

Collaborative Transportation Management

White Paper

Version 1.0

developed by the
CTM Sub-Committee of the
VICS Logistics Committee

April 6, 2004

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Collaborative Transportation Management (CTM): a holistic process that brings together supply chain trading partners and service providers to drive inefficiencies out of the transport planning and execution process.

The objective of CTM is to improve the operating performance of all parties involved in the relationship by eliminating inefficiencies in the transportation component of the supply chain through collaboration.

1 CTM Introduction

This white paper provides an overview of Collaborative Transportation Management (CTM), a process for bringing trading partners and transportation service providers together for the sake of “win-win-win” outcomes among all parties. The paper will:

- define and describe “Collaborative Transportation Management”;
- present the business case for CTM;
- illustrate a process for collaboration; and
- provide guidelines for implementation.

We start out by examining why transportation represents an important opportunity for collaboration in the supply chain.

1.1 Why Collaborate on Transportation?

The job of moving goods from where they are produced to where they are demanded is a 24/7/365 job. Transportation consumes 5.5% of the U.S. gross domestic product, and approximately the same proportion of a company’s sales revenue¹. These percentages have declined somewhat for U.S. customers of transportation since the industry was largely deregulated in 1980. A deregulated environment has dramatically intensified competition among carriers. Intense competition, along with rising costs of operation, requires carriers to run an efficient operation or close their doors. While efficiency improvements are abundant over the past two decades there still remain significant opportunities for further improvement. Trucks still run empty approximately 15% to 20% of the time, enduring both real and opportunity costs for the carrier and driver. Waiting to load and unload shipments consumes 33.5 hours of a driver’s time each week, on

¹ Rosalyn Wilson and Robert V. Delaney, *14th Annual “State of Logistics Report”: The Case for Reconfiguration*, presented June 2, 2003.

average, according to 1999 estimates.² Drivers frustrated with long, unproductive waits are easily tempted to abandon the carrier in favor of another, causing driver turnover ratios to hover at around 100% each year.³ Revised hours-of-service (HOS) regulations that went into effect in January of 2004 will further impact the hours available for operation and how drivers will use their on-duty time, worsening the problems of poor utilization and inefficiency. Also, given the mandate for heightened security provisions throughout the supply chain, shippers and carriers must work closely to ensure the safe transit of goods while keeping the costs of enhanced security within reason.

Service implications of transportation are also significant. Transportation service represents a major component of order lead time – the time that elapses from an order placement until the goods are ultimately delivered to a customer. Much of the *variability* in order lead time is attributed to variation in transit times. The criticality of good service is never more apparent than when a truck breaks down, runs into inclement weather, or a preferred carrier goes on strike or, worse, goes out of business. With more and more companies operating on a just-in-time basis, there is less room for error in the delivery process.

Given these concerns, it is important for companies to work together to eliminate inefficiencies, reduce cost, and ensure excellence in the movement of goods. In most instances, there is only so much that a single member of the supply chain can do to resolve the problems noted above. This is why collaboration among partners in a supply chain has become a topic of great interest for many and an essential element of company strategy for others.

Collaboration is not easy and can be hard to define. However, collaboration is more than cooperation. It requires that all companies engaged in a collaborative initiative work actively together as one toward common objectives, sharing information, knowledge, risk, and profits/benefits in an agreed-to, consistent fashion to ensure a common unity of effort. At the operational level, collaboration entails understanding how other companies operate, how they make decisions, and what is important to them. For true collaboration it is critical that all parties involved realize benefits.

1.2 Defining Collaborative Transportation Management

Collaborative Transportation Management (CTM) is a holistic process that brings together supply chain trading partners and service providers to drive inefficiencies out of the transport planning and execution process. The objective of CTM is to improve the operating performance of all parties involved in the relationship by eliminating inefficiencies in the transportation component of the supply chain through collaboration. CTM recognizes two important factors:

² Truckload Carrier Association, *Dry Van Drivers Survey*, June 1999.

³ In other words, a carrier can only expect a driver to remain with the company for an average of one year when the turnover ratio is 100%. This leads to exorbitantly high recruiting and training costs for carriers.

1. More and more companies are adopting new supply chain practices in an attempt to reduce inventory investment and shorten order cycle time, resulting in increased pressure on all parties involved in the logistics process. With such short notice, many carriers are having difficulty synchronizing their assets with customer demand and, in effect, forcing buyers of transportation services (manufacturers, distributors, and retailers) to pay a premium.
2. Superior customer service is a requirement for any successful relationship between trading partners, and the importance of each carrier's contribution is underscored by the fact that many performance metrics, such as on-time delivery and order fill-rate, are directly affected by a carrier's ability to pickup, transport, and deliver goods in a timely, claim-free fashion. By bringing carriers into a collaborative partnership and working with them to reduce operating costs and eliminate inefficiency, sometimes caused unknowingly or unintentionally by the shipper or receiver, all members of the collaboration are expected to benefit.

CTM focuses on enhancing the interaction and collaboration between three principle parties -- a shipper, a carrier, and a receiver⁴, as well as secondary participants such as third-party logistics (3PL) service providers. The CTM process is designed for application to both inbound and outbound transportation flows. As such, both the shipper and the receiver can perform some of the steps in the CTM business process, while other steps are performed individually by either the shipper or receiver. Typically, the party that is ultimately responsible for the carrier relationship/contract would be responsible for the CTM steps. Participants collaborate by sharing key information about demand and supply (e.g., forecasts, event plans, expected capacity), ideas and capabilities to improve the performance of the overall transport planning and execution process, and assets, where feasible (i.e., trucks, warehouses). The process begins with an order/shipment forecast, and includes capacity planning and scheduling, order generation, load tender, delivery execution, and carrier payment.

1.3 CPFR[®] and CTM

One recent collaborative initiative has begun to gain wide acclaim for the benefits it delivers. This initiative, termed Collaborative Planning, Forecasting, and Replenishment (CPFR[®]), is a nine-step business process-model for improving the accuracy of sales order forecasts and subsequent replenishment orders. CPFR requires trading partners to collaborate on sales and demand planning activities and order placement using technology as an enabler of communications and information sharing. Improved process integration and communications among trading partners streamlines planning and forecasting and establishes a basis for aligning corporate priorities and performance goals. Better demand planning resulting from CPFR reduces uncertainty and enables more accurate and timely placement of product on retail store shelves,

⁴ The terms "shipper" and "receiver" are used in reference to the seller and buyer in a trading relationship. Either party may be responsible for hiring and paying for the transportation service under CTM.

increasing sales revenue and operational efficiency through improved shelf availability and reducing costs associated with lost sales and excess or obsolete inventory.⁵

The end result of CPFR is an order forecast which is used to generate replenishment orders automatically. There are, however, no components, processes, or steps defined for executing the order. Transportation and distribution management activities that build orders into shipments, determine the mode/carrier, and tender, schedule, ship, track, and pay for the freight are not part of CPFR. These activities represent the natural extension beyond actual order generation, converting order forecasts into shipment forecasts and ensuring accurate fulfillment. Collaborative Transportation Management (CTM) subsumes these processes, representing a new application of collaboration established to ensure that the benefits of CPFR are properly executed.

CTM may complement the CPFR model. When viewed as an extension of CPFR, CTM builds on the existing relationship between trading partners (shippers and receivers) by extending this relationship to one or more service providers (carriers and/or 3PLs), either on a carrier-by-carrier basis or to a 3PL who may, in turn, act as the collaborative “hub” with their carrier base.

The CTM process can be implemented without prior commitment to CPFR. In this variation, the order forecast that initiates the CTM business process would come from either the shipper or receiver independently as part of the execution of that party’s Sales and Operations Planning process.

