and manage the flow of products, services and information in real time or near real time, from end-to-end, as needed. True visibility is present when supply chain members can do this in concert, and they can do it across their existing technology platforms. Visibility involves seamless integration such that access to information on inventory in transit or at rest, work in progress, product availability and order status enables the supply chain to execute as if they were a single "virtual" entity.

From a tactical perspective, visibility allows supply chain managers to see the flow of materials and orders and better manage capacity and resources. Because it immediately permits alerts regarding when, where, and why a problem or changes will occur, visibility allows managers to respond in a manner that facilitates better decision making, rather than last-minute reaction. For logistics professionals, visibility is at the core of supply chain event management. It is the glue that binds the logistics and fulfillment processes from order to deliver, and is thought of as the enabler that maximizes a business' supply chain investments. It allows operational sparks to be extinguished before the fire fighting even begins.

Visibility of the supply chain can no longer stop at the shoreline or at our domestic borders—it must circle the globe to manage the flow of products, services and

information. Real-time inventory visibility, product availability and order-status information provides opportunities to drive down costs, improve service, and generally create value for customers and supply chain members.

Visibility is the doorway to a broader supply chain horizon. This horizon is characterized by suppliers that need better demand signals in order to efficiently utilize their capacity and other resources. It also includes customers who want more information on their inventory status, both at rest and in motion. Customers expect a company to anticipate their needs, and develop solutions to address them—at no additional cost. This combination of efficiency and effectiveness can be achieved with visibility as defined above. Because visibility involves people, processes, technology and information flows, it is an inherently complex issue.

How Important is Visibility?

Shortly following the horrific events of September 11, two global pharmaceutical companies responded to needs that resulted from that fateful day. The first company's top supply chain executive reported that they had been contacted by a government agency about diverting to New York a very large supply of antibiotics they produced. They impressed the government—as well as their own top management—by determining the feasibility of this request in about 20 minutes. The second company did not fare as well, and as a result of this one request, is overhauling its supply chain management processes and systems.

Hopefully, situations like September 11th will not occur in the future. Yet, the basic principles still apply, especially in a volatile marketplace. Competition is becoming more intense and global in reach.

Customers are more demanding. As a check on your performance, how quickly can your organization:

- **Identify** the current location and status of your outbound materials
- **Identify** current levels of inventory, by SKU, by location
- **Determine** the status of customer orders, and the ability to meet their requested ship dates
- **Notify** customers upon order receipt regarding the ability to fulfill their requirements
- **Respond** proactively to order exceptions
- **Develop** and integrate these capabilities at the global level
- **Reallocate** inbound global materials while they are in motion based on local current sales
- **Identify** intermediate points of inbound materials beyond order acknowledgement and order shipment
- **Rapidly Respond** to events that interrupt product flow
- **Proactively and seamlessly Provide** customers with their order status

Why is visibility such a key factor in a business' strategy? In order to execute the strategy, be it low-cost leader or customer-oriented, you must have the operational capabilities to meet the challenge.

An analogy may be helpful. Suppose you were driving a car and the instruments on the dashboard gave you information that was 30 days old. In addition, any changes in your driving patterns that you made would take 30 days to be implemented. How fast or how far would you feel comfortable going?

What type of car you have or how fast it is capable of going is immaterial. Without basic, real-time operating information such as speed or fuel level, the car limits the driver's ability to effectively and efficiently plan trips that are short, medium, or long in duration and length.

How fast markets are moving is up for debate. We asked survey participants to share with us the average amount of time it takes to acquire raw materials or goods into their process. In all cases, compared to last year's results, the cycle time has declined. This reflects increasing customer expectations in terms of speed. The minimum expected time for materials to arrive has decreased from 19 days to 16 days, a drop of 16%. The average time has dropped by 27%. While different sample sizes, economic conditions or respondents in each of the two years may explain some of these differences, an expectation has been established for a shorter, more reliable order cycle.

In addition to increasing customer expectations, current economic and market conditions have driven the gains in speed. Managing the flow of goods in the supply chain is an area that provides lots of opportunity to reduce unnecessary costs. As cost savings related to speed become measurable, they become ingrained in the organization, leaving it more efficient (and ultimately more effective) than before.

"Supply chain solutions have been around for years, yet enterprises are still chasing the same old problems: the need to reduce total supply chain costs, drive efficiency, and increase customer responsiveness. Accounts of costly supply chain fiascos continue to make headlines, leaving companies scratching their heads wondering how they could have missed the signals....."

Nov. 2001, the Yankee Group

**Cycle Time - Placement to Receipt
(in days)**

	2002	2001
Minimum expected time	16	19
Average expected time	22	30
Maximum time before ordering elsewhere	40	45

There are other indicators that speed has increased since last year. Inventory turns are up (from 11 to 15), and days sales of inventory has decreased (47 days to 43 days). While several initiatives would enable a business to increase its inventory turns, visibility in the supply chain is a major enabler for realizing these gains over the long term without loss of customer service.

There is little question that markets are moving faster and faster. Regardless of your firm's strategy, you need the ability to respond to changes in the marketplace in a timely and effective manner. How quickly your market expects and rewards innovation is the speed at which your supply chain must operate to survive.

Winners must be faster.

II. Supply Chain Event Management

Connectivity is the framework that enables end-to-end visibility, decision-support tools, and allows top management to see—in real time—the company’s suppliers, third-party providers’ and distributors’ overall performance. Visibility is the foundation of supply chain event management. It is the glue that binds the total business decision-support and technical processes to integrate the supply chain components, both within the business, and with external providers, suppliers and customers. With this information both strategic and tactical changes can be made and seen by the entire organization.

The figure below illustrates the SCEM framework. A description of each of the building blocks, as well as an assessment of the current state, is provided below.

