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Chapter 1 Introduction

Over the past two decades collaboration has become a commonly accepted business term, particularly when discussing supply chain planning between companies. Reports of improved customer service and decreased supply chain costs have appealed to many companies, but the implementation of collaborative planning and the building of collaborative relationships can be challenging. While many companies have experienced significant supply chain improvements from collaboration, some companies have devoted considerable time and energy to collaboration to make only modest improvements. One possible explanation for these varying results is that the term collaboration, and the act of collaborating, can mean different things to different companies.

For this discussion, collaboration refers to the transitioning from a traditional adversarial posture between companies to a cooperative relationship built on developing synergies beneficial to all partners. In this paper we present best practices in collaborative demand and supply planning between supply chain partners. We focus on the strategies, tactics and operations of the collaborative planning and forecasting process. We structure these best practices using a framework that consists of six main categories: Strategy, Planning Process, Resource Structure and Communication, Technology and Information, Performance Management and Relationship Management. The framework is depicted in Figure 1.1.

The first three chapters of this paper set the stage for elaborating on our collaborative planning best practices framework. In Chapter 2, we define collaboration and provide background information for context of our discussion. The value of collaboration is outlined in Chapter 3. Beginning in Chapter 4, and over the next five chapters, we present best practices by each category of the framework. In Chapter 10, we summarize our discussion and include a list of these best practices.

The findings and recommendations in this paper are based on our collective professional and academic experience. We have leveraged our research of the collaborative process through our decades of consulting, training and corporate experience working with dozens of companies in the public and private sectors to develop a useful framework of the collaborative process. The scope of our research involved interviewing both government organizations and commercial companies to understand how they perform collaborative planning and forecasting. We interviewed a diverse mix of companies across several industries that offer consumer and industrial goods varying from do-it-yourself home improvement products to office supplies to automotive spare parts. These companies included retailers,
distributors and manufacturers ranging in size from one billion dollars to tens of billions of dollars in revenue. *In this paper we often refer to “leading companies” as those companies that execute best practices in all or some aspects of their collaborative demand and supply planning.*

The purpose of this paper is to share these practices and lessons so that executives, managers and planning professionals have a standard, or a basis for consideration, as they contemplate how to improve their company’s supply chain planning processes and collaborative relationships. This paper provides new insights for those who want to enhance their collaborative planning and relationships, or confirms existing practices and concepts of those who are already collaborating successfully.
Chapter 2 Collaboration Definition and Background

Since the early 1990s, collaboration has been a prevalent theme in supply chain management. The concept of collaboration is grounded in the widely accepted belief that companies generate greater benefits and reduce risks by sharing information and working together. Broadly speaking, collaboration refers to a cooperative relationship built on developing synergies within and across company boundaries that help all supply chain partners. The primary focus of collaboration in this paper is collaborative demand and supply planning between supply chain partners.

We do not attempt to create a new definition of collaboration. Instead, we reference Collaborative Planning, Forecasting, and Replenishment (CPFR®) as an established model for describing best practices in external collaboration, and for discussing the historical context for the advancement of collaboration practices. With emphasis on external collaboration, we also reference Sales and Operations Planning (S&OP)/Integrated Business Planning (IBP) for discussing integrating external and internal collaboration for strategic partnerships.

Companies from all industries have adopted techniques of collaboration to increase dialogue between supply chain members in order to conduct better short-term and long-term planning. Reports of significant supply chain savings and increased customer support have generated considerable discussion about CPFR. Our introduction of this topic starts by listing the CPFR objective, discussing when and where CPFR got its start and how CPFR has evolved. The next chapter outlines the value of collaboration based on results reported from companies.

According to the Voluntary Interindustry Commerce Solutions (VICS) Association, CPFR is a business practice that combines the intelligence of multiple trading partners in the planning and fulfillment of customer demand. CPFR brings together multiple inputs from different functions across companies, such as sales, marketing, demand planning and supply planning to improve supply chain planning processes and execution. The expected benefits improve demand visibility and predictability, supply availability, and reduce total supply chain and inventory costs while increasing asset utilization. The VICS CPFR model is described in Chapter 5.

CPFR has its origins in Efficient Customer Response (ECR) which was an attempt by supply chain members in the early 1990s to better coordinate marketing, production and inventory management. Similar to the goals of CPFR, ECR was established to
increase value to the customer while improving supply chain performance for the practicing companies. Leading users of ECR reported that this close-knit relationship with suppliers provided increased inventory turns, increased revenue per unit sales area and increased operating profits. These supply chain improvements were built around two essential ECR components. The first is the orientation toward the customer’s needs, and the second is a process-oriented optimization of the supply chain. In essence, ECR was a quality management focus on the supply chain to better meet the customer’s needs. To accomplish these goals it was necessary for companies to shift from an intra-organizational focus to an inter-organizational view of the supply chain. Companies had to develop synergistic relationships with other members of the supply chain to successfully implement ECR. Large retailers led the way based on their influence on global suppliers and distributors.

One major benefit that came from ECR was the reversal of how product was positioned for the customer. Prior to the early 1990s most retail product was pushed forward to the customer in anticipation of a demand. Production was not synchronized with demand which caused retailers to increase their purchasing volume to receive discounts from manufacturers. This allowed manufacturers to dictate the availability of goods, but reduced manufacturer’s margins when discounts were offered. A similar financial burden occurred for retailers who had to increase their inventory which often negated any discounts received from the manufacturer. The push process forced inventory forward without regard to the customer’s desires. ECR reversed the process by focusing on the customer, and the resulting pull-system has changed the way that most companies manage their supply chains.

Movement to the pull-system and repositioning inventory has proven to be beneficial but has not been without problems. The desire to effectively position product for future customer demands requires demand forecasts, and demand and inventory data to seamlessly flow from the point of demand back to the source of supply. Transitioning to a pull-system was difficult since ECR customers and suppliers did not openly share information and did little or no joint planning based largely on the adversarial, competitive nature of their collaborative arrangements. By the mid-to-late 1990s, CPFR attempted to solve these problems through emphasizing the mutual benefits that can be obtained in a win-win situation for the retailer, distributor and supplier. This approach encouraged supply chain partners to work together to leverage each other’s resources and share information. The evolution from ECR to CPFR was built around further advancing the trust between supply chain members and the development of higher quality data and planning process improvement.

Simply sharing more data efficiently does not provide the same benefits as CPFR. An example of this is Vendor Managed Inventory (VMI) where the customer’s requirement to replenish and manage inventory is moved to the supplier. When using
VMI the supplier has greater supply chain transparency and significantly increased control for a portion of the supply chain. However, many companies have seen that VMI only shifts the planning responsibility to the supplier and does not truly leverage all supply chain assets. One large retailer reported that they first relied on VMI, but moved on to CPFR since VMI did not incorporate integrated retail stock levels, retailer promotions, distribution center realignments and new store openings into the sales and order forecast. For this company, the problems grew larger with each new VMI agreement since each supplier was competing for supply chain resources. In contrast, CPFR involves sharing data and developing planning processes with supply chain partners to improve data quality and planning effectiveness, which in turn drives significant supply chain benefits.

In 1998, VICS defined CPFR as a standardized nine-step process business model. The concept of sharing information from CPFR became adopted by hundreds of companies, but many differences arose on how these companies actually shared and used information for planning process synchronization. After a few years of transformational developments from companies working more closely together, the dominant theme in supply chain management shifted from simply sharing information to total supply chain collaboration. In response to the changing business environment, VICS redefined the CPFR model to apply to the broader concept of supply chain collaboration. This current model focuses on collaborative planning between supply chain partners and accommodates process customization for planning and execution.
Chapter 3 Collaboration Value

An early report on the benefits of collaboration comes from the first CPFR pilot program which was conducted between a mega-retailer and one of their primary suppliers. Prior to the pilot the supplier was often caught unprepared by the retailer’s ordering practices, which often included preparing for promotions. During the pilot both companies independently prepared six-month demand forecasts, and then worked on a weekly basis to resolve discrepancies. One discrepancy that was quickly corrected was the alignment of the retailer’s ordering practice to the supplier’s six-week manufacturing lead time. By the end of the first phase of the pilot in 1996, the retailer reported that their in-stock percentage increased from 85 percent to 98 percent, sales increased by $8.5 million and inventories dropped by 25 percent. The supplier also reported substantial improvements in their supply chain.