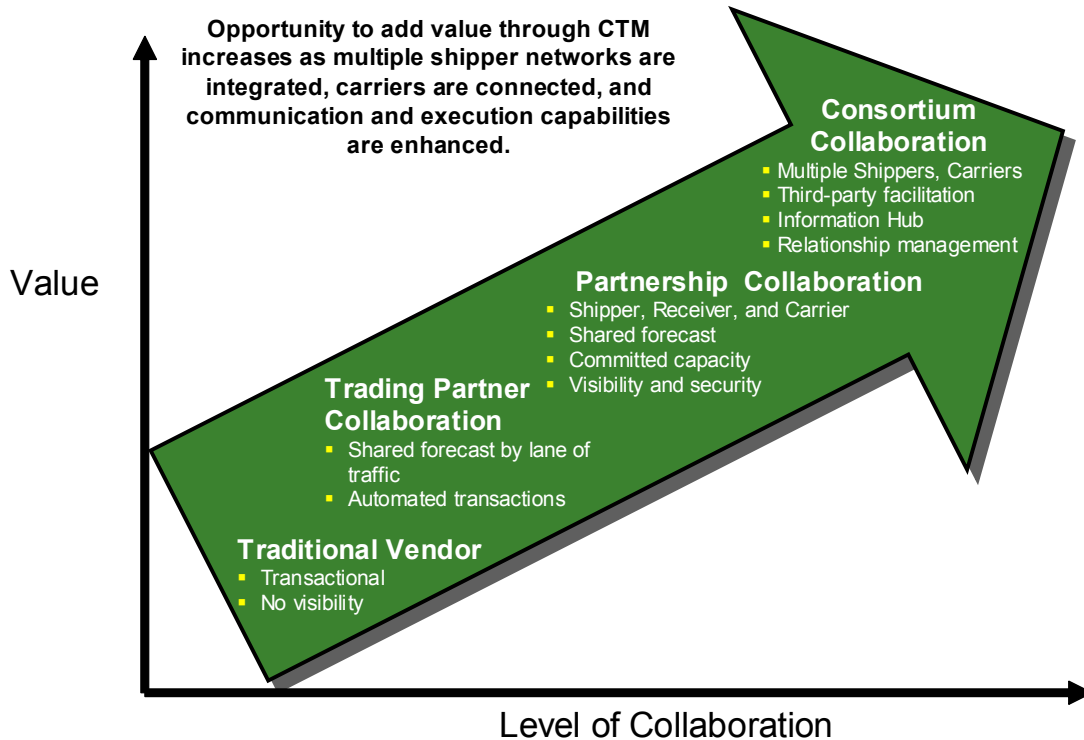
1.4 CTM Value-Add

CTM adds value by attacking transportation inefficiencies inherent in most order fulfillment processes. First, it reduces the amount of dwell time carriers experience waiting to load or unload shipments. Second, it optimizes the weight and/or volume utilization of transportation assets. Third, it reduces deadhead miles by better sequencing and routing transportation assets within a transportation network. Fourth, it reduces the lapses in transportation oversight which can lead to cargo tampering and inefficiency. Finally, it reduces billing errors and inaccurate communications. The benefits can apply not only to the typical forward flow of goods in the supply chain but also to reverse flows, given enhanced coordination between trading partners and carriers for returned or overstocked goods and recyclable/reusable materials.

The opportunities to add value increase as multiple shipper networks are integrated, connecting a broader sphere of shippers, receivers and carriers and enabling enhanced opportunities for communication and improved execution. Central to the effort to connect a network of collaborating parties is the development of a common information hub. In general, the level of information sharing increases with the level of collaboration. Figure 1-1 below portrays the extension of value contribution as the collaborative network expands and information sharing increases.

⁵ Terry L. Esper and Lisa R. Williams, “The Value of Collaborative Transportation Management (CTM): Its Relationship to CPFR and Information Technology,” *Transportation Journal*, Summer 2003, pp. 55-65.

Figure 1-1: CTM Continuum



CTM benefits can be found with short- or long-range planning horizons. For example, if the focus of CTM is on the operational picture expressed days in advance, improvements are recognized in shipment and carrier management (improving asset utilization) and fleet routing and scheduling (improving cycle times and increasing carrier revenue miles). Experience to date indicates that value increases with 2-7 days of advance notice for these operational improvements. As the time horizon extends to months or quarters, collaboration efforts can improve efficiencies in transportation procurement and contracting. Finally, with a planning horizon of up to one year, strategic issues such as supply chain network design, market growth, fixed asset planning, and transportation planning and modeling can be addressed in the collaborative network. Annual forecasts can also prove valuable in contract negotiations. The potential benefits to Return on Assets and Investment are greatly impacted by such long-range strategic initiatives.

1.5 The CTM Process Model Overview

CTM replaces reactionary relationships with proactive collaborations. It allows for innovation in the form of new processes that create value and eliminate inefficient activities. While there have been many models for partnership between shippers and

carriers, the CTM model defines new processes for participants, offering an unprecedented opportunity to establish stronger bonds between shippers, receivers, carriers and 3PLs and gain visibility into potential future business. Importantly, CTM provides carriers with the ability to build business plans with key shippers and receivers to serve their freight requirements. The CTM Business Process is also a new process for the shipper and receiver, extending their collaborative relationship through the delivery of goods with the inclusion of carriers in the partnership.

The CTM process model is comprised of three distinct phases including:

Strategic – Defines the *front-end agreement* to collaborate, including the relationship in freight terms (who pays for and controls the carrier relationship), which products are included, the locations involved, the types of shipments included, and the strategies for managing exceptions;

Tactical – Defines the process flow for *planning* purposes, beginning with the creation of a product/order forecast; and

Operational – Defines the process flow for *executing* against firm customer orders.

Figure 1-2 illustrates the CTM Model and its business processes. The framework is described in detail in Section 3.

Figure 1-2: The Integrated CTM Business Process

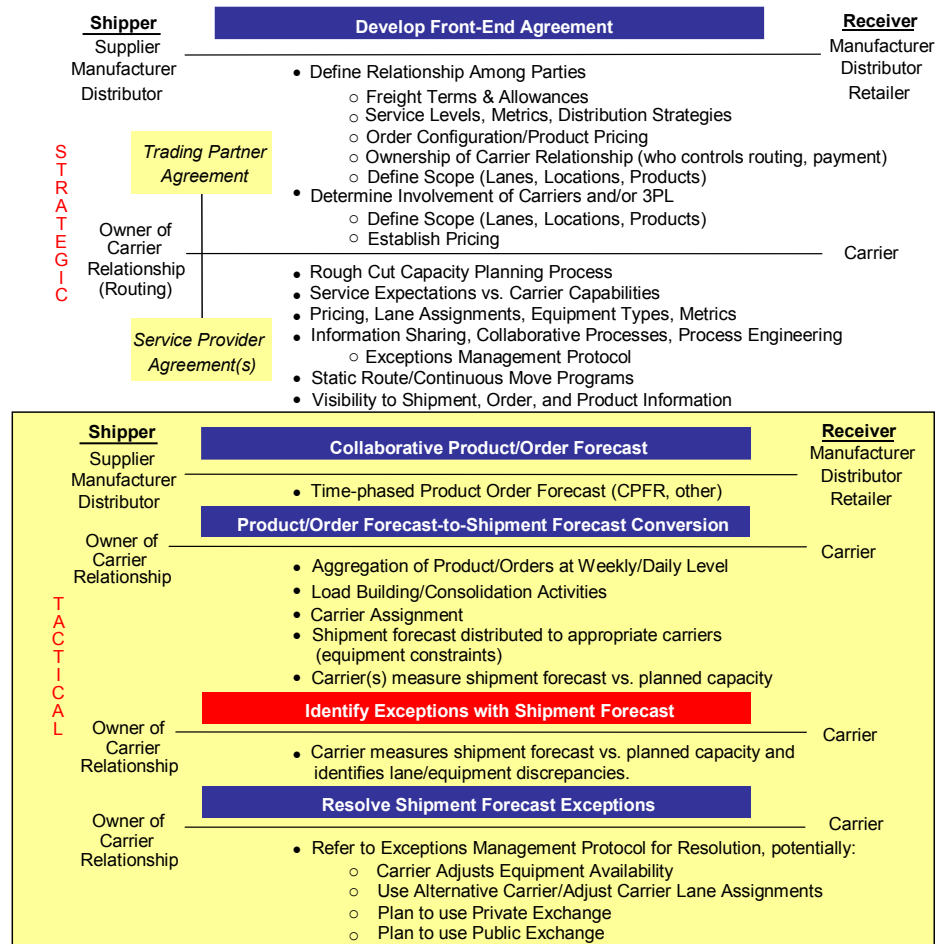
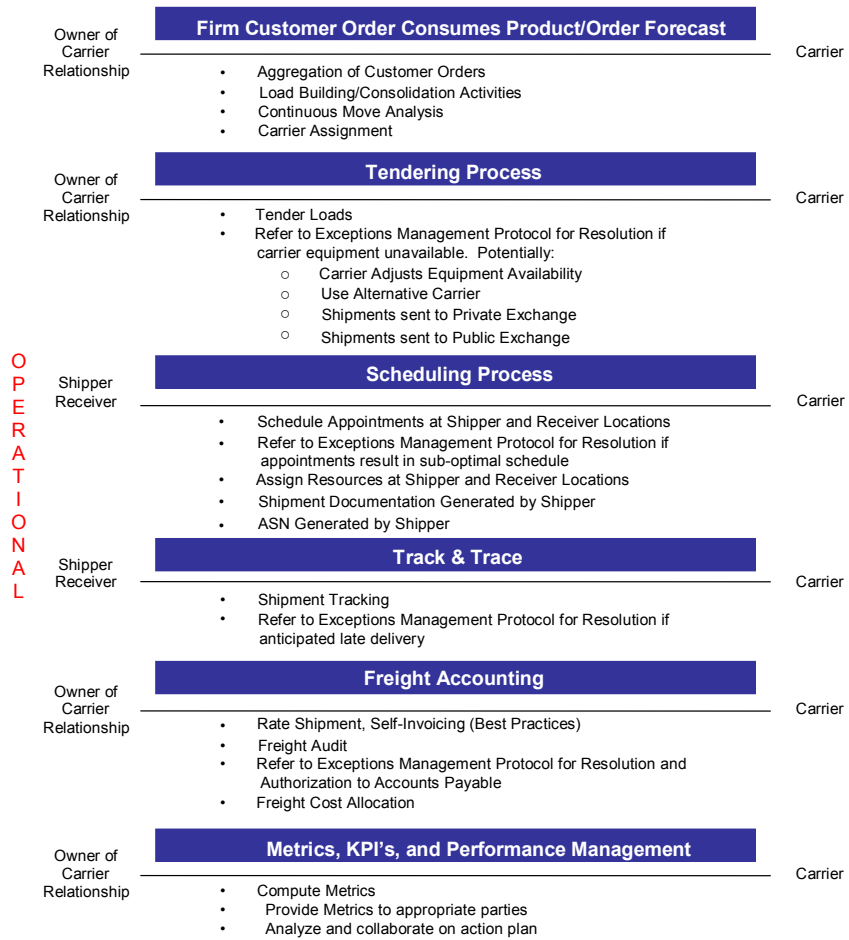


Figure 1-2: The Integrated CTM Business Process (continued)



2 Business Case for CTM

Companies enter into Collaborative Transportation Management for a variety of reasons. Whether it's that empty feeling of leaving money on the table or not perfectly satisfying customers, CTM offers an avenue for improvement – not only for a single company but for all collaborative partners. It recognizes that transportation has become a critical opportunity in supply chain management that, if managed collaboratively, can eliminate cost and service inefficiencies that impede competitiveness. In an age of supply chain competition, there is a certain sense of urgency to act on opportunities with prospective partners before they act on opportunities with competitors.