Extended Connectivity

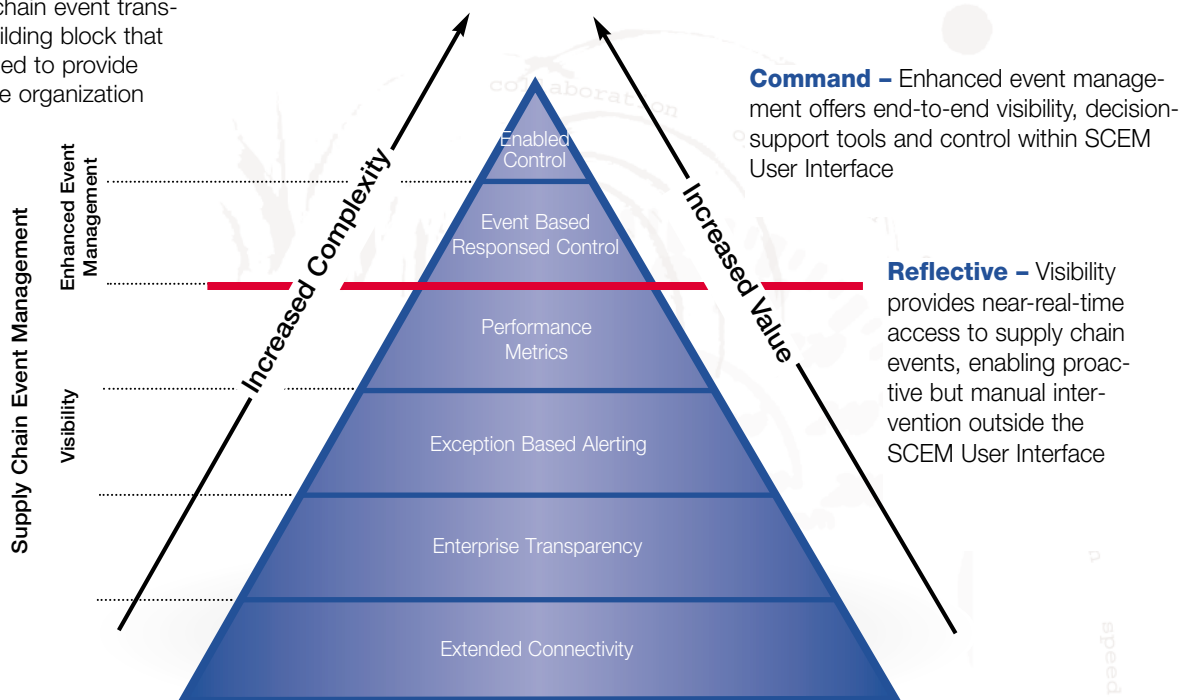
It all starts with a transaction. An order is negotiated, placed, fulfilled, shipped and delivered to the customer. Extended connectivity allows suppliers, logistics providers, customers and internal legacy systems to share supply chain event transactions. It is the basic building block that will be used and aggregated to provide indications as to where the organization is headed.

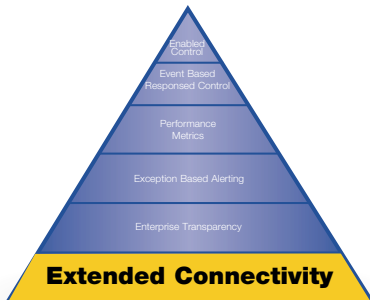
Extended connectivity provides:

- An adaptive platform that supports an information backbone
- Cross-division and cross-enterprise integration
- Centralized data repository to collect, store, organize and cross-reference extended value chain data

Connectivity can be considered on three levels. At the first level, connectivity enables logistics visibility that focuses on integrating providers and suppliers with internal applications. The second level involves visibility for order and inventory management; fulfillment connectivity. The third and most desirable level for connectivity allows extended visibility for integrating order, purchase, inventory, and supply chain planning and execution applications.

While Reflective Visibility is the foundation of SCEM, Enhanced Event Management builds on Visibility and offers the promise of truly adaptive supply chains through automated planning and control of Orders, Inventory and Shipments





Extended Connectivity -
 Allowing suppliers, logistics providers, customers and internal legacy systems to share supply chain event transactions

- An integration platform that supports an information backbone
- Cross-division and cross-enterprise integration
- Centralized data repository to collect, store, organize and cross-reference extended value chain data

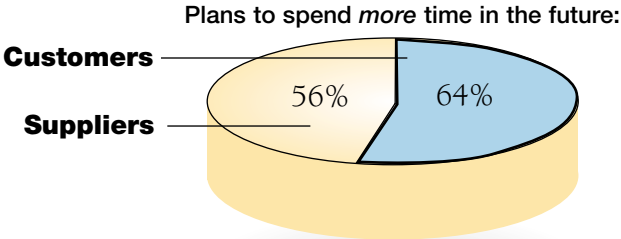
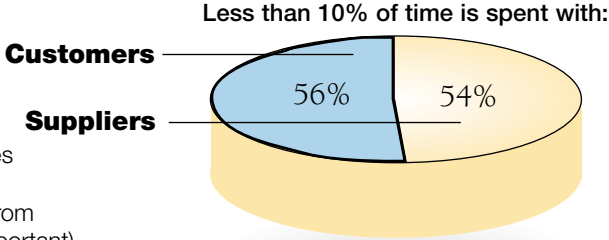
In order to develop this connectivity, time must be spent with customers and suppliers to establish the relationship—as well as develop the standards—by which information will be shared. When asked, study participants reported that they spend less than 10 percent of their time with either customers and/or suppliers. Their ability to understand the unique needs of each of these groups may be reduced by this limited contact.

While this may not be particularly good news, the bright spot is that the amount of time that companies report they will spend with each of these groups is on the rise. A clear majority of respondents report that they will spend more time with both customers and suppliers, as the pie charts above indicate.

How Respondents Spend Their Time Today

Another way to study extended connectivity is to understand what other initiatives might be underway to increase connectivity between each of the groups. Respondents were asked to identify important supply chain initiatives within their businesses. Each initiative was then rated from 1-(very important), to 7-(not important). Those initiatives that had a mean score less than two are noted in the table below.

Key Supply Chain Initiatives



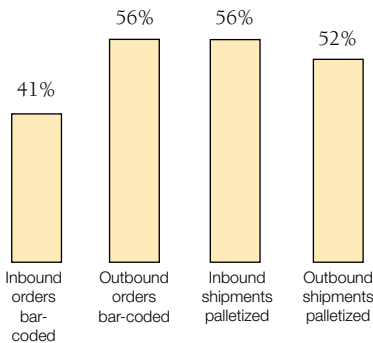
Suppliers	
Quality certification	1.7
Distributors	
Order visibility	1.4
Confirmed delivery date	1.4
Available to promise	1.7
Consolidated shipments	1.9
Customers	
POS information	1.3
Supplier short- term demand broadcast	1.8
Quality certification	1.9

1 - Very Important
 7 - Not Important

What is interesting about these results is that those items that are highly important to the distributor—often a middle position in the supply chain—captures the essence of extended visibility. Distributors require information about orders, inventory and shipments to be responsive and satisfy their customers. Adaptiveness drives their high customer service levels.

Given the quantity of operational data necessary to have extended visibility at this level, technology must be leveraged to ensure an integrated, seamless flow of information from and to the various supply chain members. Yet, at the operational level, there still appears to be a gap regarding the data being collected for use. For instance, only 56 percent of outbound shipments are currently bar-coded, as the bar graph below reports.