Since this time, the value of collaboration has been well documented by companies that have realized the benefits of collaboration and by organizations that educate supply chain management professionals. The value of collaborative demand and supply planning between partners can be understood through improved operational and financial benefits (“hard” benefits) and process and relationship benefits (“soft” benefits). Numerous companies over the years have reported double-digit improvements in operational and financial performance from collaboration. Stronger partnerships and planning process efficiencies increasing overall supply chain effectiveness have also been reported.

**Operational and Financial Benefits:**

- Increased customer service levels; fewer stock-outs and backorders
- Decreased customer wait time; improved customer response time
- Improved forecast accuracy; reduced forecast error
- Increased sales revenue
- Reduced supply chain and operations costs; increased profit margin
- Reduced total inventory and working capital requirements
- Improved asset utilization

**Process and Relationship Benefits:**

- Integrated business planning or joint processes for coordinated planning
- Improved communication through joint planning; better quality of meetings and fewer misunderstandings
- Increased visibility to supply chain information and performance
- Increased predictability through better planning and risk management
- Engaged executive management and resource commitment
- Expanded knowledge base between collaboration participants
- Earned trust through visibility and by consistently performing to expectations

The benefits of collaboration can be achieved by all supply chain companies who are willing to invest the time and energy required to exchange information, improve communication and share responsibility for the supply chain.
There are many facets to collaboration that make it beneficial and at the same time very difficult to obtain. The anticipated audience for the remaining chapters of this paper are supply chain planners, managers and executives that are either currently engaged in collaborative demand and supply planning, or considering the inclusion of collaborative planning in their supply chain. We structure our comments based on experience, public reports and personal interviews in a manner that should provide practitioners with additional insight into the necessary components and investments required to create a successful collaborative relationship with their supply chain partners.

Our framework structures collaborative planning best practices in to six main categories: Strategy, Planning Process, Resource Structure and Communication, Technology and Information, Performance Management and Relationship Management. Collaborative planning best practices are presented by each category in the next five chapters, beginning with Strategy in this chapter. A list of these best practices is provided in Chapter 10.

The decision to launch a supply chain collaboration program must be made at the strategic level since resources will be demanded. As with any other strategic decision it is necessary to define goals and objectives, commit appropriate resources and evaluate the results at the most senior level of the company.

4.1 SELECTIVELY CHOOSE COLLABORATION PARTNERS

Careful consideration should be given to choosing the right partner before entering into a collaborative agreement. Collaboration is a resource-intensive, time consuming practice where confidential information is shared between supply chain partners. Companies should evaluate the benefits and risks, and justify the resource commitment to a formal partnership. Companies that successfully collaborate share a strong commitment to work together to drive supply chain improvements. Engaging with the wrong collaboration partner may exhaust limited resources and incur costs that exceed benefits.

Partnership selection usually includes criteria with strategic, operational and financial implications. Collaboration partner selection decisions may include:


- **Percent of spend, revenue or profit.** Suppliers or customers that comprise the top 50% - 80% of spend, revenue or profit may be potential candidates for partnership. For many companies, this equates to the top 20 to 30 suppliers or customers.

- **Share of operational capacity or volume of business.** A customer should have a meaningful share of overall supplier production or distribution capacity for partnership consideration. Some companies have clearly defined percentages of capacity while others use recommended guidelines. If the percentage of supplier capacity utilized by a customer is relatively small (less than 10%), it is likely not important enough to justify the resource commitment to a formal partnership.

- **Operational capacity availability.** When real production or distribution capacity constraints exist for a company or across an industry, there is a high incentive for companies to form collaborative partnerships. Collaborative planning, along with an established collaborative relationship, may lead to increased product availability or better communication to adjust demand expectations for delayed product delivery.

- **Technological capability.** It is necessary to determine the technological tools and systems that each partner has to use for collaboration. Sharing information seamlessly between companies and utilizing advanced planning systems is required for collaboration. Insufficient technological capability is a limiting factor for partner selection or the level of collaboration that can be achieved.

- **Personnel resource availability.** A lack of personnel resources may be the most limiting partnership selection criteria, and it should be thoroughly considered upfront between companies. If manpower is severely limited it is better for companies to restrict the number of collaborative partnerships. A strong collaborative program with fewer partners will provide much better results than weak support for collaboration with numerous partners.

- **Strategic importance and direction.** The strategic importance and direction of a collaborative relationship may depend on mutual dependencies, developing capabilities or overall market competitiveness. Each company considering entering into a collaborative partnership should understand their role and influence on the relationship and growth potential over time. For instance, a manufacturer may sell a large percentage of its total sales volume to a large customer at a lower margin simply to gain competitive market share or cover their fixed operating cost and maintain plant utilization. In this case, the customer is strategically important to the manufacturer, and the manufacturer is highly motivated to work collaboratively with the customer.
4.2 DEFINE GOALS AND OBJECTIVES

Executives and managers looking to start a collaborative partnership should consider what their corporate goals and objectives are and determine whether they are compatible with the goals and objectives of the partner. Collaboration goals and objectives can be stated from two different perspectives. The first is the perspective of the initiating company and the second is the perspective from the collaboration partner. It is important for the initiating company to understand and respect both positions if they want to create shared goals and objectives.

Most companies enter into a collaborative partnership with the desire to improve their portion of the supply chain. Manufacturers undoubtedly focus on maximizing production schedules and minimizing production and procurement costs and finished goods inventory. Distributors focus on minimizing warehousing, transportation and inventory costs, and retailers emphasize maximizing sales and product availability while minimizing inventory costs. **Defining mutual goals and objectives that balance trade-offs between supply chain cost and service is paramount to realizing tangible benefits from the collaborative relationship.** If not, the alternative is a collaborative arrangement where goals and objectives are not aligned, and one company runs the risk of incurring costs that may not exceed their benefits while the other company captures the majority of supply chain benefits.

Collaboration partners should also consider relationship management and intangible benefits when defining goals and objectives. Perhaps the most important intangible benefit is the trust that can be developed between partners. It is difficult to measure the trust in a relationship, but **executives and managers must make it a priority to strengthen the level of trust between partners.** As trust increases, improvements can be seen in communication, information sharing, process development and planning proficiency. This leads to a productive collaborative relationship geared toward achieving better operational and financial performance.

4.3 DETERMINE THE LEVEL OF COLLABORATION

Collaborative relationships range from transaction focused to strategic partnerships. Depending on the level of collaboration between partners, the information and resource inputs may vary significantly. Subsequently, the quality of outputs or results expected from the process will be different. **Collaborative relationships become more sophisticated with advanced levels of collaboration. These relationships**
require more time and become more complex, but generate greater supply chain benefits\(^2\). Figure 4.1 graphically displays this concept.

![Figure 4.1 - Collaboration Relationship Sophistication](image)

The levels of collaboration are more like a continuum rather than distinct stages. Below are characteristics of three levels of collaboration.

- **Limited Collaboration (Transactional Relationship)** – Transactional relationships exchange data for improved supply chain visibility, but planning is done separately between partners. Common data standards and rules for synchronization are established. Resource commitment is low and management intervention is minimal. Supply chain performance is expected to improve but benefits are likely to be modest.