Despite the need and reported benefits of CTM, the challenge remains converting the often intangible benefits into a sustainable business case in terms of financial value – cost savings and revenue enhancement that can only be accomplished through collaborative effort. Aside from reductions in transportation-related costs, companies stand to benefit from reduced inventory investment and improved asset utilization, among an array of possible benefits. Meanwhile, time represents the most significant investment. Time is not only required to establish the operational readiness for collaboration but, most importantly, to shift cultural attitudes which may not include trusting your competitors or collaborating with your service providers. When changes are called for along these lines, it becomes imperative that the rewards of collaboration be calculated along with the costs. This section establishes the business case for CTM, illustrating the resource commitments, benefits, and a method for justification.

2.1 Key Areas for CTM

Four transaction areas that represent key opportunities for CTM include: 1) capacity procurement, 2) inbound management, 3) integrated movements, and 4) transportation marketplaces. Each area is described along with potential benefits.

2.1.1 Capacity Procurement

Capacity procurement represents the interaction between the shipper and carrier to arrange transportation capacity. Even when transportation capacity is negotiated under contractual arrangements, the carrier must often anticipate the needs of the shipper and make quick, and often imperfect, decisions when a load is ultimately tendered. Through collaborative planning, the carrier can anticipate demand much better than if left to guess where and when demands for service will surface. Providing the carrier with load tendering plans is also beneficial for shippers. Through improved planning, the shipper can seize load consolidation opportunities not otherwise available. The load tendering process is simplified and administrative costs are reduced. The shipper can also reduce the carrier base and better leverage its carrier base nationwide, reducing the shipper's total freight cost. In return, carriers benefit from increased volume commitment, guaranteed lane assignments, process simplification, and reduced administrative costs.

2.1.2 Inbound Management

Inbound management refers to the proactive control of inbound goods flow and management of transportation by the receiver of the freight. By exhibiting better control of inbound freight, the receiver can reduce transportation cost through inbound consolidation and vendor allowance. Compliance issues should be more precisely defined and enforced. Overall lead time and lead time dependability can improve, resulting in better sales with reduced levels of inventory. Carriers benefit from increased volume commitment, guaranteed lane assignments, and advanced scheduling predictability.

Collaboration of inbound management involves not only the carrier and receiver but also the shipper. As a result of transferring freight management responsibility to the receiver (i.e., converting freight payment terms from prepaid to collect), the shipper reduces its own administrative expense and diminishes its risk of shipment refusal. With dependable lead times, inventories can be reduced and, quite possibly, sales will increase.

2.1.3 Integrated Movements

Integrated movements, or continuous moves, involve aggregated volumes for multiple locations within a company, across divisions or even across companies. Shippers and receivers benefit from reduced freight costs, an increased amount of dedicated usage, and improved service. Receivers that enjoy greater control of their inbound freight movements can realize opportunities for coordinated and consolidated inbound-outbound movements. Carriers can improve asset utilization while reducing empty miles, labor cost, and sales and administrative expense. By developing scheduled tours, the carrier enjoys greater familiarity with customers that leads to better service. Scheduled tours may also include closed loop, milk run service to accommodate returnable container usage or any other reverse logistics flow.

2.1.4 Transportation Marketplaces

Transportation marketplaces refer to on-line venues for transportation capacity procurement. The Internet supports real-time matching of supply and demand. Through transportation marketplaces, the shipper has immediate access to capacity that is not normally visible, providing coverage for "unusual" load volumes and avoidance of premium freight costs. Carriers that make capacity available in transportation marketplaces enjoy opportunities for additional business, particularly for loaded backhauls and capacity that might not otherwise be tapped. Automated load tendering can also reduce overall lead time and variance to the benefit of the shipper, receiver and carrier.

2.2 Reported Performance Benefits

CTM pilot initiatives have been implemented in various companies and settings in the U.S. starting in 1999. These pilot projects have demonstrated that the benefits of CTM are very real and substantial. Shippers and receivers have documented gains such as:

- On-time service improvements by 35%
- Lead-time reductions of more than 75% (e.g., average lead time for one customer was reduced from 7 days to 1.5 days)
- Inventory reductions of 50%
- Sales improvements of 23% through improved service to customers
- Premium freight cost reductions of greater than 20%
- Administrative cost reductions of 20%

Carriers have recorded equally dramatic benefits from CTM pilot projects, including:

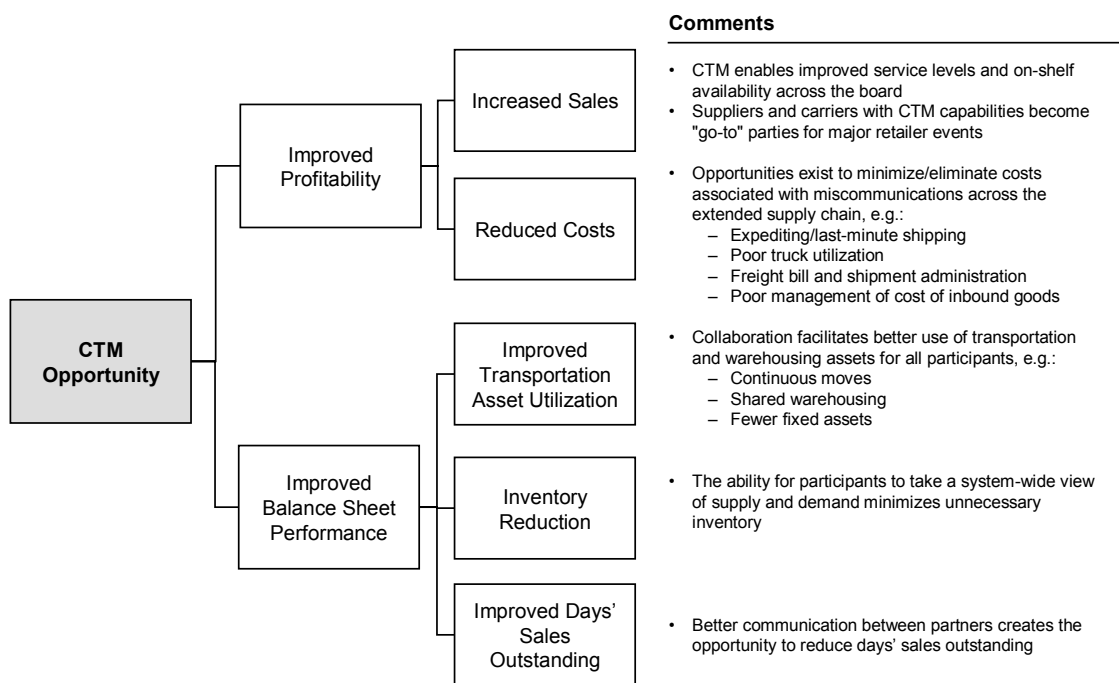
- Deadhead mile reductions of 15%
- Dwell time reductions of 15%
- Fleet utilization improvements of 33%
- Driver turnover reductions of 15%

While these benefits are significant, what value do they lend to the company? What do they mean to the non-logistician? Conveying the dollar value of CTM is the topic of the next section.

2.3 Translating Benefits into Financial Return

No one can deny that improved on-time performance, reduced lead times, inventory reductions, sales improvements, and cost reductions are desirable outcomes. These benefits in and of themselves, however, typically will not justify the investment of time and effort required of collaboration. The business case for CTM must be stated in financial terms that spell out the real costs and benefits in a denomination common across functional boundaries as well as to higher echelons of the firm, i.e., in dollars. Figure 2-1 represents the business case for CTM, illustrating how some of the benefits reported in CTM pilots have translated into improved profitability and balance sheet performance. The increased sales potential and reduced costs result in improved profitability. Better utilization of transportation assets, inventory reductions, and the potential for reduced days' sales outstanding (DSO) yield improved balance sheet performance. The improvements are found among all parties -- shippers, receivers and carriers involved in collaborative effort.