Operational Visibility



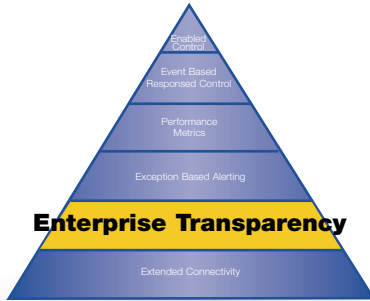
For many companies the first challenge is gaining internal visibility. Companies with intra-company sales involving great distances and cross-border transactions involving many hand-offs, experience high frustration trying to obtain accurate timely information. The technical difficulties often are exacerbated by the lack of traditional leverage one party has over a supply chain to ensure compliance. Supply chains have multiple members; compliance is most often accomplished through cooperation and collaboration. Supply chains with a low degree of collaboration further complicate the goal of achieving internal visibility.

There is hope. Many third-party service providers can supply timely and accurate information directly from carriers and warehouse operators, thus avoiding the politically charged internal debates of whose budget is to be tapped to develop and maintain the information infrastructure sought by internal and external customers.

The cost of integration: Many supporting IS/IT organizations view the process of achieving internal visibility as one of creating closely coupled, fully integrated systems.

As the cost of those systems increase, it becomes increasingly difficult to justify the work needed to allow visibility.

Some supporting IT organizations are reluctant to look to outside solution providers and instead patch together the systems that they already have leaving the problem in an endless round of “awaiting capital approval.”



Enterprise Transparency

Allowing distributed access to critical value-chain events, statuses, levels and capacities

- Web based access provides extended value chain transparency
- Query protocols support third-party web page access to information

Enterprise Transparency

Often times, shipments are not visible to supply chain partners from the time they leave the dock door until they arrive at their destination. To provide greater visibility of these shipments, many firms are offering near-real time visibility of their orders.

Enterprise Transparency allows distributed business users to see order, inventory and shipment information that is important to their role in the supply chain. These users might be suppliers, carriers, customers, or even third-party providers. A hub portal acts as a dashboard for the user and communicates statuses across multi-step supply chain processes. The hub interfaces information from various internal systems such as supply chain event management, distributed order management, transportation management, and financial settlement. Information from the various stakeholders can also be passed back through this hub.

These solutions cannot be provided from historical data or from siloed departmental reporting. However, these demands can be satisfied by near-real time monitoring, alerting and reporting of event management solutions. Even within the parameters of near-real time, we clearly are not there. Yet, each year we see increasing demand for more accurate and timely transactional detail between all supply chain partners.

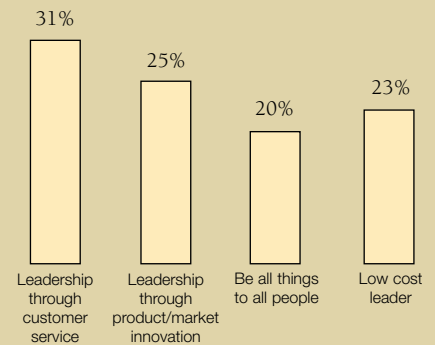
One of the reasons that we have not obtained this level of integration can be explained by some of the key findings of our study. First, senior management in the company must fully understand the value that supply chain management provides in supporting the goals of the organization.

To this end, we asked respondents to select the strategy that best describes their firm. The respondents saw their organizations competing based more often on customer service (31 percent) than the other business strategies. This was followed closely by product or market innovation (25 percent) and competing as the low cost leader in the industry (23 percent).

Respondents were then asked to describe how their organizations viewed logistics / supply chain management. As noted in the bar charts to the right, the overwhelming majority of respondents reported that they were viewed more as a cost center than the next nearest choice—strategic component—by a ratio of over 2:1.

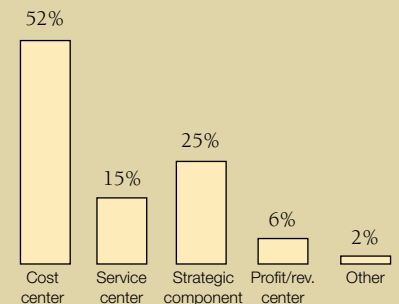
Organizational Strategy

2002



How Organizations View Logistics/Supply Chain Management

2002





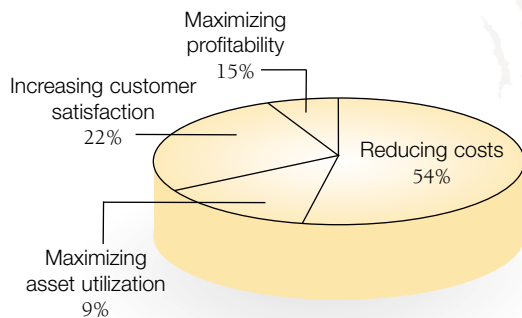
Why is This Critical to the Issue of Visibility?

A cost reduction perspective typically does not allow for strategic investment that enables long-term gains in both efficiency and effectiveness, even though substantial savings can come from increased visibility. If companies truly desire to change their level of performance in their supply chain, they will have to first change their perspective to be more strategic. Attaining leadership in the marketplace through customer service cannot be reached if those departments responsible for key customer satisfaction attributes are responsible for minimizing costs in the short term. Visibility has become a strategic step in improving customer service and, in most cases, provides revenue lift.

Interestingly, and not too surprisingly, cost control was the primary objective this past year. Again, in a greater than 2:1 ratio, cost reduction was more critical to the organization than increasing customer service. This mentality—while understandable in a sluggish economy—will greatly impede the efforts of supply chain professionals to provide the level of visibility needed in these uncertain times.

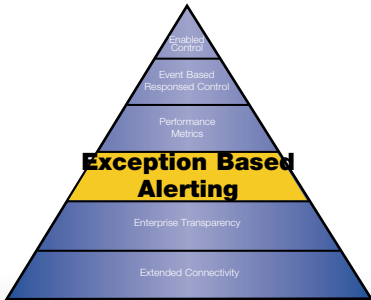
Primary Focus of Respondents

2002



In the 11 years of this research, the focus on reducing costs in logistics has never been greater than 2002. Economic conditions are not the only factor impacting this viewpoint. Shareholders and Wall Street exert tremendous pressure on firms to achieve better bottom-line results. Cost reductions have an immediate positive impact on profitability. What is harder to correlate and track are the long-term effects of a cost reduction viewpoint. That is, an emphasis on reducing short-term costs may have reduced investments in new technologies or process improvements.

Visibility has become a strategic step in providing customer service and, in most cases, provides revenue lift.



Exception-Based Alerting is supply chain management by exception. The goal is to identify potential problems prior to the breaking point.

Exception-Based Alerting

Not all problems need to be problems. In fact, many can be avoided with some advanced notice. This requires the ability to see into the supply chain, capture the relevant information, and provide notification of those events that are beyond the predetermined acceptable range.