- **Partial Collaboration (Preferred Partnership)** – The next level of collaboration involves joint process planning and higher levels of management engagement with preferred partners. Focus and attention is given to monitoring customer and supplier performance and how planning
processes, activities and behaviors can be improved between companies. A supplier relationship management program may be established to foster greater interdependency between partners. Strategic briefings are shared, but executive decisions are made separately. Collaborative benefits increase through shared planning and resource commitment.

- **Full Collaboration (Strategic Partnership)** – A strategic collaborative partnership involves additional planning complexity and a sophisticated relationship built on a higher degree of trust. Greater commitment from management and planning resources are necessary to integrate planning processes and manage the relationship. Partners share mutual dependencies and strategic decision-making with more focus on desired outcomes. The knowledge base between partners expands and supply chain innovation breakthroughs occur. In return for their investment, collaborative partners realize greater operational synergies and financial benefits from supply chain alignment.

*Not all relationships can be, or should be, strategic partnerships.* Leading companies prudently select partners and the level of collaboration based on multiple factors including existing business, the strategic importance of the relationship, resource commitment and technology available to enable efficient information flow. As the relationship matures with time, the level of collaboration may advance or regress based on the results obtained.
Chapter 5 Planning Process

In this chapter we describe collaborative best practices focused on the demand and supply planning process. First, we stress the importance of designing a formal process and understanding the demand and supply planning process for each supply chain partner in order to develop an integrated planning process. Second, we comment on how companies are currently determining how to prioritize their forecasting and planning efforts. We then recommend methods for developing quantitative and qualitative forecasts and subsequently how to evaluate and improve those forecasts. Lastly, we conclude this chapter by discussing the best practices for supply and inventory planning.

5.1 DEVELOP AN INTEGRATED PLANNING PROCESS

5.1.1 Design a formal collaborative planning process

At the onset of collaborative planning, leading companies formally define and document processes to coordinate activities and share information. Planning, communication and information sharing cannot be conducted ad-hoc. An advanced collaborative planning process between companies is complex and needs to be defined. The process involves multiple parties communicating and sharing information with one another in order to make adjustments to dynamic changes in the forecast and supply chain operations. Without a formal process, unnecessary confusion, poor communication and duplication of resource efforts ensues.

One of the goals of leading companies is for collaborative planning to become the way of doing business and to no longer be a management exception process, especially for more mature collaborative relationships. In part, this goal may be accomplished by designing a formal planning process that sets the expectations and guides the actions of all partners. Roles and responsibilities are clearly defined and resources are allocated more efficiently. By establishing a formal process, leading companies more readily integrate planning routines for new and existing partners.

There are as many differences in planning processes between companies as there are similarities. Supply chain partners must start the collaborative process by designing processes that optimize the sharing of information and improve supply chain performance beyond company boundaries. The Voluntary Interindustry Commerce Solutions (VICS) Association has established an updated model that can be referenced when designing a formal process for Collaborative Planning, Forecasting
and Replenishment (CPFR®)\textsuperscript{3}. CPFR is largely focused on external collaboration between partners. Figure 5.1 illustrates the VICS CPFR model and further information can be obtained at [www.vics.org](http://www.vics.org).

The CPFR model consists of four main Collaboration Activities:

- **Strategy and Planning** – This activity defines the basis for the collaboration relationship. The scope, objectives, approach, guidelines and expected cost and benefits are developed through a Collaboration Arrangement. A Joint Business Plan describes the mutual activities and events for collaborative planning.
- **Demand and Supply Management** – Sales Forecasting and Order Planning/Forecasting are part of this activity. The tactical and operational steps in collaborative planning and forecasting are defined.
- **Execution** – From the point the forecast is realized as actual demand to product delivery to the customer, the plan is turned into action in this activity. Order Generation and Order Fulfillment is accomplished.
Analysis – Exception Management and Performance Assessment is included in this activity. Monitoring, measurement and continuous improvement of the collaborative planning and execution processes completes this activity.

A complementary process that is used for coordinating and synchronizing company demand and supply planning is Sales and Operations Planning (S&OP). S&OP is a decision-making process that realigns strategic and tactical plans to support a company’s business goals. Traditionally, S&OP has been used for internal company planning across business functions. More recently, leading companies have extended their S&OP process to include inputs from their collaboration partners. When integrating external and internal planning processes, the S&OP process is also referred to as Integrated Business Planning (IBP)⁴.

S&OP/IBP is a monthly process with inputs from product development, demand, supply, finance and management. The S&OP/IBP process and outputs are outlined in Figure 5.2. While each company might have a different number of steps in their S&OP/IBP process, there are generally five business review activities.

- **Product Review** – Review product roadmap, get status updates on new product development schedule and integrate new product introductions
- **Demand Review** – Reach consensus on the quantitative and qualitative demand forecasts taking into account brand strategy and sales account plans
- **Supply Review** – Create a demand constrained forecast given supply capacity constraints and interruptions, inventory position and backorders
- **Integrated Reconciliation** – Identify and reconcile gaps between demand and supply review. Compare plan versus actual. Develop an integrated financial plan from the management strategy, business plan and demand forecast.
- **Management Business Review** – Make key management decisions on unresolved issues. Reach consensus and approve one operating plan.

Based on the scope of this paper, we tend to discuss the history and concepts of CPFR more than S&OP/IBP. However, it is important to make clear that an S&OP/IBP process is essential for successful collaborative planning. The next section discusses integrating external and internal collaboration processes through the use of CPFR and S&OP/IBP.
5.1.2 Integrate external and internal collaboration processes

Leading companies are improving their Integrated Business Planning by linking CPFR and S&OP processes, or integrating external and internal collaboration. For companies that have practiced and adapted CPFR and S&OP processes, the boundaries between external and internal collaboration have blurred.

A closed-loop planning process for integrating CPFR and S&OP is depicted in Figure 5.3. Through CPFR, companies work with their customers and suppliers to review and modify the forecasts at a detailed level. In S&OP, this forecast undergoes a top-down and bottom-up reconciliation internally with the product development schedule, sales and marketing plans, financial forecast and management considerations. Next, demand and supply reconciliation occurs by creating a “realistic” demand forecast that can be achieved given potential supply constraints. This constrained demand forecast is again compared to the financial plan to identify gaps with the operating business plan. Action plans are enacted to resolve identified problems and
performance is measured. Lastly, root causes are identified and continuous improvement plans are put in place.

When designing an IBP process, a best practice is to first consider external collaboration before internal collaboration. A natural tendency for companies is to collaborate internally first since they have greater visibility and control of their functional processes. This view may leave further supply chain planning process improvements on the table. Companies should consider the extended enterprise, or upstream and downstream supply chain, and the planning processes of suppliers and customers. Through external collaboration, joint processes can be developed to optimize supply chain performance for each supply chain partner while focusing on the end-customer. In fact, external collaboration is often the impetus for improving internal collaboration within a company.

Implementing IBP requires process discipline and practice. The process involves more participation and input from multiple parties, sometimes with competing objectives, and it can be difficult to coordinate activities. Each party should understand their role and the overall cadence of the planning process to make a timely, relevant contribution. Companies that have successfully implemented IBP have achieved greater supply chain performance and experienced improvements in planning transparency and effectiveness.
5.1.3 Understand planning processes between partners

Knowing how forecasts and planning information is derived at a supply chain partner is as important as having information visibility. **Understanding the planning processes and how inputs into the plan are generated among supply chain partners builds trust.** Differences between customer and supplier forecasts and supply plans can be resolved and necessary adjustments made. Additional supply chain performance improvements are possible by expanding the scope of supply chain planning across company boundaries.

While this best practice sounds practical and widely accepted, it still remains a struggle for many companies. The direction of information flow may be more one-sided depending on the nature of the collaborative relationship and the propensity for problems increases. **Companies with more leverage in the relationship may not feel inclined to openly share planning information. On the other hand, costly issues and poor performance act as strong incentives for companies to work closer together.**

Consider a situation where a retailer shares Point-of-Sale (POS) data and their sales forecast with a distributor. The distributor creates a sales forecast but does not share it with the retailer. The distributor insists on using their forecast based on the distributor’s assumption that it is more accurate than the retailer’s forecast. In this situation the retailer demand is a small percentage of the distributor’s market share, and therefore the retailer does not have much leverage to negotiate changes in the collaborative forecasting process.