Figure 2-1: Possible CTM Benefits

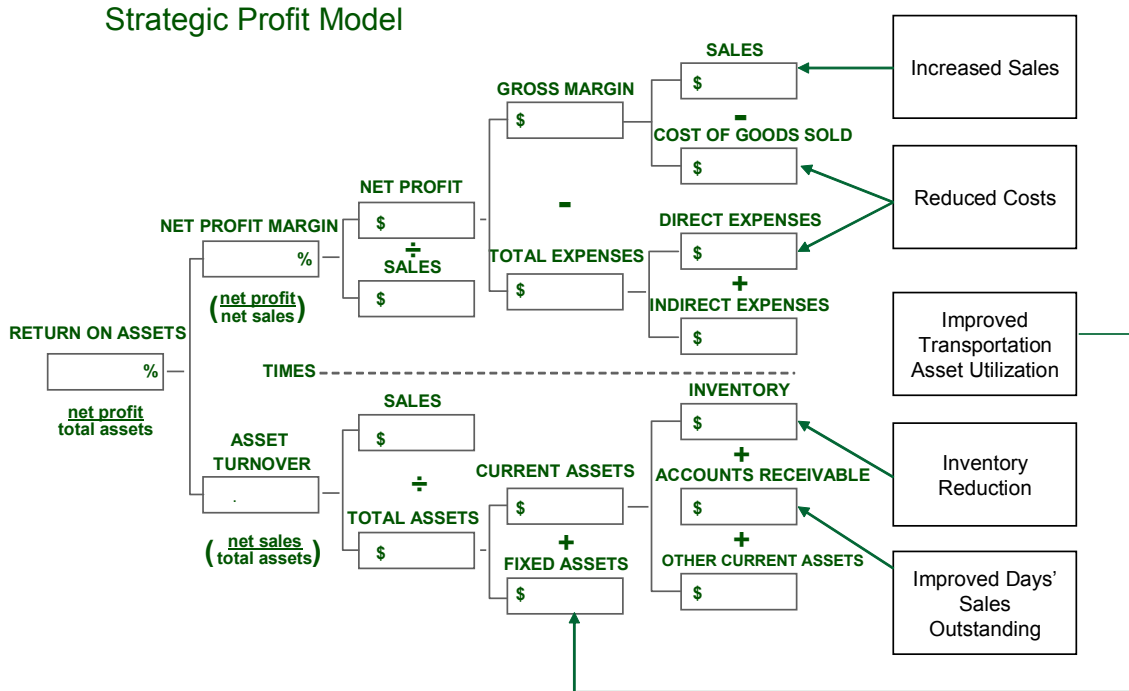


One way to state the business case for CTM is to examine return on assets (ROA) by way of the Strategic Profit Model (also known as the “DuPont Model”). The Strategic Profit Model offers a relatively easy, yet effective way to convey the impact of actions on financial outcomes. More specifically, the model expresses the impact of decisions with regard to cash flows and asset use.⁶ Figure 2-2 illustrates how the benefits of CTM feed the model to generate improved ROA.⁷

⁶ Douglas M. Lambert and Renan Burduroglu, “Measuring and Selling the Value of Logistics,” *The International Journal of Logistics Management*, Vol. 11, No. 1, 2000; pp. 1-17.

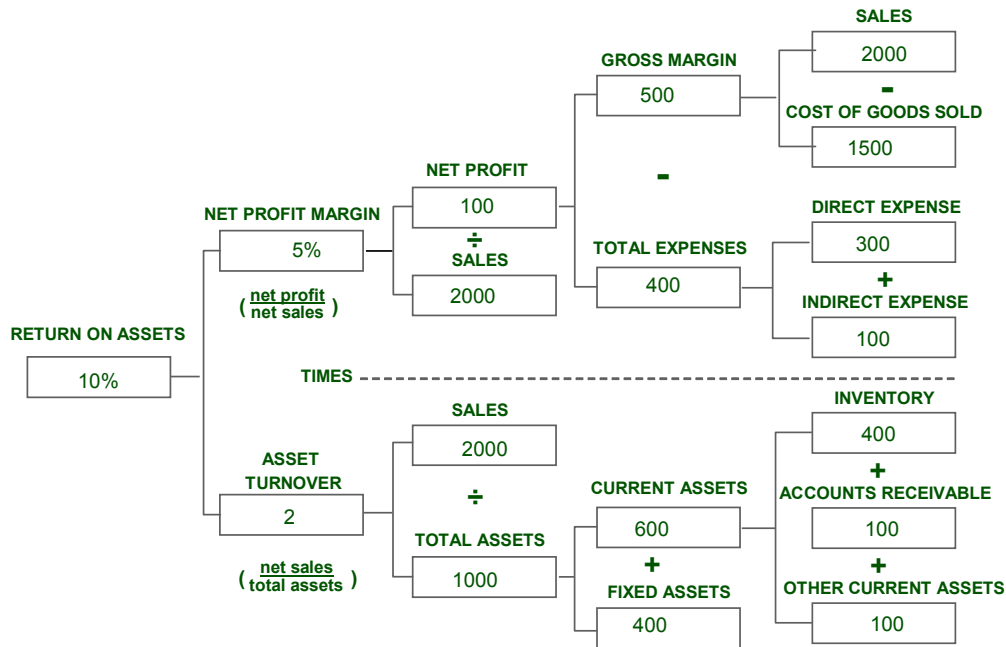
⁷ When multiplied by the firm’s financial leverage (total assets divided by net worth), ROA is converted to the before-tax return on net worth (net profit divided by net worth).

Figure 2-2: Converting the Benefits to Financial Return



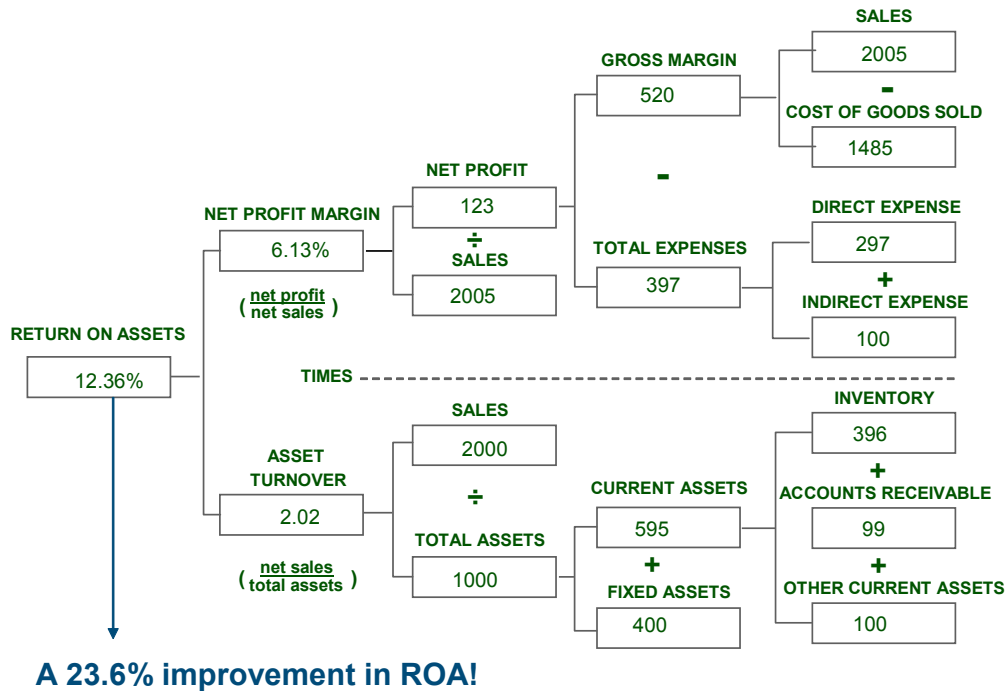
To provide perspective on the potential benefits of CTM, consider the base case scenario below in Figure 2-3. Let's assume a shipper is pondering collaboration with a trading partner and carrier. Given a net profit margin of 5% and asset turnover ratio of 2.0, we find that ROA is 10%.

Figure 2-3: CTM Financial Impact – Base Case



What might be the impact of modest improvements in sales, costs, asset utilization, inventory, and days' sales outstanding? Let's assume a 0.25% improvement in sales, 1% reduction in costs, 1% improvement in asset utilization, 1% reduction in inventory, and 1% reduction in days' sales outstanding -- values that pale in comparison to those reported in pilot CTM initiatives. When fed into the Strategic Profit Model below (Figure 2-4), we find that net profit margin improves from the base case (5.0%) to 6.13% while asset turnover also improves from 2.0 to 2.02. The product of these two values (6.13% x 2.02) yields an ROA of 12.36% -- a 23.6% improvement over the base case scenario! The business case for CTM becomes all the more clear and meaningful to C-level executives when expressed in these terms. Of course, any determination is only as good as the data that feed it. Therefore, careful consideration of all model inputs and assumptions is imperative for valid conclusions.

Figure 2-4: CTM Financial Impact – Improvement in ROA



Surprisingly, very little capital investment is required for Collaborative Transportation Management. While a sufficient level of information system capability is required to capture and process needed information, physical assets are generally not required to bring about the results of CTM. Rather, the primary forms of investment involve people and time. As noted in the introduction to this section, resources and commitment are required to build internal readiness for CTM and to create the collaborative culture within and between parties. The final two sections of this document describe the CTM business process as well as guidelines for achieving readiness and an accommodating culture for the collaboration.

In summary, the returns of CTM far outweigh the investments required. The returns are potentially significant with positive impacts to profitability and balance sheet performance. The Strategic Profit Model is one tool among many that can illustrate the favorable impacts of CTM outcomes like improved sales, reduced administrative costs, reduced inventory investment, and the like on the company's financial position. This approach can be applied by any party participating in the collaboration – shipper, carrier, or receiver. Now that the business case has been established, the next section describes how to achieve CTM.

3 CTM Processes and Enablers

The diagrams depicted below (and previously introduced at the end of Section 1) describe the CTM Model and its business processes. This section will describe the model in detail.