Alerting functionality notifies one or more stakeholders if an event did or did not occur within a specified time frame. Exception-based alerting is rule-based management by exception, that allows managers to focus on exceptions to the process rather than every single event. Much like a sieve, exception-based alerting allows the ordinary, on-time orders to progress, and identifies those that need special attention. Workflows of events are defined and configured so that when events are reached or delayed, designated personnel are alerted. Stress and unnecessary work are eliminated from the supply chain when the alerts are restricted to only those who need the information.

For example, if information is forthcoming that an order is going to be late for delivery to an important customer, the manager can divert inventory from another distribution center (DC), expedite a shipment from the current DC, or call the customer to alert them of the situation.

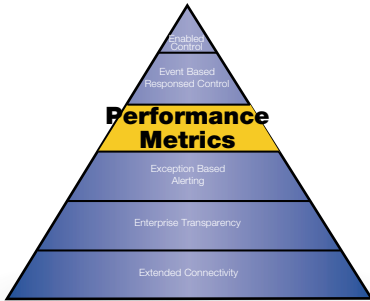
In all three cases the manager is proactively managing the problem before it occurs.

A key in this process is for users to define the business rules to deal proactively and reactively with the information. Not all exception-based alerts are emergencies. In some cases, merely alerting the customer of a potential service failure may be sufficient; they may be able to reschedule other work flows, or pull the materials out of their safety stock. Many times, alerts are configured to enable appropriate service levels for customers or to highlight cost saving opportunities for the client and their partners. Allowing the supply chain partners to be part of the solution builds credibility and trust in the relationship.

Finally, while supply chain managers have visibility into these alerts, it is important to define who else in the supply chain needs this information. This is especially critical for those processes that affect multiple stakeholders. Again, enterprise transparency enables the firm to respond more efficiently to changes—and problems.

This year's respondents were asked to identify those functions/departments that request or receive information on some of the indicated attributes. As the table below illustrates, order and shipment information is predominantly requested by purchasing. Only one area—tracking outbound shipments—is not of primary concern to this functional unit. In a supply chain, one firm's outbound shipment is another firm's inbound shipment. It appears from the results reported below that two distinct functional areas are interested in shipment visibility.

Users of Logistics Information				
Attribute	Purchasing	Manufacturing	Sales/Mktg	Other
Order status	62.3%	14.8%	13.1%	9.8%
Tracking inbound shipments	61.9	19.0	6.3	12.8
Alerts on transportation delayed shipments	58.2	16.4	15.6	9.8
Divergence of shipments	52.6	21.5	17.2	8.7
Domestic visibility of orders	46.4	17.6	23.2	12.8
Alerts on order delays	46.1	21.8	21.1	11.0
Tracking outbound shipments	17.6	21.0	42.9	18.5



Performance Metrics provides the functional areas, departments, divisions, business units, suppliers, customers and logistics providers with the tools needed to evaluate their contribution to the supply chain. They must be clear, quantifiable, measurable, and agreed to by all parties.

One of the more interesting findings is the awareness of the perfect order, especially given its relatively new introduction. It is much more boundary spanning than some of the traditional, functional metrics, like fill rate or on-time delivery. As such, broader, boundary spanning metrics will begin to gain greater acceptance and popularity.

How well firms are doing in providing a perfect order was also explored. The most typical definition of a perfect order is the interaction of four attributes of each individual order: on-time delivery, order shipped complete, accurate invoice, and no loss or damage.

**on time delivery.
order shipped complete.
accurate invoice.
no loss or damage.**

perfect.

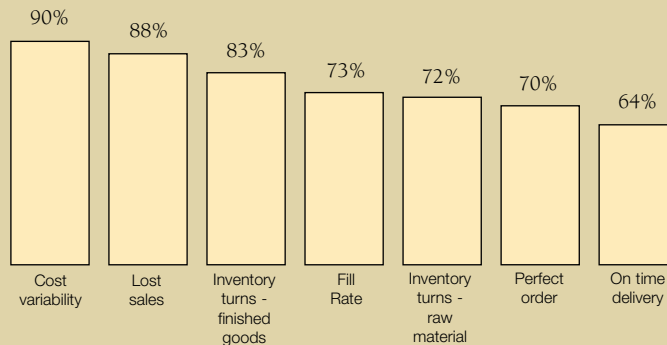
Performance Metrics

No matter the original topic, sooner or later the topic turns to metrics. While there are a plethora of articles encouraging businesses to utilize metrics, and the advantages of doing so, it is still a struggle for most managers. Which metrics should be used? How should they be defined? How many should be tracked?

Clearly, metrics should be process and function appropriate. But, as the organization increases its visibility into the functional areas, what metrics are being used or requested by top managers today? One of the major questions for organizations believing they have a high fulfillment and delivery performance is how many extra resources are diverted to these areas to manually achieve these targets.

In this year's study, we gave our respondents a series of metrics, and asked them to identify which groups regularly receive or request information about them. The findings were telling, in that the respondents reported a high level of top management involvement and interest in key supply chain metrics, as illustrated in the bar chart to the right. Operational metrics such as perfect order and on-time delivery are requested less often by top management.

Operational Metrics Requested by Top Management



Given the definition for a perfect order, how are businesses performing? As the table below indicates "best" customers (as defined by the respondents) receive significantly different service than do "average" customers. This is a key finding for the study. It indicates an ability on the part of the organization to segment its customer base, and provide different levels of service based on their relative importance.

Metric: Perfect Order

Attribute	Best Customer	Average Customer
On time delivery	97	93
Over/short/damage	98	95
Correct invoice	98	95
Invoices shipped complete/ total invoices	98	95
Expected Perfect Order	91.3%	79.7%

Strategic Implications

To this point we have discussed the tactical building blocks that are key to creating visibility into the supply chain. Each is critical, and provides a synergy that is greater than just the sum of the parts. These tools provide supply chain managers with data, which they can process into information to do their jobs and do them well.