With time, the retailer begins to lose confidence in the distributor as the number of backorders grows. The retailer does not have insight into the distributor’s planning processes or visibility into available inventory or expected shipment dates. Frustrated by this lack of understanding of the distributor’s planning processes, the retailer increases its forecast for many products as a hedge against backorders. The distributor, feeling pressured due to the volume of backorders, decides to follow the retailer’s higher forecast for multiple products, despite not understanding how the retailer generates their forecast. However, after fulfilling the backorders and with inventory levels on the rise, the distributor begins to question the retailer’s forecast and reverts to using their forecast.

At this point, collaboration has failed. The distributor has cash tied up in the wrong mix of inventory, product is not available for the retailer and planning is disconnected between both parties. This example illustrates the need for each company to fully understand, and respect, the planning processes of their supply chain partners.
5.2 FOCUS AND PRIORITIZE DEMAND PLANNING EFFORTS

Creating the statistical forecast is one of the first steps in demand planning. Supply chain planning at the companies we interviewed was inherently complicated based on the variety of events (e.g., promotions, advertisements and planned service repairs) and the number of items included in the forecast.

In this paper we use the term item and SKU interchangeably unless otherwise noted. Many advanced planning systems technically define a SKU is an item at a single location. Based on this definition the number of SKUs is always equal to or greater than the number of items. For instance, one item stocked at 7 locations is defined as 7 SKUs. Using this definition of a SKU, the companies we interviewed had SKU counts ranging from tens of thousands to tens of millions. The count of items for which these companies performed demand planning ranged from as low as 7,500 items to as high as 400,000 items. To effectively deal with this volume of items it is necessary for companies to determine which items to focus their planning attention on and then determine which methods to use to develop the statistical forecast. We now discuss best practices associated with selecting which items to focus on and prioritize demand planning efforts.

5.2.1 Analyze the demand profile

5.2.1.1 CONDUCT A PARETO ANALYSIS

Many companies are experiencing SKU proliferation where a large percentage of SKUs comprise a small percentage of the sales volume or profit. These SKUs are known as the “Tail” whereas SKUs that contribute to the majority of sales volume or profit are the “Head.” Conducting a Pareto analysis, or applying the 80/20 rule, will help demand planners identify which SKUs belong to the “Head” or the “Tail.” Planners should spend more time forecasting SKUs identified in the “Head” to have the greatest impact on reducing forecast error and improving supply chain and financial performance.

5.2.1.2 PERFORM SKU SEGMENTATION

Aligning supply to demand is the essence of supply chain planning and integration. Companies segment SKUs based on demand and supply characteristics to identify opportunities and develop alternate strategies to match demand and supply. Moreover, leading companies segment SKUs to prioritize resource time and attention for collaboration and demand planning.
SKU characteristics used for segmentation may include:

- **Volume** – Total units of demand per time period
- **Variability** – Demand variability
- **Value** – Product revenue, profit or cost of goods sold
- **Criticality** – Importance of product to operations or competitiveness
- **Capacity** – Available or limited capacity
- **Lead time** – Duration of time for resupply

The most common SKU segmentation is based on analyzing demand volume and demand variability, as shown in Figure 5.4.

<table>
<thead>
<tr>
<th>High Variability</th>
<th>Moderate Collaboration - SKU De-Proliferation (D)</th>
<th>High Collaboration - Promotion and Event Management (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Variability</td>
<td>Simplified Forecast - Exception Based (C)</td>
<td>Statistical Forecast - Exception Based (B)</td>
</tr>
</tbody>
</table>

| Low Volume       | High Volume                                    |

*Figure 5.4 – Volume-Variability Matrix*

We use the Volume-Variability Matrix to define different approaches to collaborative demand planning for each quadrant, starting in the upper right and rotating clockwise.

- **Quadrant A: High volume, high variability.** *Collaborative planning efforts should focus most resource attention on high volume and high variability SKUs.* SKUs in this demand profile have large swings in volume and can cause sizable problems in production scheduling and capacity planning, resulting in backorders or excess inventory. Internal input from sales and marketing on promotions and planned events and external input from customers and suppliers is critical to improving forecast accuracy and timing of expected demand.
- **Quadrant B: High volume, low variability.** For high volume, low variability SKUs, time-series statistical forecasting methods are adequate with occasional overrides.

- **Quadrant C: Low volume, low variability.** Low volume, low variability SKUs can be planned using time-series statistical forecasting methods similar to Quadrant B. Exceptions may need to apply based on demand frequency and product lifecycle management.

- **Quadrant D: Low volume, high variability.** Collaborative planning efforts should selectively manage low volume, high variability SKUs. Demand for these SKUs is commonly referred to as lumpy or erratic demand. Demand spikes are characteristic of these SKUs and are very difficult to forecast accurately. Using forecast methods including moving averages can dampen the volatility in the forecast. However, caution should be taken to quickly accept this solution as the moving average forecast may steadily over-forecast demand and increase product supply and inventory over time. This depends on the size of demand spikes relative to average demand and frequency of demand. Planning for these SKUs may also benefit from a thorough review of the product proliferation and understanding the drivers for demand variability.

Figure 5.5 graphically depicts an example of SKU volume-variability analysis where the SKU count per quadrant varies based on the demand profile. The horizontal axis shows the average monthly unit demand volume and the vertical axis represents demand variability as measured by the Coefficient of Variation. In this example, most SKUs fall in Quadrants B and C, and as previously stated, these SKUs can be statistically forecasted due to lower demand variability.
5.2.2 Develop strategies for planning effectiveness

Perhaps the most important part of developing planning strategies is determining which items should receive resource attention. Using both methods previously mentioned to analyze the demand profile, a company can identify items as “forecastable” versus “non-forecastable,” and perform “active” versus “passive” demand planning.

5.2.2.1 IDENTIFY “FORECASTABLE” VERSUS “NON-FORECASTABLE” ITEMS

Some items are inherently difficult to forecast accurately due to high demand instability. Understanding which items can have demand reliably predicted versus those items that have been historically difficult to predict can help reduce forecast error and improve collaboration. Leading practices involve determining which items are “forecastable” versus “non-forecastable” based on variability and forecast error.
Coefficient of Variation (COV) is an effective measure of variability to help identify whether items should be classified as “forecastable” or “non-forecastable.” COV equals the standard deviation of the distribution of demand divided by the average demand. *As a general rule for thumb, items with a COV > 1, where the standard deviation of demand is greater than average demand, have relatively high variability and may be difficult to forecast.* It is important to keep in mind that the COV threshold value for determining high variability varies according to a company’s specific demand profile and their ability to plan for the demand. A COV threshold value may be as high as two or three.

Mean Absolute Percent Error (MAPE) is one of the most popular forecasting metrics of forecast error and can be used to classify items as “forecastable” or “non-forecastable.” MAPE is an average calculation of percent error associated with the forecast as compared to actual demand. For instance, an item with a 30 percent MAPE means that the forecast was either 30 percent higher or lower than the actual demand. It can be easily understood that a higher MAPE equates to higher forecast error, and therefore the goal of collaboration demand planning is to lower the MAPE. Most companies we interviewed used MAPE, or a weighted MAPE, to determine the amount of forecast error associated with each item and in aggregate.

No hard tolerance for the maximum MAPE is defined for “forecastable” items since each company has a distinctly different supply chain. *Leading companies define a tolerance for MAPE between 30% - 40% for “forecastable” items.* No matter where the tolerance is set, one common suggestion is to baseline the current MAPE and make significant efforts to reduce the MAPE in the collaborative process. One means of accomplishing this is to determine which items consistently have a forecast error outside an acceptably defined range and define these items as “non-forecastable.” Some companies have developed or are exploring alternative methods, such as min-max inventory level setting, to manage these items and account for the level of risk associated with these items.