Figure 3-1: The Integrated CTM Business Process

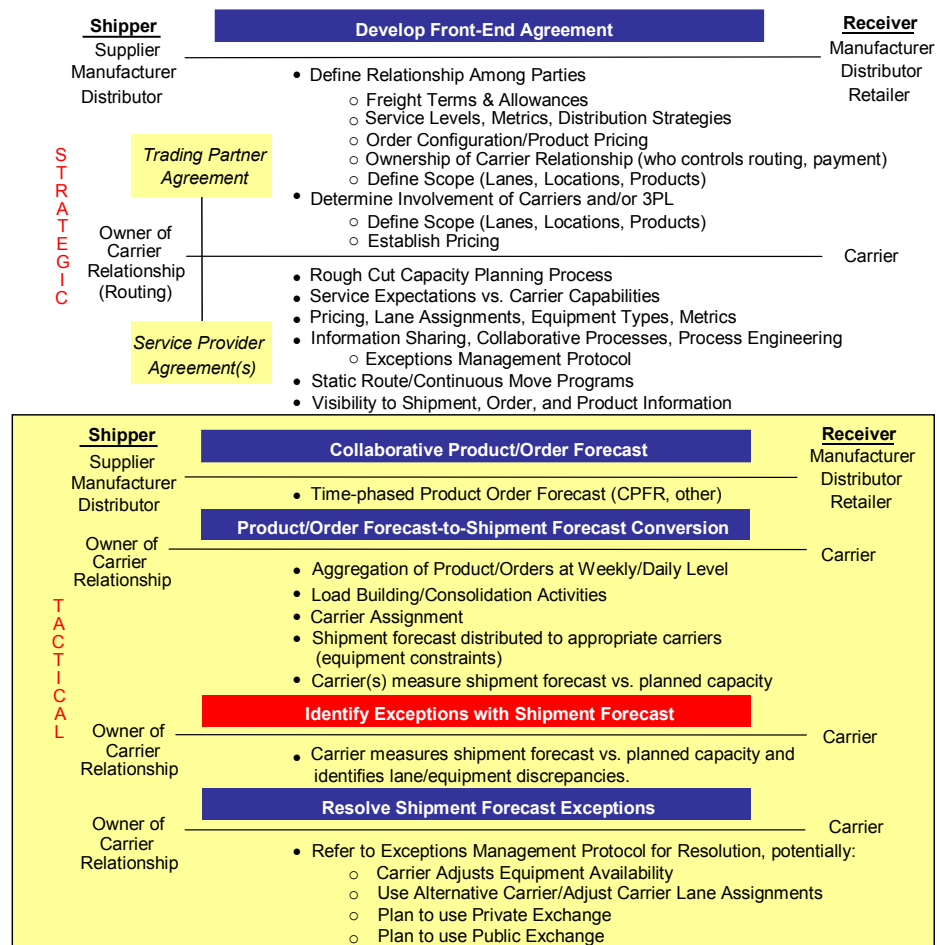
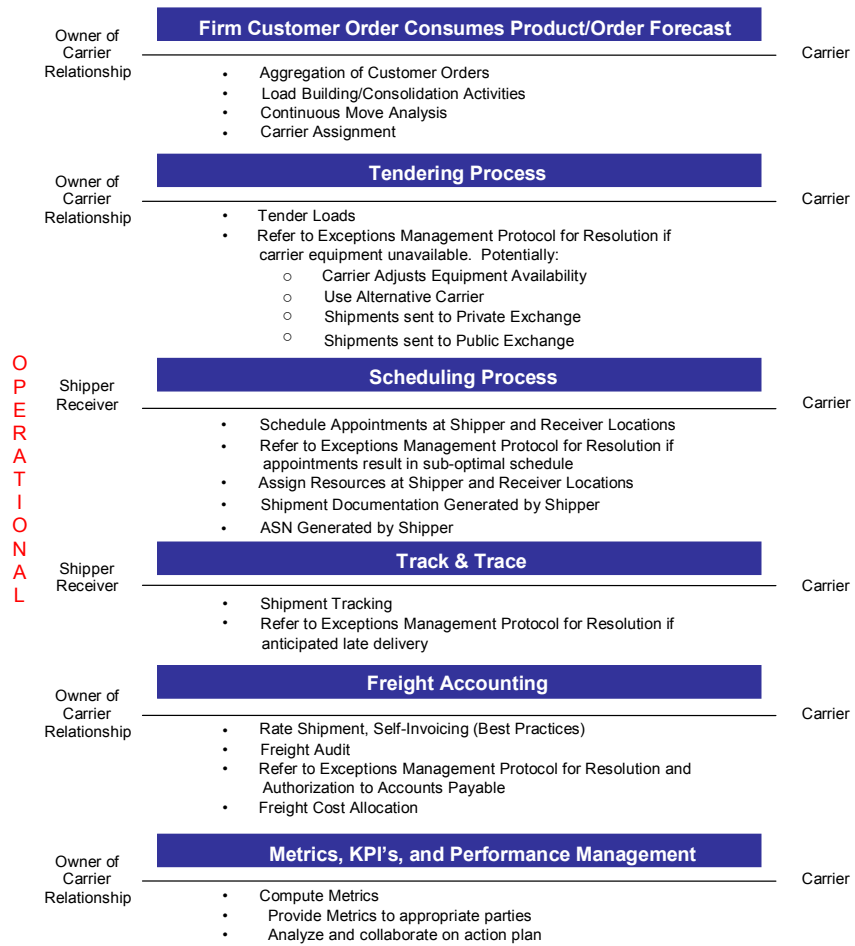


Figure 3-1: The Integrated CTM Business Process (continued)



3.1 Phase I - Strategic Component: Front-End Agreement

Before engaging in Collaborative Transportation Management, trading partners (shipper and receiver) must first agree on critical elements of the relationship. The strategic phase defines the formal Front-End Agreement to collaborate that delineates these elements. The Front-End Agreement should formalize the agreed upon period of time in which the relationship is valid. The agreement also defines the scope of the relationship between the parties to determine which process steps are to be performed, what data will be shared, and how that information will be communicated amongst all parties. Finally, the agreement should specify the goals of the relationship (e.g., reduce cost by X%, increase on-time delivery by Y%).

Furthermore, the Front-End Agreement provides an opportunity for companies to define freight terms, geographic scope of the partnership, and distribution strategies to be utilized. A key point that should be addressed is determination of who will manage the

carrier and/or 3PL relationships. Ultimately, one party should assume responsibility for managing the carrier relationship; this is usually the party responsible for routing decisions and payment remittance. Topics that should be included in this responsibility include freight terms (who pays for and controls the move), which products will be included, the locations that will be involved, the types of shipments that will be included and the exceptions management protocol. Additionally, the agreement should delineate performance metrics and the manner in which expected benefits will be shared.

Depending upon the business environment, multiple carriers or a 3PL also may join the shipper-receiver relationship. These parties should engage with the full understanding of previously agreed upon goals, as well as with the commitment from all parties that the goals -- whether focused on cost reduction, improved efficiency, or both -- should be extended to all parties in the relationship. All parties must agree upon lanes of operation that fall within the scope of the collaboration, the exact data to be transmitted, the format and timing of transmissions, the performance metrics used, the protocol for handling exceptions, and, most importantly, how the benefits will be shared. It is assumed that actual partnership performance will provide the framework for future pricing levels. Collaborative partners must find the balance between the level of specificity required to make the relationships work and the placement of limitations that can stifle the benefit potential in the relationships.

3.2 Phase II - CTM Tactical Component: Business Process using Product/Order Forecast

The second phase of the CTM model defines the tactical component of the process, which focuses on planning shipment requirements. Phase II begins with the handoff of a product/order forecast. Since transportation typically operates on the basis of orders and shipments, the initial time-phased product/order forecast is rolled up and extended to a shipment forecast using pre-determined load building strategies (i.e. aggregation or consolidation). The shipment forecast should be shared with all parties to the relationship. The trading partner responsible for the carrier relationship should handle both the load building and carrier assignment activities. The intent here is to help the carrier(s) anticipate future equipment demands by providing an advance look at anticipated shipping volume. The timing of this process will vary among collaborative partners with the key question centered on determining how long in advance of a shipment date does the carrier need to know the shipment characteristics (ship date, delivery date, ship from, ship to, weight, cube, units, pallets, special handling provisions). The answer may be days, weeks or months depending upon a carrier's flexibility in deploying assets.

Upon receipt, each carrier reviews the shipment forecast (consider these "advanced load tenders") and measures its ability to support the projected volumes with equipment. If a carrier is unable to meet a requirement(s), then all parties fall back to the exceptions management protocol defined in the strategic component of the CTM process model. Potential resolution scenarios may include changing delivery requirements on some of the shipments, using alternative carriers, or using a public marketplace/exchange for

coverage. As the shipping time horizon narrows, the product/order forecast and the resulting shipment forecast become more accurate, thus providing carriers with better information to plan their capacity requirements. Additionally, by providing accurate shipment forecasting in advance, carriers will have a reduced need to react to equipment requirements at a moment's notice, easing capacity constraints and improving the efficiency of equipment deployment and utilization. This benefit may not be as valuable to non-capacity constrained carriers such as LTL or parcel/air delivery carriers.