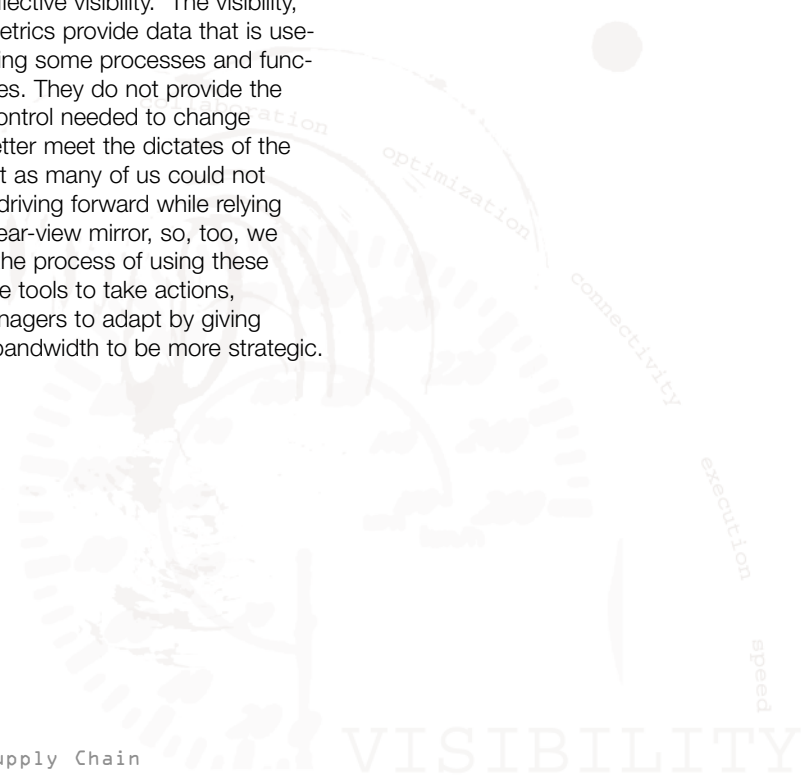
This is coupled with the momentum of continual market change. We have been conditioned to think in terms of new and improved; unaltered products are relabeled as "classic." As speed in the marketplace increases, so too does the need for greater visibility. What shipments are delayed? What orders have been cancelled? What priority is being placed on particular orders? These questions, though tactical, become strategic in nature in a time-sensitive market.

It is the automated control, management and utilization of this visibility data that is the focus of the next two stages. These are the supply chain tools that allow businesses to adapt rapidly to change, respond to immediate requests, and avoid costly errors.

Organizational behavior theory asserts that metrics should be aligned with the firm's strategy. For instance, a firm whose strategy is to be a low-cost provider should place greater emphasis on cost metrics. This is not to suggest that customer satisfaction metrics should not be gathered; rather, it is a matter of emphasis or importance that is placed on them versus the cost metrics.

The SCEM application's workflow history captures information from partners and the integrated applications across the orders' life cycle and creates a central repository of supply chain information. This provides enhanced supply chain, vendor, and internal performance measurements; supplier, vendor and carrier scorecard and key performance indicators. Many SCEM applications provide ad-hoc reporting tools that assist in assessing and evaluating performance. These tools help evaluate from both an operational and strategic level those processes in need of improvement.

Yet, this tactical data should be thought of as merely reflective visibility. The visibility, alerts and metrics provide data that is useful in managing some processes and functional activities. They do not provide the directional control needed to change course to better meet the dictates of the market. Just as many of us could not conceive of driving forward while relying solely on a rear-view mirror, so, too, we must begin the process of using these near-real time tools to take actions, enabling managers to adapt by giving them more bandwidth to be more strategic.





Event Based Response functionality provides the decision support and optimization capabilities to dynamically respond and re-plan to alerts in a near real-time basis.

Event Based Response:

There is little doubt that business expectations are increasing. When respondents were asked to describe the time focus of their firms, approximately 33 percent said they were moving toward a near-real time response to requests; another 45 percent reported that they were moving from a weekly focus to mere days.

Event-based response functionality provides the decision support and optimization capabilities to dynamically respond to alerts and re-plan in near-real time. It provides the potential answers and actions to the questions that the data from the alerts creates. Since the critical visibility support components, the back-end systems, are assumed to be in place, this functionality generates feasible actions for the user and provides information regarding the business and/or supply chain impact of each of the decisions.

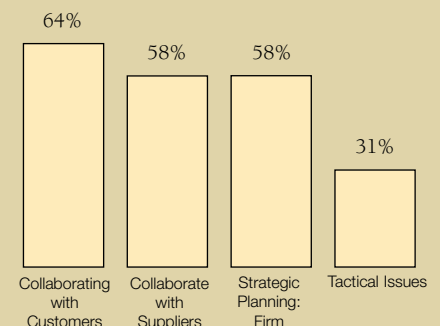
For instance, in the past a supplier may have missed a ship date on a critical material, thereby making it impossible for the business to produce an order for a customer. By using rules that have been configured in the workflow, the software provides potential solutions based on the planning or optimization functionality that has been integrated into the solution architecture. Thus, the business can either expedite the material—and maintain the integrity of the current manufacturing process—or it can reschedule the manufacturing process to enable it to free up capacity when the material does arrive.

One of the fundamental benefits of visibility is that one can configure the solution to know there is a problem early enough to respond, and do this much earlier than with the traditional EDI technology. Using the example above, a customer is only alerted to a potential problem if the supplier missed the ship date. By collaborating with a supplier it is possible to understand the key events within their manufacturing process such as "entered into production," "entered into finishing," or "awaiting carrier." By looking for these key internal events, the customer and supplier have time to respond long before the traditional moment of the missed shipment.

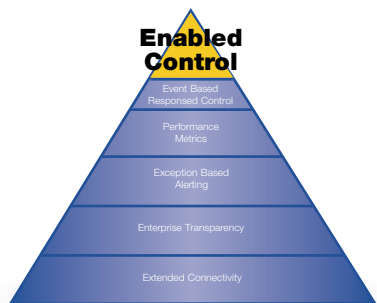
This, fundamentally, is the difference between responding and reacting. Knowing that there is a delay, and understanding the consequences of the delay allows time for the manager to respond to the situation. Reacting to the delay is visceral; the options available are minimal, as much of the time that was available for planning is no longer available. The resulting actions allow continuous improvement across supply chain boundaries.

This requires that managers spend more time collaborating with both customers and suppliers. There is good news based on our respondents. Study respondents were asked if they would be spending more, less, or the same time in each of the following areas. The net result (increasing - decreasing) is provided in the bar chart below. As a benchmark, it is encouraging to report the smaller percentage of individuals that will be spending more of their time on tactical issues.

The Net Result - Spending more time



While there is certainly value in the decision-support function of event-based response from a tactical level, its full value can only be derived from the strategic use of the tool. That is, its ability to evaluate and re-shape supply chain processes to better meet the needs of the customer. This implies that information from previous events has been used to create knowledge that will be utilized to redesign supply chain event management as needed. It is this level of adaptation that creates a responsive supply chain. By capturing critical information, the supply chain managers—as well as top management—have greater visibility into key processes. This enables them to determine what parts of the process are in need of improvement, as well as what parts are performing to expectations.



Enabled control allows managers to build an organization that will respond to changes semi-automatically in the future.