5.2.2.2 PERFORM “ACTIVE” VERSUS “PASSIVE” DEMAND PLANNING

By performing a SKU volume-variability segmentation and applying the Pareto principle to understand the SKUs contribution to overall sales or profit, leading companies develop an “active” versus “passive” demand planning strategy. *The concept of “active” demand planning is to focus resource time and attention on items that most impact operational and financial performance.* “Active” demand planning should be reserved for items where frequent, relevant communication is required between the supply chain partners, whether the items are “forecastable” or “non-forecastable.” High variability items (Quadrants A and D) often receive more attention, but targeted items can be dispersed among quadrants based on their high
dollar volume. Similarly, any item, regardless of quadrant, may need to be actively collaborated on if the item is deemed highly critical or in a production constrained environment.

“Passive” demand planning suggests spending less time and attention on items that can be easily forecasted or do not significantly impact performance. They are normally characterized by low variability (Quadrants B and C) and low dollar volume. Time should be spent fine-tuning the parameters of the forecasting methods and let the planning system forecast effectively with minimal manual intervention. Companies can avoid diminishing returns in time and resource commitment for collaborative planning efforts by employing “active” versus “passive” demand planning.

5.2.2.3 MANAGE BY EXCEPTION

Setting tolerances and managing by exception is a best practice for effective demand planning. Management by exception emphasizes placing resource attention to actual results that differ significantly from planned results as defined by a threshold. Tolerances for demand planning are normally based on key metrics for forecast error, such as MAPE, bias, or a combination or derivation of both. Tolerances for supply planning revolve around time-phased capacity constraints, and the variability of supplier lead times, duration of backorders, and estimated order ship dates and arrival times. The key is to set reasonable tolerances, and over time, through continual learning and improvements in planning, make the tolerances more aggressive.

This planning strategy can be easily executed through the use of proper advanced planning tools. Most advanced planning tools have standard and customized options to provide alerts to notify the user of exceptions. Automated workflow for managing a planning process also further increases productivity.

5.3 CREATE THE DEMAND FORECAST

Previous discussion has outlined methods for analyzing the demand profile and developing effective planning strategies. We now focus on creating the quantitative and qualitative forecast. Developing the forecast is a process and applying a few best practices and principles will help improve forecast accuracy and the processes used to create the forecast.
5.3.1 Generate the quantitative demand forecast

Creation of the statistical forecast, or quantitative forecast, is usually the first step in demand planning. In this section, we share a few best practices and fundamentals that should be considered for generating the quantitative forecast.

5.3.1.1 LAY THE FORECAST FOUNDATION: DETERMINE THE HIERARCHY, LEVEL, HORIZON, INTERVAL AND FREQUENCY

All forecasting processes include basic elements such as determining the hierarchy, level, horizon, interval and frequency when laying the foundation for creating and reporting the forecast. The important point is to strategically determine the structural design of the forecast and consider when it needs to be modified. Many companies setup and establish the forecast hierarchy and design upon implementing advanced planning systems. With significant changes in business priorities or as planning systems are upgraded, companies may find it worthwhile to revisit their forecast hierarchy and design, and evaluate if it needs to be updated.

Many companies create their primary statistical forecast at the item level. Item forecast demand is then allocated across network locations typically based on a percentage of historical demand to the SKU level (see Item vs. SKU description in Section 5.2). However, depending on a company’s operations or the purpose of their forecast, the statistical forecasts may be created at the SKU level or the item category/family level, particularly for long-term forecasts and capacity planning. In either case, the forecast can be easily aggregated and disaggregated to different hierarchy levels with the support of advanced planning tools to support operational requirements and business planning. In general, a more aggregate forecast results in greater forecast accuracy.

The forecast is used for multiple purposes for sales, financial, operational and capacity planning. Product demand cycle, capacity requirements and supply lead time (procurement and production lead time) are a few key components that influence the forecast horizon. The forecast horizon should be far enough out into the future to properly plan for each of these purposes. For instance, the forecast horizon should not be shorter than supply lead times. Many companies forecast between 18-24 months, but the horizon varies by company and industry.

A company’s forecast interval and frequency often depends on its demand pattern and the planning cycle of its customer and suppliers. Many companies operate on a monthly planning cycle and their forecast interval and frequency is synchronized monthly. On the other hand, most retailers create sales forecasts monthly but in
weekly intervals due to weekly sales promotions and events. Similarly, distributors with seasonal demand fluctuations may forecast in weekly intervals.

*Companies with demand that does not fluctuate much between intervals may want to consider expanding their forecast interval or reducing their forecast frequency from weekly to monthly, or monthly to quarterly, to improve planning effectiveness.*

### 5.3.1.2 UTILIZE SOPHISTICATED FORECAST METHODS

**Leading companies use advanced forecasting tools with multiple sophisticated forecast methods.** Many of the time-series forecast methods include moving averages and exponential smoothing for trend and seasonality as well as algorithms for forecasting slow moving and intermittent demand. More advanced forecasting tools also include forecast methods for new product introductions and product lifecycle management, and have the ability to automatically or manually select a best-fit forecast method. With the capability to generate dozens of different types of forecasts, companies need to decide how to use these forecast methods most effectively. Some companies allow the tool to select the best-fit forecast from among each forecast method per SKU. Other companies predefine a specific forecast method for all SKUs based on a demand pattern or by echelon in the supply chain.

Additionally, some advanced forecasting tools have capabilities to facilitate collaborative planning by allowing multiple parties to contribute to or modify the forecast. This technology is extremely helpful and productive for companies that require a large number of inputs from multiple parties with disparate views.

### 5.3.1.3 PLAN FOR INDEPENDENT VERSUS DEPENDENT DEMAND

Another point for discussing best practices in statistical forecasting is to determine if the demand is either independent or dependent. For our discussion, independent demand is an item ordered directly by the customer whereas dependent demand is a unit of demand for one item that is generated based on the demand of another item. An example of dependent demand is the demand for four tires with the purchase of a new car, the independent demand. Yet, the requirement for a replacement tire is also independent demand if the original is damaged and needs to be replaced. It can be seen by this example that some items may have both independent and dependent demand creating additional challenges as to how best create the forecast. **Leading companies have the ability to calculate dependent demand by exploding a bill of materials as well as creating a statistical forecast.** Determining which method is best may depend on the composition of demand and the capability of the demand planning system.
5.3.2 Develop the qualitative demand forecast

Developing the qualitative forecast is part of demand collaboration as it incorporates human intelligence into the statistical forecast. In this section, we present best practices for creating the qualitative forecast.

5.3.2.1 USE HUMAN INTELLIGENCE TO ENRICH THE FORECAST

The statistical forecast serves as the foundation upon which the qualitative forecast is generated to improve the demand forecast. The qualitative forecast plays an important role when history is not expected to be a good predictor of future demand. The qualitative forecast is based on human intelligence and knowledge of the current and future market and business conditions that are believed to affect the forecast.

There are many company (internal) and market/economic (external) factors that favor qualitative forecasting:

**Company (Internal)**
- New product introductions
- Short product life cycles
- Product substitutions
- Product cannibalization
- Promotions
- Pricing changes
- Sales pipeline
- Planned maintenance schedule

**Market/Economic (External)**
- Input from key customers
- New customers
- Competition
- Macroeconomic factors

Qualitative forecasting requires coordination of cross-functional inputs. Sales, marketing, category/account management, product development, operations, finance, and demand and supply planners can be involved in creating the final demand consensus forecast. Each function plays a role and offers a different perspective:

- **Sales** – Owns the sales forecast and customer relationship
- **Marketing** – Plans customer or segment sales and marketing strategy
- **Category/Account Management** – Manages product category or customer account forecast and interfaces with customer
- **Product Development** – Plans new product introduction schedule
- **Operations** – Provides supply availability and capacity constraints
- **Finance** – Evaluates dollar vs. unit forecast and compare to financial plan
- **Demand Planner** – Generates quantitative demand forecast and receives inputs from internal and external sources
- **Supply Planner** – Generates supply plan (order forecast) based on demand forecast, inventory position and supply availability

Consider the following examples where qualitative forecasting has proven beneficial.