3.3 Phase III - CTM Operational Component: Firm Orders

The operational component of the CTM Model defines the process flow for the logistics activities required to execute and fulfill firm customer orders. Phase III, therefore, focuses on planning, executing, and accounting for actual shipments. The key difference between the CTM operational process and most current operational processes is that the CTM process leverages previously agreed upon protocols, e.g., distribution strategies and exceptions management protocols. As firm orders are placed, the owner of the carrier relationship(s) will plan the orders into shipments using the agreed upon distribution strategies (i.e., aggregation, pooling, cross-docking, load building, continuous moves) and agreed upon carrier assignments. Capacity-constrained carriers will receive electronic load tenders, and if unable to provide equipment as planned, the agreed upon exceptions protocol is employed. As carriers accept the shipment tenders, appointment is scheduled and shipping/receiving resources are reserved. As the shipper prepares and ultimately ships an order, appropriate documentation and information (e.g. ASN, shipment status) are generated and transmitted to all parties in the format agreed upon in the Front-End Agreement. When exceptions affecting the overall performance of the partnership occur (e.g. late delivery is anticipated), the appropriate exceptions protocol is referenced. Finally, the freight accounting process is activated to ensure that the carrier is paid per the terms of the Front-End Agreement or following the exceptions protocol to resolve any discrepancies.

The CTM Tactical Component occurs concurrently with the CTM Operational Component. For example, the product/order forecast may be provided to the carrier on a weekly basis starting six weeks in advance for tactical planning, while the operational process occurs daily with real orders being provided one week in advance.

3.4 Data Collection Process

The CTM Process Model must ensure that all data supporting performance measurement are gathered at each step of the process. The following types of data prove helpful in assessing each party's performance, identifying areas for improvement, and providing a better understanding of the overall gains associated with CTM:

1. Shipment volume characteristics (e.g. weight, cube, units, pallets) so that "actual" shipment volumes can be compared to "forecasted" shipment volumes, allowing

companies to measure forecast accuracy and thus its importance in planning capacity. In addition, these data allow companies to measure carrier equipment utilization;

2. Shipment tendering results, including date/time stamping, in order to measure carrier responsiveness as well as their ability to provide the needed equipment;
3. In-transit shipment information (e.g. en-route location and status) so a determination can be made if a shipment will or may be late;
4. Actual pickup and delivery times (e.g. carrier arrival time at pickup, loading time, carrier departure time at pickup, carrier arrival time at destination, unloading time, carrier departure time at destination) provide insight into on-time pickup and delivery performance as well as carrier dwell time, dock availability, and loading/unloading times;
5. Claims information allows companies to assess carrier performance and better determine the value of goods damaged or lost while in-transit; and
6. Freight payment information (e.g. freight bill amount, adjustments, reasons for adjustments, pay amount, date) so the accuracy and timeliness of the freight payment process can be measured.

Aside from these data collected for the sake of performance measurement is information that supports day-to-day execution. Freight descriptions such as freight classification, hazardous material indicators, and other special provisions for handling and security provide greater assurance that sufficient care is rendered throughout the delivery process, minimizing counts of accident and severity of accidents. Some shippers and carriers have found success in using a load number, or shipment ID, as well. These load numbers are distinct from purchase order numbers, with one assigned to each shipment. The load number provides a common reference for all parties in the transaction and enhances shipment visibility as product moves through the entire supply chain. The use of load numbers common to the members of a collaborative relationship facilitates the capture of performance measurement data listed above.

3.5 Key Enablers and Impediments to Collaboration

In order for collaborative business initiatives such as the CTM process to succeed, key activities and enablers must be in place. These enablers support best practices in critical activity areas and help overcome the impediments that inevitably surround collaboration. If the enablers are in place and impediments are removed, supply chain partners can capture the value of CTM.⁸

One critical enabler of CTM success is establishment and mastery of transportation best practices. Such practices are separate from CTM but create the needed foundation for CTM success. Best practice transportation plays a central role in seamless supply chain operations, moving inbound materials from supply sites to manufacturing facilities, positioning inventory among different plants and distribution centers, and delivering finished products to customers. Benefits accruing from world-class operations at the

⁸ John T. Mentzer, James H. Foggin, and Susan L. Golicic, "Collaboration: The Enablers, Impediments and Benefits," *Supply Chain Management Review*, Vol. 4, No. 4 (September/October), 2000, pp. 52-58.

points of supply, production, and customer locations are pointless without the accompaniment of excellent transportation planning and execution. Having inventory positioned and available for delivery is not enough if it cannot be delivered when and where needed in a cost efficient manner. In order to meet ever-increasing expectations, the basic work of transportation has changed from operationally meeting low cost *or* high service criteria to providing a strategic edge by simultaneously meeting elevated service requirements *and* increasingly lower costs. Successful managers today require a broad view of transportation management's role and responsibilities in an integrated supply chain.⁹ The following list summarizes transportation best practices that facilitate CTM success:

- Increase operational control and centralize transportation management
- Establish a core carrier program; rationalization and reduction of carrier base
- Institute proper contract terms and conditions
- Optimize daily transportation plan: Consolidation (economic loads) and selecting lowest cost carrier
- Implement electronic tendering
- Implement shipment status reporting and visibility for orders, shipments, and inventory
- In-source freight payment; implement self-billing
- Eliminate freight bills for contract carriers; pay on agreed milestone/timeframe
- Establish concise KPIs and metrics; ensure compliance
- Implement trading partner report cards and quality reviews
- Establish Continuous Improvement programs
- Implement accurate freight cost allocation and cost/unit reporting
- Implement transportation financial analysis

While developing best practice transportation is central to CTM success, other key enablers are equally important. These enablers are related to human resource management. Successful collaboration is a function of how well people work together both internally and with collaboration partners. The following list entails key people-oriented enablers of CTM success:¹⁰

1. **Common Interest** - All parties need to have a stake in the collaboration's outcome to ensure their ongoing commitment.
2. **Openness** - For a relationship to work, the partners must openly discuss their practices and processes. Sometimes this means sharing information traditionally considered proprietary (though adherence to anti-trust guidelines remains prerequisite).

⁹ Theodore P. Stank and Thomas J. Goldsby, "A Framework for Transportation Decision Making in an Integrated Supply Chain," *Supply Chain Management: An International Journal*, Vol. 5, No. 2, 2000, pp. 71-78.

¹⁰ John T. Mentzer, James H. Foggin, and Susan L. Golicic, "Collaboration: The Enablers, Impediments and Benefits," *Supply Chain Management Review*, Vol. 4, No. 4 (September/October), 2000, pp. 52-58.

3. **Recognizing who and what are important** - Not all prospective collaborators and supply chain activities are created equal. Choose those that will deliver the greatest benefits.
4. **Mutual help** - When addressing supply chain problems or opportunities, the old adage applies "two heads are better than one."
5. **Clear expectations** - All parties need to understand what is expected of them and others in the relationship.
6. **Leadership** - Without a champion to move collaboration forward, nothing significant will ever be accomplished.
7. **Working together and adjusting to one another** - There's no CEO of the supply chain, so the partners have to work collaboratively to figure out how to get the job done.
8. **Cooperation, not punishment** - When things go wrong in a relationship, punitive actions seldom make them better. The right approach is to solve the problem jointly.
9. **Trust** - This basic human quality must be evident throughout the organization -- at every management level and functional area.
10. **Benefit Sharing** - In a true relationship, the partners need to share both the pain and the gain -- use of a shared modular supply chain scorecard can help.

Finally, advanced information technology (IT) is essential to enabling collaborative relations across the supply chain. Communication and process automation achieved through IT enables CTM by facilitating real-time data transfer and reducing transaction costs and risks. While not enough to ensure success by itself, IT, when combined with effective human skill development in data analysis and information utilization, enables realization of the benefits associated with CTM.

In addition to enablers of CTM success, firms seeking to implement the CTM Model should be able to recognize and avoid debilitating impediments to CTM success. Many of these impediments stem from behaviors, attitudes, and practices associated with traditional business operations. The following list summarizes primary reasons for failure of collaborative initiatives.¹¹

1. **Doing things the old way** – The natural resistance to change that confronts any broad initiative like supply chain collaboration.
2. **Conventional accounting practices** - These practices become impediments to collaboration when they focus on the traditional accounting role of determining the value of a single firm, rather than measuring cross-company values.
3. **Tax laws** - Tax laws dictate the need for a clear "price paid" and "price sold" to determine profitability. Yet these practices can obscure the synergistic, and often indirect, cost savings that are primary drivers of supply chain collaboration.
4. **Limited view of supply chain** - The legacy of the traditional silo organizational structure in which people think only about their own functional area.