Enabled Control:

Many of us remember our first days behind the wheel of an automobile. Alert and tense, we took in each bump and turn, unable to distinguish between what was important and what was not. Our vision was limited, and we dared not look around,

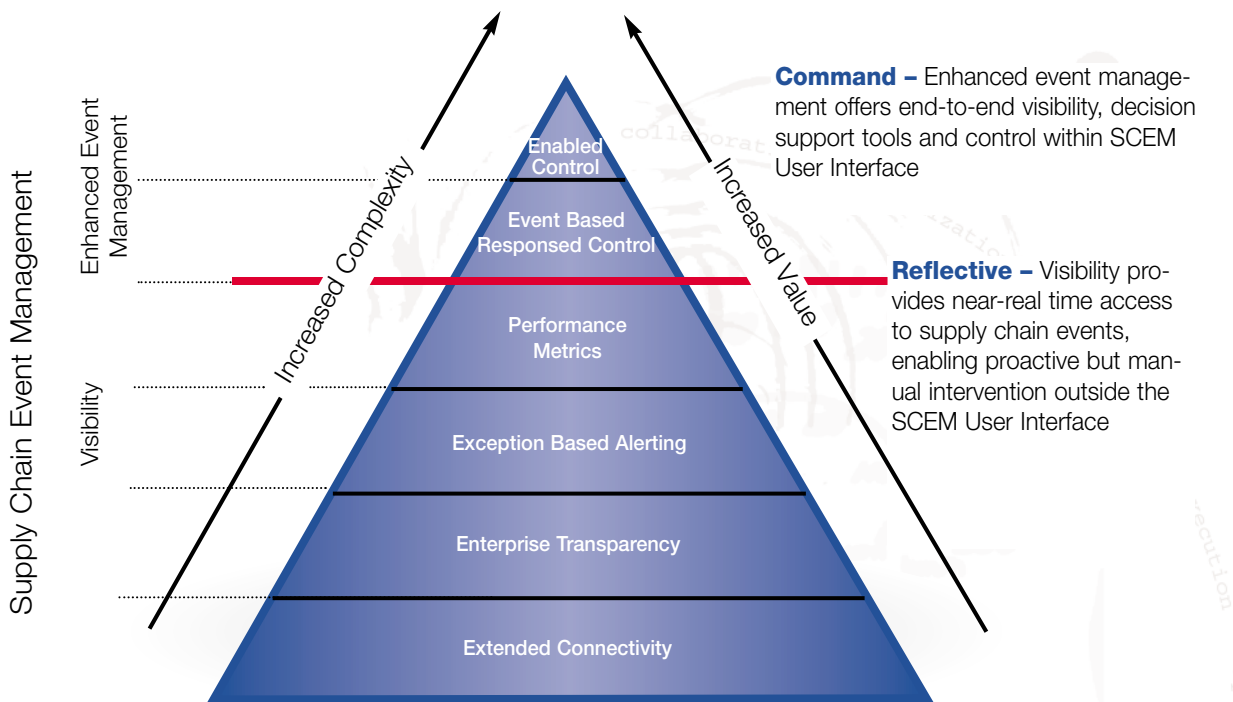
or too far ahead. As we became more comfortable with the act of driving, our ability to discern between events increased. So too did our vision, as we looked beyond the hood ornament.

Enabled control allows organizations to build an organization that can respond to changes semi-automatically in the future. It is much the same as setting the cruise control on a car as a commuter heads home from the office. The car maintains its speed, regardless of the hills, valleys or turns in the road. The driver is still responsible for the vehicle, and is in control of how fast it is going; this feature, however, allows them to focus on other matters at hand.

So it is with enabled control. Enabled control is the zenith of the SCEM pyramid and, as such, takes the event-based response functionality one step further. Here, the solution provides visibility into a potential

problem, and provides a series of feasible solutions for the management team. More critically, if the alert is within a specified tolerance (cost, time or service levels) the solution automatically re-optimizes and takes the corrective action.

Enabled control solutions interface with enterprise resource planning and supply chain execution applications, triggering actions when there are deviations from plan. Workflows are initiated based upon transactions that occur within the enterprise application, or SCEM tool, and the results are sent to the transaction systems. The system executes allowing managers the ability to respond rather than react; to learn rather than fight fires. While this is still a relatively new technology solution, vendors show it as a critical item being developed on their product roadmap.



Some might argue that the lack of visibility—or blind spots in the organization—is a technology issue. One key feature of current visibility solutions is that most of them are based on fully web-enabled technology. This gives customers of the supply chain a much simpler portal into the supply chain instead of cumbersome integrations and EDI-only transactions. From our perspective, reliable, tested technology providers are in place that offer logistics, fulfillment and order-to-cash solutions. Characteristics of these types of providers can be found in the table below.

SCEM Provider Characteristics

Logistics SCEM Solutions

- Based on transportation management applications such as rating, routing, booking, contract management
- Integration platform for extended enterprise trading partners to enterprise applications
- Strong in in-transit visibility of shipments, orders and items
- Recommended end user focus on managing in-transit inventory and mitigating unplanned supply chain disruptions

Fulfillment SCEM Solutions

- Based on enterprise order management and warehouse management applications
- Integration platform for multiple enterprise packages with company and between trading partners
- Strong in order and inventory visibility, with some track and trace capabilities
- Recommended end user focus on matching supply, demand and inventory capacity

Order-to-Cash SCEM Solutions

- Based on integrating multiple inter and inter-enterprise applications to consolidate capacity inventory, order and shipment visibility
- No inherent functionality, dependent feeds from internal and external applications - including fulfillment and logistics visibility applications
- Recommended focus of end-user

Selecting the Right Provider is Critical

As with any software tool, selecting the right provider is critical. However since the SCEM software market is relatively fragmented, there are many players and many definitions of visibility and event management functionalities. Consequently, management needs to determine how and where more visibility will add value to the firm, as well as its customers.

The firm must identify the critical processes that occur within their supply chain; each process has its own chain of events that are characterized and enabled by a unique blend of people and technology. As a single process unfolds, event-by-event, the mix of visibility requirements and corresponding management decisions change. Each event in this chain is linked to a set of stakeholders. Each stakeholder, in turn, is concerned with a particular view upon which their related management decision is based. This is considered a scenario, or the fundamental relationship defining the set of tools or tool that will be required. Operationalizing SCEM means addressing the people, process, and technology requirements associated with each scenario. Provider strengths and weaknesses in providing this strategic decision-making can then be weighed against these scenarios.

Some might argue that the pharmaceutical industry is a bad example for innovation in supply chain management.

According to a senior manager in a global organization, emphasis on innovation has been placed in the laboratory, and not at the loading dock; historically logistics tended to be their blind spot.

Yet, even bad examples can be inspiring and helpful, especially when it comes to getting buy-in from the “CXO level” for visibility initiatives. Negative experiences can accelerate the change management and implementation speed of visibility initiatives. A large global pharmaceutical business is now undergoing a rapid evolution. They will have identified, selected, installed, and begun training on a new transportation event management software package in less than six months, and anticipate deriving benefits starting in the last quarter of this year. As one Senior Manager related, “Speed of benefits delivery is absolutely critical to me. Our first goal is to start walking - using the system. After that, we’ll get more individuals trained on the software and be able to jog. As we become more sophisticated, we will be running.”