Example 1: One retailer stocks high-tech products with short lifecycles. New products are introduced three to five times per year, or on average once a quarter. Their advanced forecasting software has difficulty predicting these short product lifecycle patterns. Further complicating the forecast are the pricing changes and promotions based on the product lifecycle stage and sales volume. Unlike the start of a normal demand planning process, this retailer does not create a statistical forecast for this product line. Instead, they rely solely on the qualitative forecast created from collaborating with suppliers, category managers, marketing and finance.

Example 2: One manufacturer sells products to multiple competitive retailers. Although some of the products stocked by each retailer are unique, many of the products supplied by the manufacturer are the same. These retailers also stock products from competing manufacturers. Product sales in this industry are highly competitive and driven by sales promotions. In this competitive environment, the manufacturer and retailer collaborate on the qualitative forecast by coordinating sales promotions, new product introductions and product substitutions. The manufacturer has the expertise to understand the impact of their promotions across multiple retailers and the potential for cannibalization. The retailer understands competitor sales promotions based on their extensive experience on market sales.

Example 3: A distributor of spare parts supplies customers for planned and unplanned maintenance. Forecasting spare parts for unknown repairs relies heavily on the statistical forecast of historic demand patterns. At the same time, the distributor collaborates with its large customers to obtain their planned maintenance schedules. The qualitative forecast supplements the quantitative forecast when the volume and scheduled timing of repairs changes based on certain events.

These three examples show how different information can be used to develop qualitative adjustments to the forecast. There are several different techniques and processes, such as sales force composite, which can be used to incorporate these
qualitative adjustments. Companies need to determine which methods or processes are best for them to create the qualitative forecasts.

5.3.2.2 DOCUMENT AND DISCUSS ASSUMPTIONS (AND ACTIONS)

Documenting assumptions and actions taken to modify the forecast helps facilitate the collaborative forecasting process. The forecasting process has inputs from multiple parties that must be reconciled to create a single consensus demand forecast. Sharing and understanding the assumptions that underlie the forecasts enables more productive discussions between parties. *The focus of the conversation shifts to challenging or accepting the assumptions instead of debating or blindly accepting the forecast numbers.* Decision-making becomes easier and accountability increases with transparency.

Analyzing past performance is part of making continual improvements in the forecast. Documenting assumptions and actions taken provides a record to understand how and why the forecast was created. Whether the forecast error was large or small, *the documented history allows forecast participants to learn from their mistakes and confirm their good judgment. The quality of the forecast is more likely to improve sooner rather than later.*

5.3.2.3 ASSIGN A PROCESS OWNER TO THE FORECAST

The process of creating a consensus demand forecast must have a process owner. Although multiple people across multiple functions provide input into the forecast and participate in the process, there can only be one owner. This owner must have full responsibility and accountability for reducing forecast error. In many organizations, the sales, marketing, or category/account management team members are the owners of the forecast for the products they manage. They drive sales and likely have the most intimate knowledge of their customers and the competitive marketplace.

5.3.2.4 TAKE A RISK MANAGEMENT APPROACH

In today’s dynamic business environment, companies must excel at designing processes for optimization and robustness. *Unlike designing processes for optimization, few companies spend enough time and attention on supply chain contingency planning and robust process design.* Taking a risk management approach to developing the qualitative demand forecast is recommended to avoid significant costs associated with planning disconnects or uncertainty.
As part of S&OP/IBP, a company creates a constrained demand forecast by identifying where demand exceeds available supply, and adjusts the forecast accordingly. This is a good practice of integrating demand and supply planning, but what happens if the demand forecast is not realized or supply is interrupted beyond expectations? Contingency planning, or continuity planning, should not be dismissed.

Integrating contingency planning into the qualitative forecast process may include considering such questions as:

- Where will inventory be positioned if plans do not come to fruition?
- Where should inventory be positioned? Upstream or downstream?
- What is the potential financial impact and who is responsible for lost sales or excess inventory?
- What is the cost trade-off between out-of-stocks vs. excess inventory?
- What financial tolerance is management willing to accept?
- How much inventory will we allocate to key customers?
- How will this impact our customer relationships?
- Are customers or suppliers willing to share the risks?

Consider a situation where a manufacturer and retailer ran a sales promotion, but the expected lift from the retailer was twice that expected by the manufacturer. Pressured by the retailer, the manufacturer hesitantly increased their qualitative forecast. The supply plan was increased and inventory was pushed into the distribution channel. In the end, the manufacturer’s sales projection was more accurate and the distribution channel was flooded with excess inventory. The retailer sold its remaining inventory at a heavy discount and the manufacturer’s days of supply inventory and working capital increased. Treated as a lesson learned, the manufacturer now holds inventory upstream as far as possible to take advantage of risk pooling and then rapidly replenishes inventory downstream as sales dictate.

5.4 EVALUATE AND IMPROVE THE DEMAND FORECAST

Discussion with leading companies identified the importance of verifying the forecast after it has been developed. The concept is to produce the most accurate statistical forecast possible and then use resources to improve that forecast. The process begins by accurately measuring the forecast error and determining which steps in the creation of the quantitative and qualitative forecast are contributing to either increasing or decreasing the forecast error. The following four best practices are offered as means for companies to accomplish that goal.
5.4.1 Determine the value added of forecasting changes

A more accurate forecast influenced by human intelligence and insight beyond the statistical forecast is a fundamental value assumption of demand planning and forecasting. However, not all companies routinely measure or emphasize the difference of the changes to the statistical forecast. Leading companies seek to **quantify and validate the modifications to the forecast made by demand planners, sales, marketing and finance by monitoring Forecast Value Add (FVA)**. FVA is a measure of forecast error of the updated forecast based on the key contributors to that forecast. To accurately measure FVA it is necessary to track the statistical forecast and any adjustments that are made to the forecast. Improvements or degradations are therefore easy to identify.

5.4.2 Minimize bias as part of reducing forecast error

Forecast error is often expressed using MAPE (mean absolute percentage error), a measure of the percentage error compared to actual demand, and forecast bias, a directional indicator of cumulative under-forecasting or over-forecasting. In some companies, MAPE seems to get more attention than bias, even to the extent where bias is not actively measured, tracked or reported. **Minimizing forecast bias should be a priority for improving demand planning and reducing forecast error.**

Consistently under-forecasting or over-forecasting can have costly supply chain ramifications. Supply resources are squandered and misallocated by over-forecasting. Excess inventory and poor production and supply capacity planning are caused by over-forecasting. Under-forecasting results in the failure to meet customer expectations and missed sales opportunities due to backorders and late shipments. Particularly for demand that has high variability, the best forecast may be a moving average to minimize bias and predict stable demand.

5.4.3 Analyze actual demand variability versus forecast error

Actual demand variability is calculated by measuring the variability of historical sales. Forecast error refers to the difference between the forecast and actual demand. It is recommended to analyze and compare actual demand variability against forecast error to improve demand planning. **If the forecast error is greater than the actual demand variability, the forecasting process is introducing unnecessary noise and variability, and thus complicating the planning process.** The demand planner may decide to adjust the forecast method, to a moving average for example, to dampen swings in the forecast and better reflect demand variability.
5.4.4 Critically examine the statistical forecast methods

Using complex statistical forecast methods do not always equate to a more accurate forecast. Depending on the demand pattern, sophisticated forecast methods can sometimes generate forecasts that are more inaccurate than a naïve or moving average forecast. Particularly for volatile demand or slow moving, intermittent demand, some exponential smoothing forecast methods might identify trend or seasonality that does not exist. The result is a forecast overly sensitive to demand spikes or sudden changes in demand.