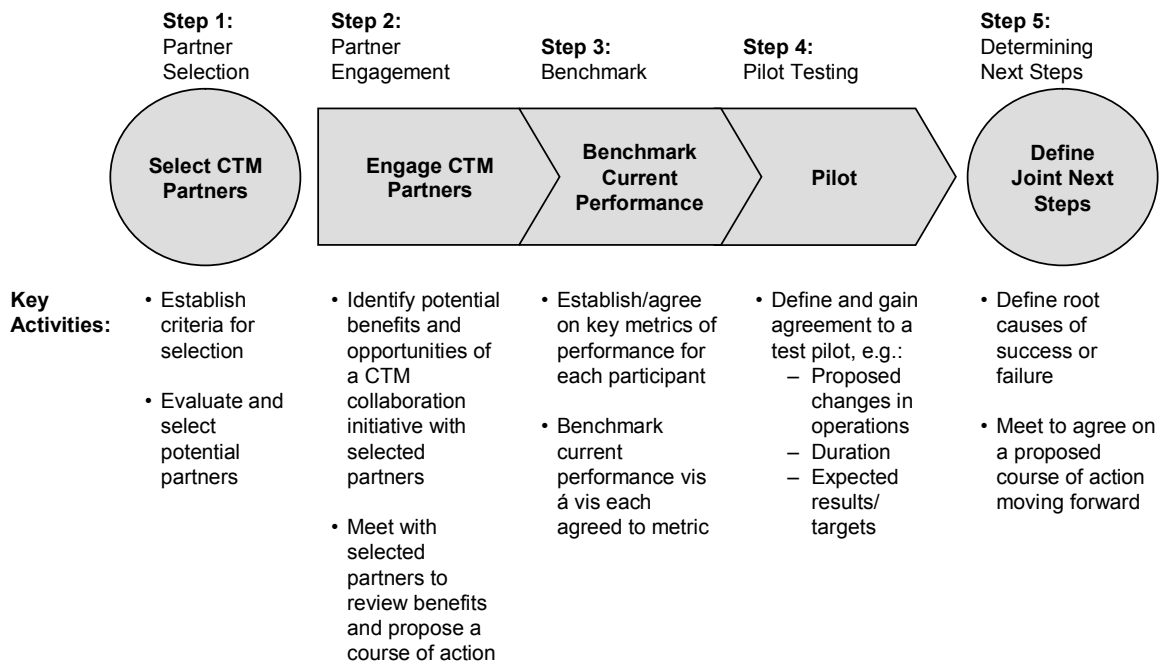
¹¹ John T. Mentzer, James H. Foggin, and Susan L. Golcic, "Collaboration: The Enablers, Impediments and Benefits," *Supply Chain Management Review*, Vol. 4, No. 4 (September/October), 2000, pp. 52-58.

5. **Annual negotiation process** - Annual negotiations consume time and energy, plus they are usually adversarial. There are better alternatives.
6. **Time investment** - Collaboration takes time and a lot of hard work. To get people to make the necessary effort, they have to be clearly shown the expected benefits.
7. **Inadequate communication** - When communication between supply chain partners is nonexistent or inadequate, the potential for problems increases exponentially.

4 Guidelines for Adopting CTM

Despite the documentation of the CTM model and its business processes, the task of implementation can seem daunting. Where does one start? The CTM sub-committee has devised a five-step approach for getting started. Primary to any CTM implementation is the selection of CTM partners. Engaging partners in the prospects and methods of collaboration is the next step. Determining the bases of assessment, pilot testing the collaboration, and defining next steps follow. Each step is described in detail below. This approach and the key activities associated with each step are illustrated in Figure 4-1.

Figure 4-1: Potential Approach for Getting Started



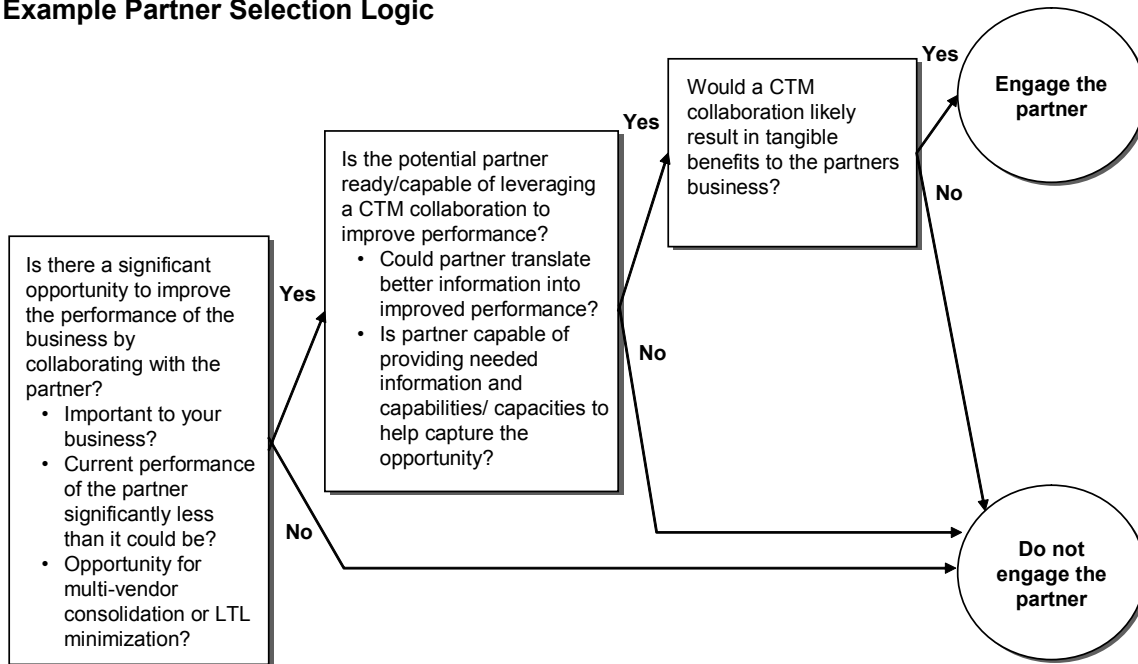
4.1 Step 1 – Partner Selection

Collaboration is not meant for every situation. That is, collaborative effort must result in gains for everyone involved. If outcomes involve only one party gaining, and the winner's gains are not shared to offset the losses of others, the collaboration should not be pursued. Therefore, no single party can only consider what it stands to gain from the effort. The initiative must represent a collective win. However, the potential for gain

among all parties is not sufficient for collaboration. The collaborative partners must also have a willingness and ability to engage in pursuit of the gains. Figure 4-2 depicts the decision logic for selecting a potential CTM partner.

Figure 4-2: Step 1: Partner Selection

Example Partner Selection Logic



The willingness to engage involves the recognition of the time and effort required to find the opportunities. Also, the willingness to share critical information with collaborative partners – information that up until now had never been shared – is key driver of success. Having faith in the collaborative partner(s) is essential, trusting that the rewards of sharing the information outweigh the potential risk.

The final requirement is ability. Having good opportunities and good intentions will only get you so far. The partners must individually and collectively have the skills and information capabilities to seize the opportunities. Management and analytical skills are necessary for finding the value and selling the prospects with internal and external parties. As noted in Section 3, information technology represents a critical enabler of CTM. With the exception of transportation marketplaces, however, CTM is not a “technology solution.”

While outside parties such as third-party logistics providers are not required of CTM, they can serve as facilitators of communication or execution. This is particularly true when potential for gains are found among trading partners but capabilities are lacking. The presence of an unbiased, capable intermediary can sometimes make collaboration possible when it might not exist otherwise.

4.2 Step 2 – Partner Engagement

Upon selecting prospective partners for collaboration, engagement commences. The natural starting point for partner engagement is the introduction of possible benefits enjoyed from collaborative effort. Opportunities should not be limited to those preconceived by the initiating party. In fact, the brainstorming of potential benefits can serve as a starting point for collaboration.

Once potential benefits are identified, attention shifts to determining the requirements for successful collaboration. Again, this planning does not call for a unidirectional flow of ideas, demands, or requirements. The relationship must offer opportunities for gains among all parties and, in turn, all parties must be involved in determining how the gains will be achieved. Consensus is required to ensure the anticipated effort and outcomes of collaboration are realistic and attainable. The business processes outlined in Section 3 provide insight regarding the respective roles and responsibilities of each party.

Beyond recognizing the responsibilities of each party in the collaboration is the identification of key personnel in each company that will drive the relationship at a strategic level as well as those directly involved at the tactical and operational levels. These “touch points” fulfill the integral function of keeping the collaboration alive through regular interaction and the collection of benefits. Figure 4-3 lists key discussion points that support partner engagement.

Figure 4-3: Step 2: Partner Engagement

Key Discussion Points With Potential Partner

Key Discussion Point(s)	Comments/Learnings
1. Articulate Potential Benefits, e.g.: <ul style="list-style-type: none"> • Advance product level visibility • Reduction of lead time • Advance scheduling opportunities • Elimination of freight bill and shipment administration • Ability to scorecard and quantify root causes • Consolidation opportunity • Continuous moves • Increase in business • Advance notification/projecting of moves • Expense minimization 	Its important to demonstrate the full breadth of potential opportunity for all partners involved
2. Present a broad outline of a potential plan and requirements to capture the opportunity <ul style="list-style-type: none"> • Key changes in operations (e.g., increased visibility to in-transit shipments, extended demand forecast) • Critical requirements for you and the partners to make it successful (e.g., early involvement of transportation group) 	Translating the opportunity into a tangible set of operational requirements will help partners to see that the opportunities are real and attainable and give them something to grab on to and engage in a discussion
3. A suggested approach for moving forward together <ul style="list-style-type: none"> • List of suggested next steps • Suggested teams/resources to be involved 	Suggesting next steps will move the discussion to action

4.3 Step 3 – Collaborative Assessment

“If you’re not keeping score, you’re only practicing.” “You can’t manage what you don’t measure.” These axioms of measurement find relevance in the pursuit of CTM. As noted in Section 3, performance measurement is instrumental in guiding the collaborative relationships. The measures themselves must be agreed upon, defined, understood, prioritized, gathered consistently, and shared with collaborative partners.

Table 4-1 lists key performance indicators (KPIs) of logistics management that are likely to be affected by CTM. To understand the relationship between operational activities and strategic imperatives, the measures should be related to the business case for CTM. In other words, if inventory reduction is a significant driver of CTM, inventory levels and measures of service reliability should serve as focal points of assessment. Improvements in these measures should correlate very closely with the desired outcome, reduced inventory levels. It’s in this regard that prioritizing measures is important. Given an array of measures, which ones are critical to the success of CTM in the eyes of all participants in the collaboration? Not all measures are equally important nor is there a single set of measures that should serve as the focus for any given CTM initiative.