One of the big benefits of the system will be global visibility into the supply chain. Managers will be alerted when shipments are delayed, or when there is a potential service failure. It will give them the information they need to manage the delivery of products to the market.

The Quest for Logistics Visibility at Agilent Technologies

In many large corporations, the quest for logistics visibility is a journey that takes preparation, forethought, endurance and patience.

The quest at Agilent Technologies is no different. Agilent is an \$8.4 billion global technology leader in communications, electronics and life sciences. Based in Palo Alto, California, this 1999 spinoff of Hewlett-Packard has 37,000 employees serving customers in 120 countries. Its Global Trade and Logistics Services team is responsible for leveraging trade and logistics capabilities, solutions and costs across the company.

Agilent's quest for logistics visibility started more than two years ago. At that time, Sean Burke, Global Logistics Solution Manager, asked his customers—the sales and field organization—how Logistics could add value to their customers. The answer came back loud and clear: they wanted more visibility into their shipments to help decrease variability and increase customer satisfaction.

Burke and his team started by selecting an appropriate software provider to manage the process. Burke selected Celarix because it focused on what Agilent wanted to provide its customers—data warehousing and visibility into the logistics process. Fourteen different providers and software solutions currently feed into the Celarix package.

Burke and his team then decided that the focal point within Agilent should be on outbound logistics, with a special emphasis on customers. Since tracking orders is always a challenge for customers receiving products from all over the globe, the team believed the greatest customer satisfaction improvements would come from making more information available to Agilent customer service representatives, and therefore to customers. This was a unique approach at the time. Most firms and software providers were focusing on making inbound materials visible by establishing private exchanges with the supplier base.

Burke also saw an opportunity to drive internal improvements. For example, instead of relying on carriers and third parties to provide data on how well they performed, the team will be able to use data generated by the Celarix software to evaluate Agilent's service providers. And, by using the tool's electronic proof of delivery (POD) functionality, more transportation and supply chain costs can be driven out of the system. The benefits can positively impact many elements of the cash-to-cash process. In addition, Agilent sees an opportunity to tie carrier payment terms to electronic POD submittal.

As the project unfolded, the team also reinforced the strategic value of logistics management. And what is Burke's suggestions for those starting the journey? "Understand the value and don't underestimate the time and effort needed to complete the task," he said. "Celarix doesn't provide us with better solutions. They provide us with data. It is our job to take the data, turn it into information, and take action."

“Logistics visibility and data is only powerful if it is turned into data and action is taken”

Sean Burke
Global Logistics Solution Manager

In last year's report, we stated that now is the time to develop newer, adaptive supply chain networks that will lead to unprecedented advances in customer service, drive less-responsive firms out of business, and pose significant barriers to market entry. Those firms that wait for a better economic climate may find themselves far behind their more aggressive competitors who have used these trying times to their advantage. In order to build these adaptive supply chain networks, managers at all levels of the organization must focus on building visibility within the organization, as well as with its critical supply chain partners. Our research suggests that this particular driver is one of the most critical components in supply chain management, and that it is the lynchpin for building an adaptive supply chain. It encompasses more than just a capability to track and trace orders. True **visibility** allows all supply chain participants to immediately know when, where, how, and why a problem is occurring with inventory, an order, and/or a shipment.

Visibility requires the integration of information coming from multiple supply chain partners. This information must be seamlessly integrated. Achieving seamless integration does not mean that existing partners need to change their software, hardware, or systems.

Added to this, **visibility** entails fast and easy access to accurate, real-time information. Because supply chain members often have different technology platforms ranging from enterprise to spreadsheets, the complexity of achieving true visibility is greatly increased.

For true **visibility** to be achieved, supply chain members must act as a single "virtual" business entity to meet the respective member needs for being able to answer "when," "where," "how," and even "why" at any point in time.

While it may appear simple for the authors to recommend significant transformation efforts despite the soft economy and risks inherent with change itself, we believe the following to be true:

1. Visibility within firms has not yet matured.

Few firms have achieved reflective logistics, fulfillment or order-to-cash visibility; very few firms have reached the most efficient/complete level of extended visibility. Like the pharmaceutical firm attempting to respond to a critical request for information, many firms today are operating with minimal operational visibility. For many firms, it is that market-altering event that forces the organization to acknowledge that they are unable to respond when in atypical situations. While in some cases there is still time to react, in other cases this lack of responsiveness leads to market decline as well as greater expense in resources to manually achieve acceptable performance.

2. Visibility does not occur in a vacuum.

Along with improved visibility will come improvements in the other five drivers of an adaptive supply chain: connectivity, collaboration, execution, optimization and speed. Without visibility each of these drivers is inhibited and diluted. Connectivity has historically been seen as defined EDI messaging. In the context of visibility we broaden our requirements to flexible XML communications in real time and across multiple technology platforms. While collaboration can take place without technology or sophisticated tools, having extended visibility is the key to effective and efficient collaborative supply chain commerce. When two or more parties can share the same metrics and view a common dashboard, decision quality improves dramatically. Execution has historically been the core of logistics and fulfillment excellence. Our view does not suggest that this driver is any less important. In fact, research indicates that by focusing on extended visibility, the firm is able to greatly improve its overall operational performance. This is an example of leveraging a driver to attain even greater and faster results in another. In the past, optimization was often a static event that in some instances could be done in the logistics manager's head. Today new tools are available to quickly calculate alternate solution scenarios and present these to operators in near-real time. These new tools require vast amounts of information in defined formats in order to be effective. Extended visibility is the key to this information. Furthermore, it is this level of visibility that enables a company to dynamically use optimization in its quest for taking supply chain event management to the next echelon.

3. End-to-end visibility is the desired state of an adaptive supply chain.

Operationalizing all levels of the SCEM pyramid is the core enabler for the transition to an adaptive supply chain business model. As a part of enhanced event management, the ability to "see" the entire supply chain is necessary in order to enable automated response and enabled control. Implementing these control levels of the SCEM pyramid truly allows businesses to be more strategic and adaptive. Managers can spend less and less time fighting fires and reacting, and instead allow the system to take action. Managers have more time to truly be subject matter experts and adapt to an ever-changing supply chain and market.

IV. What does it mean? - Cap Gemini Ernst & Young

Why Visibility?

Over the last two decades, we have seen three generations of supply chain management. In the '80's, firms tried to attain functional excellence, investing in point solutions in order to optimize their functional areas. The '90's saw a quest to develop integrated supply chains; centralized supply chain management departments were created and decision making focused on processes. Today the focus is on creating adaptive supply chains, where collaborative environments are created with a firm's extended enterprise and applications and processes are integrated over the web.