Furthermore, advanced planning systems that utilize best-fit forecast algorithms have a tendency to switch forecast methods across planning periods. This “forecast churn” can create more variability in the forecast that is not present in actual demand. Leading companies gain analytical insight from analyzing past forecast performance and making adjustments to the forecast, whether fine-tuning forecast parameters or simplifying the forecast method selection.

It is worth noting the importance of comparing forecasts that are generated from multiple sources. A key source for this comes from establishing a formal process between collaborative partners where their respective forecasts are compared to each other. If there is minimal discrepancy in a forecast, the forecast can be accepted. If a forecast is different it is beneficial for both partners to discuss assumptions that were used to generate the forecast. Reconciling an individual SKU forecast error often results in improving the statistical forecast for not just that SKU, but for many other SKUs as well based on a greater understanding of the overall assumptions each partner used to develop the statistical forecasts.

5.5 PLAN SUPPLY AND INVENTORY REQUIREMENTS

While a lot of attention is devoted to demand planning in collaboration, supply planning is as equally important to be able to execute to plan. Additional finished goods inventory masks problems in supply chain planning and execution, and buffers demand and supply variability. One of the fundamental premises of supply chain collaboration is to improve supply availability and reduce inventory while sufficiently meeting desired customer service levels. To accomplish this, leading companies plan supply and inventory requirements in a number of ways.

5.5.1 Determine supply and inventory positioning strategy

Collaborative partners must evaluate and determine the appropriate supply and inventory positioning strategies for their relationship. Through better exchange of
information and joint planning, sourcing, production and distribution practices are realigned to better satisfy the needs of customers. Inventory positioning shifts accordingly based on these operational practices.

**Leading companies evaluate whether a make-to-order, configure-to-order or make-to-stock supply model works best for a collaborative relationship.** They may develop different supply strategies for different products or customers. Analyzing the demand profile and segmenting SKUs are two methods for providing analytical insight to identify improvement opportunities across products and customers. Alternatively, companies may choose to deploy a uniform supply model that is most cost efficient.

Inventory positioning strategy is about deciding how best to manage inventory to support customer delivery and supply chain operations in the most efficient and effective manner. Trade-offs between inventory risk pooling and stocking locations to meet service lead times are analyzed and alternative economic cost models evaluated by collaborative partners.

Determining which company is responsible for the inventory and transfer of ownership of inventory is also agreed on. VMI, rapid replenishment based on geographic location or postponement, or standard stocking and replenishment models may be deployed.

### 5.5.2 Provide visibility to supply availability and inventory

The flow of the majority of collaborative information is typically from customer to supplier as may be expected. **The best examples of collaboration involve companies providing a two-way exchange of information enhancing demand and supply visibility.**

Limited collaboration involves sharing the sales forecast and order forecast (supply plan). Customers in more integrated collaborative relationships share inventory targets, minimum and maximum inventory levels, and daily on-hand inventory levels in addition to expected demand. This increased visibility enables suppliers to be more responsive and make adjustments as to when replenishment may be imminent.

Sharing supply availability (or capacity) and inventory levels has been traditionally more difficult for suppliers to share with customers. There are multiple reasons for this limited two-way exchange of information. Suppliers may not have the information technology to adequately and reliably provide this data. Competitive reasons may justify protecting production capacity, inventory levels or sensitive data from being shared across customers or suppliers that are direct competitors.
Additionally, they may have business policies around inventory allocation, such as available-to-promise or first-come first-serve, that exposes their ability to service different customers.

Consider one example where a supplier is a market leader and has significant leverage with its customers who are mostly retailers and some distributors. The supplier’s leverage is a reversal from relationships where a large customer influences supplier behavior. For one retailer, the limited exchange of information from the supplier presents challenges. The supplier does not share their capacity or current inventory levels and they follow a first-come first-serve inventory policy for customers. Large orders from other customers may severely decrement inventory levels or limit supply availability. If product ordered goes unfulfilled and turns into a backorder for the retailer, the supplier does provide an estimated date of arrival. Because of this situation with restricted visibility to inventory and supply availability, the retailer must aggressively manage its own inventory levels and planned purchase orders, and hedge some of its financial risk.

### 5.5.3 Perform multi-echelon inventory optimization

Safety stock levels for product stocked at multiple locations are dependent on each location linked from the source of supply to the final point of consumption. Leading companies utilize multi-echelon inventory optimization software to calculate safety stock levels across multiple locations in the supply chain network. Inventory levels are calculated to achieve targeted service levels based on supply chain parameters and demand and supply uncertainty.

Most companies today employ at least single echelon inventory optimization models to set safety stock levels. The multi-echelon inventory optimization capability is normally implemented later within companies as their supply chain planning and replenishment processes mature.

The frequency of calculating safety stock, such as on a monthly or quarterly basis, depends on fluctuations in demand and supply reliability. Similar to considering the forecast frequency, **if there is not a significant change in the rate of demand and supply lead times remain stable across forecast intervals, the frequency of calculating safety stock may be reduced.** If the opposite situation exists, safety stock calculations should occur more frequently to accommodate changes in demand and supply variability.

*More sophisticated inventory optimization tools consider various inventory pipeline probability distributions in addition to a normal distribution. Some tools rely on developing unique probability distributions based on actual demand patterns and*
the frequency of demand to calculate optimal safety stock levels. Additional tool capabilities may include optimizing safety stock levels for a group of SKUs and applying funding constraints. It is important for companies to carefully select the right tool with robust functionality to match specific demand and supply characteristics.

5.5.4 Plan inventory across the extended enterprise

Even with the help of proper tools and technology, many companies plan inventory levels only internally. Additional inventory reductions and better stock positioning can be achieved by performing inventory planning and optimization across the extended enterprise, from raw material suppliers across the supply chain to the end-customer. Leading companies recognize that as part of optimizing inventory across the supply chain, inventory may be positioned very differently at each company based on their role in the supply chain. These companies work with collaborative partners to manage inventory trade-offs and align supply chain metrics for optimal supply chain performance.

The development of lean and/or six-sigma processes across collaborative partners also enables further reductions in cycle and safety stock by shortening lead times and reducing process variability.

5.5.5 Run “What-If” scenario analysis

Collaboration requires coordination of efforts across many levels of the supply chain. This interconnectedness means that decisions that are made at one level have consequences at all other levels, and may not have been considered prior to collaboration. In a collaborative environment, these decisions are not made in a vacuum but are made by looking at the effects to all partners. To accomplish this task it is helpful for companies to use advanced optimization and simulation software that can evaluate complicated trade-offs from changing policies and practices. This allows companies to perform “what-if” scenario analysis to evaluate different options and predict the potential supply chain impact before making decisions. Leading companies use this predictive capability across planning processes, from forecasting and replenishment to inventory management to S&OP/IBP.
Chapter 6 Resource Structure and Communication

Collaboration requires leadership and communication. In this chapter we present best practices in leadership where commitment to the program is needed at the onset of the initiative and throughout the effort to ensure success. Our discussion then offers recommendations on the use of those assets and concludes with best practices concerning communication.

6.1 OBTAIN EXECUTIVE-LEVEL SPONSORSHIP

Embarking on full collaboration with integrated planning and shared strategic decisions requires executive leadership. The idea sounds simple and obvious. Companies have a multitude of competing internal initiatives or different perspectives, and if collaboration is not a top priority, the effort is unlikely to succeed. *If only partial leadership support is given from either partner, the potential collaboration benefits will not be fully realized and it will diminish the impact of working with each other.*

Leadership sets the tone of the relationship by approving the company guidelines and allocating resources for collaboration. Day-to-day collaboration occurs at several organizational levels below the executives, but strategic decisions and relationship disagreements demand executive leadership. Even some leading companies, at times, have suspended or opted-out of collaborating with each other because of major disagreements between executive management.