Table 4-1: Logistics Metrics Affected by CTM

KPI	Measure	Definition	Example
Days' Supply On-Hand	Inventory days	Value/units of inventory (cost of goods) divided by the value/units of average daily sales (based on past 6 months' history or on forecast for next 6 months) of these products	Avg. value of inventory = \$5,000 Avg. Daily Sales = \$400 Inventory = 12.5 days
On-time Delivery	% Shipments on-time	Number of shipments delivered on-time divided by the total number of shipments	Shipments on-time: 80 Total shipments: 100 On-time % = 80/100 = 80%
Fill Rate	% Order in full	Number of order lines/cases/SKUs delivered in full divided by the total number of lines/cases/SKUs ordered	Ordered: Product A = 100 cases Product B = 60 cases Delivered: Product A = 100 cases Product B = 50 cases Line Fill Rate = 50% (1/2) Case Fill Rate = 93.75% (150/160)
Out-of-Stock Frequency	% Out of stock	Number of items not available divided by the number of items ordered	Out-of-stock should be measured as frequently as capabilities allow (e.g., daily, weekly, audit). The target is a systematic approach to daily measurement.
On-Shelf Availability	% On-shelf availability	Number of days/hours the product is available on the shelf divided by a defined period of time	There is a wide range of measurement methods for on-shelf availability. It is recommended to agree on the measurement among the trading partner's, including the time of measurement.
Order Lead Time	Days/Hours	Number of days/hours it takes from order generation to order receipt	Order sent at noon. Picked and shipped at 17:00 the next day + 6 hours of transit time Lead time = 35 hours (1.4 days)
Capacity Planning	Days	Number of days for frozen period of capacity plan	A manufacturer plans capacity two months in advance and does not adjust it afterwards (KPI: 60 days)
Transportation Planning	Days	Number of days for frozen period of transportation plan	A supplier schedules trucks two weeks in advance and does not change the plans (KPI = 14 days)
Full Truck	% Full truck	Number of trucks with over 95% of volume full divided by the total number of trucks shipped	Number of full trucks in May = 20 Trucks with less than 95% fill = 10 % Full Truck = 66.6% (20 out of 30)
Vehicle Fill	% Vehicle fill	Average volume of vehicles used divided by the total volume of vehicle	Number of full trucks = 20 Trucks filled at 80% = 10 % Vehicle Fill = 93.3%
Empty Running	% Empty running	Number of miles driven empty divided by total miles driven	Miles driven empty = 300 Total miles driven = 6,000 % Empty Running = 5% (30/6,000)
Distribution Costs	% of Sales	Total distribution costs (e.g., transportation, warehousing, inventory) divided by sales dollars	Total distribution cost = \$750 Total sales = \$2,000 KPI: % Sales = 37.5% (750/2,000)
Invoice Accuracy	% Invoice accuracy	Number of lines with matching data (specification and price) divided by total number of lines	16 lines ordered 10 lines match 100% % Accuracy = 62.5% (10/16)

4.4 Step 4 – Pilot Testing

Once all parties recognize the potential of CTM and agree to the general roadmap for achieving the benefits, engagement can proceed to pilot testing. Pilots conducted to date have identified the following key elements that, when adopted, elevate the probability of pilot success.

- **Define the procedures in detail.** Everyone must understand the rules of engagement. Procedures must be in place to address potential problems or changes in the relationship(s).
- **Ensure clear responsibilities.** All participants must understand their respective roles in the planning and execution activities. For instance, are the terms of purchase and terms of routing properly delineated and understood?
- **Establish the pilot duration and timeframe upfront.** The pilot must be substantially long enough to yield the anticipated benefits of collaboration yet short enough to allow for reworking, if necessary. “Time outs” should be scheduled on a regular interval (weekly/bi-weekly) to assess the initiative’s progress in its early stages.
- **Agree on the benefits.** The objectives for each party in the collaboration should be recognized by all partners. Key metrics are identified, prioritized, and shared. Consensus understanding should be sought if priorities shift among any of the participants.
- **Clearly define the resource commitment.** Who will be involved in the pilot from each participating company and how much of their time will be spent on the pilot?
- **Develop a communications plan upfront.** How will progress/issues/results be communicated over time (e.g., weekly conference calls, monthly face-to-face meetings)?

Consideration of these key points prior to pilot testing will provide greater assurance of harmonious, successful collaboration not only during the trial period but also in subsequent collaboration.

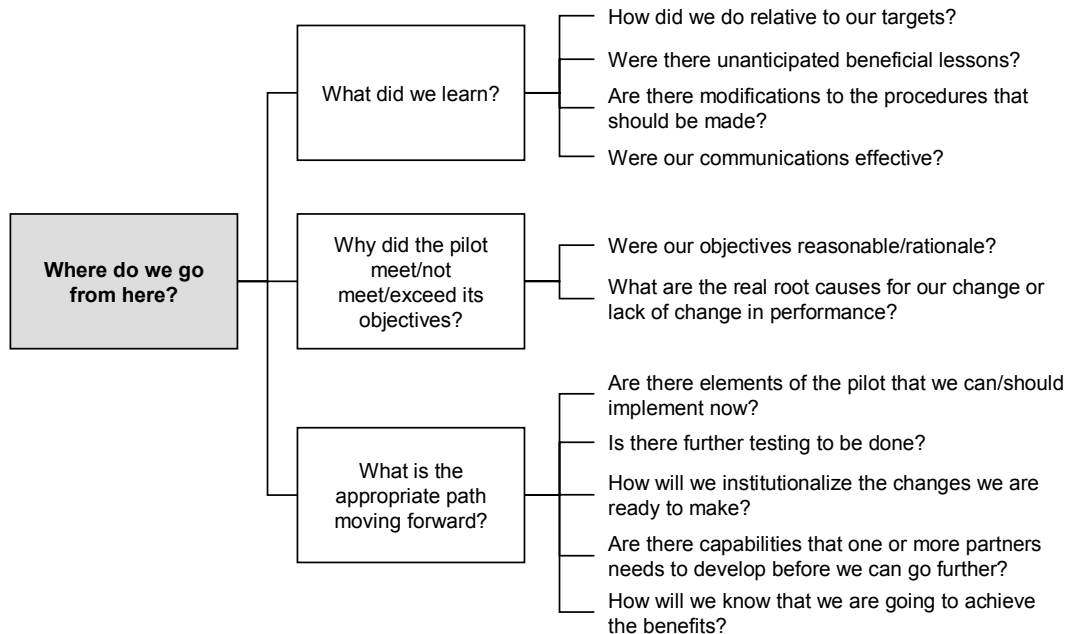
4.5 Step 5 – Determining Next Steps

The pilot testing experience will prove pivotal in determining how to proceed with further collaborative effort. It is unlikely that any pilot will prove to be an unqualified success or failure. An overall assessment will inevitably suggest that the project would have run more smoothly or the gains would have been greater if only something had been done differently. Objective review of the experience will allow the partners to build upon success and to prevent any failures of the pilot in future collaboration.

Pilots completed to date have reinforced the expectation that even the best planning will not anticipate all possible events. Establishing an effective communication mechanism and contingency plans, therefore, is a necessity. Also true of the pilots is the realization of substantial benefits -- benefits that sometimes exceeded expectations and benefits that can prove even more substantial with continued effort. Figure 4-4 outlines a process for defining next steps by first asking "Where do we go from here?" The answer to that question rests with all members of the collaboration.

Figure 4-4: Step 5: Defining Next Steps

Key Elements To Be Addressed In Evaluating Pilot Results And Defining Next Steps



4.6 Summary of Lessons Learned and Best Practices

Those beginning their trek down the CTM road can take comfort in knowing that others have set out on the journey and achieved the intended success of their collaborative efforts. Prospective collaborators can also benefit from the best practices to emerge from pilots and full implementation of CTM. These include:

Mindset -- The mindset of the individuals participating on the CTM team has to be one of collaboration. A willingness to share information and jointly manage the process is critical to success.

Unbiased Guidance -- In order to keep the process focused, and to enable the interaction among companies in the process development stages, third-party unbiased guidance is recommended.

CTM Readiness -- Once there is commitment to the concept of CTM, it can be used by each individual partner as a tool to build relationships with other business partners, where the existing relationships may not be as strong.

Face-to-Face Meetings -- The value of face-to-face meetings seems crucial to maintaining the momentum of the project, and to ensuring the quality of the CTM process that is developed.

Values of Interaction -- As a result of face-to-face, telephone, and e-mail communications, companies tend to encounter unanticipated opportunities along the way, even if there is not 100% follow-through on some initiatives.

Scheduling -- To ensure participation in face-to-face meetings, scheduling the sessions a month in advance compels participants to make them a priority.

Commitment to Supply Chain Improvement -- While CTM is focused on "transportation" management, its impact is spread throughout the supply chain.

What's important to recognize with any collaboration is that there must be a driving motive for all parties involved in the relationship to work together to achieve something greater than any individual company acting in isolation could achieve on its own. To that end, participants become a committee of "equals" – there is no room for "lesser members". While the magnitude of each partner's "win" will vary, everyone must find value in the collaboration to ensure its long-term viability.