But, the idea of adaptiveness begs a few questions from those in and outside a firm's supply chain organization:

- **How do businesses achieve this adaptiveness?**
- **Why do companies need to continue to invest in supply chain technologies?**
- **Haven't supply chain implementations been going on long enough?**
- **Where do companies start if they still have many processes that wouldn't even qualify as functionally excellent?**

The findings of this year's study demonstrate that the key to more adaptive supply chains is increased visibility, and the means to achieve this is by implementing SCEM solutions. SCEM combines both process visibility and decision elements through electronic connectivity and software systems to seamlessly extract and create valuable real-time information for the appropriate stakeholders along the supply chain. Only then can all stakeholders improve their adaptiveness and derive real economic value for their organizations by better recognizing opportunities and more effectively manage orders, inventory, and shipments.


Many in the organization may feel that this adaptiveness should have already been achieved based on all the investment that has been made in supply chain management solutions. However, these investments may have been fragmented and weakly connected, or perhaps some of the solutions have not kept pace with changes in technology. Moreover, the company may have acquired other businesses, or maybe now you are selling and coordinating demand through multiple channels. SCEM addresses these gaps. It is the new "glue" that binds the total business and technical process to integrate the component solutions and maximize your investment.

SCEM works with a business' other supply chain tools as the enabler to maximize your supply chain investments by providing order, inventory and shipment visibility that in turn improves customer service, trading partner performance, carrying costs and inventory turns and reduces transportation costs.

The study tells us that managers are spending more and more time collaborating with customers, and management is thirsty for meaningful operational metrics; visibility tools can add such value now. But where does a firm start? While SCEM offers significant value as an enterprise-wide solution, it is readily implemented in a step-by-step fashion at the process, event, and scenario levels. Certainly in today's economy, many firms do not have the bandwidth to engage in large-scale, big bang, transformational efforts to attain overall adaptiveness. Instead, the trend is to use such a step-by-step approach to operationalize SCEM and identify the value-add scenarios focusing on core problem areas and then a roll-out to the total enterprise.

In summary, although firms may have made significant investments in supply chain software, implementing a SCEM solution can be the key to bind these solutions together and enable an adaptive supply chain.

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V. What does it mean? - Academic Perspective

Why Visibility?

The concept is easily comprehended yet extremely difficult for supply chains to achieve. Individually, businesses know that having the ability to view orders, inventory and shipments would enable them to manage supply chain events in a dramatically different manner. Most firms have chosen to begin the drive to achieving visibility by focusing on logistics. In almost every case, this begins with tactical-level initiatives that end with track and trace capability. Without being tied to strategic objectives, the value of logistics visibility will not be realized to its fullest extent. That is, without the "bigger picture" view, logistics visibility will not be a compelling force to move the firm toward attaining extended visibility. It is this end-to-end view of events that defines visibility. The strategic focus is important because it encompasses more than the focal firm perspective; it is the entire supply chain acting as a single "virtual" entity.

Managing complex supply chains has caused many firms to rethink how they approach supply chain event management. In order to reach and maintain world-class status, a firm and its supply chain partners must have the capability to answer "when," "where," "how," and "why" in a manner that meets the information requester's needs.

In addition to creating an adaptive supply chain that is capable of effectively and efficiently responding to changing environment conditions, the proven outcomes in achieving visibility include:

Increased ability to do demand-driven replenishment

Lower inventory levels

Reduced cycle times

Use of more cost-effective transportation of finished products.

Visionary firms are working to build innovative capabilities that lead to world-class excellence in supply chain management. Of the six drivers that comprise the state of supply chain excellence, visibility is the key to leveraging the attainment of the other drivers.

The six drivers of logistics and supply chain excellence were first introduced in 2000. At that time, we took an assessment of where firms were with regard to transforming their supply chains to adaptive, responsive networks. In 2000 only a few firms fully understood the compelling need to transform their supply chains. Even fewer of them had begun the process of developing and implementing the drivers of logistics and supply chain excellence that are fundamental to transformation.

Since the introduction of the six drivers - visibility, connectivity, execution, optimization, collaboration, and speed - many firms have used this framework to develop their roadmap for transformation. In the process of operationalizing the drivers, however, firms have repeatedly asked the question "Where do we start?" In other words, which driver should be first in terms of implementation? This year's study has answered that question - visibility. We believe that future research should examine the interactive effect of visibility with the other drivers. For example, it is important to know whether fulfillment visibility or extended visibility would be the best phase to use optimization tools for collaborative supply chain planning. In addition to the interaction focus, it is our plan to research the other drivers to determine if they involve multiple phases of implementation just as we found with visibility.

This year's study and the previous years' research have enabled us to develop a significant base for understanding how organizations can achieve an adaptive state. It is this knowledge that provides the continuation point for exploring answers to the next question that we anticipate from firms: Where do we go from here?

About the Authors



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Alan Montgomery is a vice president in Cap Gemini Ernst & Young's Global Supply Chain Consulting practice, and is the global leader of its Logistics & eFulfillment practice area. CGE&Y's Logistics & eFulfillment Solution encompasses an order-to-delivery process that uses Supply Chain Event Management as an integrator of world class order planning and management on one hand, and logistics planning and execution on the other. Prior to joining Cap Gemini Ernst & Young in 1991, Mr. Montgomery had a 20-year track record of rapid professional growth in Fortune 500 transportation companies. He has served as vice president of marketing for Chemical Leaman Tank Lines, Inc., a specialized truckload motor carrier. Before that he held several senior positions in strategic planning, marketing and finance with Consolidated Rail Corporation, as well as other positions in the railroad industry. He holds an MBA from the Wharton School of Business of the University of Pennsylvania and started his logistics career as a U.S. Army logistics officer, serving both in Berlin, Germany and the Republic of Vietnam.



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About Cap Gemini Ernst & Young

About Cap Gemini Ernst & Young, Georgia Southern University and The University of Tennessee

The Cap Gemini Ernst & Young Group is one of the largest management and IT consulting organizations in the world. The company offers systems integration, and technology development, design and outsourcing capabilities on a global scale to help businesses continue to implement growth strategies and leverage technology. The organization employees around 55,000 people worldwide and reported 2001 global revenues of more than 8.4 billion euros. More information about individual service lines, offices and research is available at www.cgey.com.

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Georgia Southern University

Georgia Southern University is a growing nationally recognized logistics program located in Statesboro, Georgia. The university is a major teaching and research institution. The faculty publish in a wide range of topics and are invited to speak at events across the globe.

The University of Tennessee

The internationally recognized logistics program at The University of Tennessee, Knoxville, is one of the most comprehensive and contemporary programs in the nation. This university is a major research entity. The faculty publishes widely on topics of current industry concern and explores future trends through research and studies. It has been ranked as one of the top schools in the country for educating logistics/distribution managers.

For more information on how to address the challenges and opportunities discussed in this report or to obtain additional copies of this publication, please contact:

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