6.2 ALIGN AND EMPOWER FUNCTIONAL RESOURCES

In the past, companies would typically rely on communication and planning to be managed between a buyer and salesperson. This resource model has proven to be ineffective. Supply chain planning has become more complicated and cannot be managed by this one-on-one communication style. *People with the right knowledge, skill sets and experience must be engaged for successful collaboration.* The free flow of information is encouraged.

Best practices demonstrate collaborative planning is done using cross-functional teams where personnel in similar supply chain functions are horizontally aligned between companies. For instance, working relationships and points of contact are
established between demand planners, supply planners, sales, marketing, finance and information technology within and between companies. Some companies require a minimum number of people from specific functional areas to be included in the collaboration process. *For one retailer, between two and six personnel per supplier must participate in the collaboration program with at least one person having a Director-level position or higher.*

Strategic personnel must be aligned with operational personnel to support collaboration. Executive management is responsible for determining the strategic direction of the relationship between companies. One particular means of alignment is the development of a clear escalation path and governance structure to address unresolved issues to engage executive management as needed. Another method is to plan specific meetings where executive management from both collaborative partners can communicate directly with each other.

Much of the value of collaboration comes from not only better predicting future demand but communicating and acting responsibly to unexpected changes in the supply chain. *Collaborative teams must be empowered to make difficult decisions to accommodate sudden changes on short notice.* Team members must have the appropriate authority to recommend adjustments to the operational plan if they are to be held accountable.

### 6.3 BALANCE DEMAND PLANNING WORKLOAD

Resource allocation can be a difficult decision for companies engaging in collaborative planning efforts. For demand planning, item count is a good indicator for determining the appropriate resource structure and balancing workload. *Based on the practices of leading companies in collaboration, between 800 and 1,600 items is a typical range for the number of items that a demand planner can effectively manage.* This range is only a guideline since the item count assigned to a demand planner depends on the “forecastability” of the items to be forecasted and the extent of collaboration.

In collaborative relationships where the forecast is created with a greater reliance on statistical forecasting as opposed to qualitative inputs or manual overrides, a demand planner can handle a wider breadth of items. *For a basis of comparison, each demand planner at one company manages about 1,200 items where the statistical forecast created is sufficient for 75%-80% of the items.* The forecast for the other 20%-25% of SKUs is composed of overrides from collaboration.
In an example of a collaborative strategic partnership, one demand planner is responsible for as few as 200-400 items. These items have high inventory turns and demand variability is high due to sales promotions. A lot of time and attention is spent collaborating on planning activities and making improvements to the forecast, and subsequently, forecast error is low. On the other end of the spectrum, in a transactional relationship, some demand planners manage as many as 3,000 – 5,000 items with limited collaboration. The demand profile has a long tail of slower moving products and a high percentage of these items can be statistically forecasted reasonably well.

6.4 COMMUNICATE FREQUENTLY AND WITH PURPOSE

The resource structure between demand and supply planners varies by company. In some companies, demand and supply planners are separated in the organizational structure with different functions and responsibilities. Within this structure, frequent coordination and communication between planning personnel is absolutely necessary to accurately align demand and supply. Collaboration best practice for communication frequency ranges from multiple times per day to multiple times per week between demand and supply planners, whether internally or externally.

In other companies, the same person acts as the demand and supply planner. Supply planning in this context includes review, editing and prioritizing planned orders generated from the forecasted demand. The more time-consuming activity of daily communicating and managing order deliveries with suppliers is managed by purchasing personnel and not by these planners.

Table 6.1 outlines common practices based on the frequency and purpose of communication. Daily and weekly communications may be formal, but are usually more casual in nature based on the topics of discussion and parties involved. Real-time changes, issues and points requiring clarification are often discussed on a daily basis by operational personnel. Weekly scheduled meetings may include reviewing supply chain metrics and ongoing operational issues with management. Operational level personnel are those members that are actively working the collaborative planning process. Operational personnel include demand planners, supply planners, sales, category managers, information technology, and others from the supply chain.

Discussions that are planned on a monthly basis, or less frequently, are typically formal meetings where the focus shifts from operational to strategic topics involving performance management, unresolved issues and the future direction of the relationship. Tactical level personnel include supervisors, managers and directors, and strategic level personnel are vice-presidents and other executives.
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Discussion Purpose</th>
<th>Structure</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>• Real-time changes&lt;br&gt;• Updates&lt;br&gt;• Issues&lt;br&gt;• Points for clarification</td>
<td>• Scheduled or reactive team meeting as needed&lt;br&gt;• Informal phone calls, emails, instant chat</td>
<td>• Operational</td>
</tr>
<tr>
<td>Weekly</td>
<td>• Weekly planning cycle&lt;br&gt;• Metrics&lt;br&gt;• Updates&lt;br&gt;• Issues&lt;br&gt;• Plans for next week</td>
<td>• Scheduled or reactive team meeting as needed&lt;br&gt;• Informal phone calls, emails, instant chat</td>
<td>• Operational&lt;br&gt;• Tactical</td>
</tr>
<tr>
<td>Monthly</td>
<td>• Monthly planning cycle&lt;br&gt;• Scorecards&lt;br&gt;• Updates&lt;br&gt;• Issues&lt;br&gt;• Plans for next month</td>
<td>• Formal meeting</td>
<td>• Operational&lt;br&gt;• Tactical</td>
</tr>
<tr>
<td>Quarterly or Semi-Anually</td>
<td>• QBR or Semi-Annual Meeting&lt;br&gt;• Scorecards&lt;br&gt;• Unresolved issues&lt;br&gt;• Strategic plans for next 6 to12 months</td>
<td>• Formal meeting</td>
<td>• Operational&lt;br&gt;• Tactical&lt;br&gt;• Strategic</td>
</tr>
</tbody>
</table>

Table 6.1 - Communications Frequency

6.5 STANDARDIZE COMMUNICATION TOOLS AND MEETINGS

Collaboration breaks down with the failure to communicate effectively. Poor communication and lack of understanding between partners leads to supply chain planning inefficiencies with potential costly consequences. As part of designing processes for joint planning, leading companies develop standardized planning tools, templates and reports to improve communication. Standardization fosters a common vernacular further improving planning communication by reducing the probability of errors and eliminating duplication. In one collaborative relationship, for example, both supplier and customer jointly created Microsoft Excel spreadsheets and web-based reports for planning and communication. These templates and reports form the basis for planning discussions that occur multiple times per week. Both companies share a common method for populating data and providing updates and general comments in these templates.

Standardized meeting schedules and formats also drive efficient communication for collaboration. Meetings are scheduled at recurring times daily, weekly or monthly as part of process discipline. Each meeting has a defined agenda where participants come prepared to efficiently exchange information and solve problems.
Collaboration is dependent upon the availability and transfer of information from one level of the supply chain to another. In fact, the sheer volume of information that is available today makes the task of collaboration easier in the sense of having the data, and at the same time difficult in trying to determine which data is most important. In this chapter we look at several aspects of information technology and discuss best practices for collecting, sharing and analyzing planning data and information.

7.1 INVEST IN AND UTILIZE ADVANCED PLANNING SYSTEMS

Enterprise Resource Planning (ERP) systems enable an integrated technology and information capability essential to collaboration. Leading companies rely on ERP systems for the timely coordination and availability of information across multiple planning and management functions. The ERP system is often the information source for “the single version of the truth.” Without an ERP system, collaboration is severely inhibited due to the inability to efficiently store, process and share information internally and between companies.

Many companies utilize Advanced Planning and Scheduling (APS) modules integrated with ERP systems for demand, inventory, production and transportation planning and optimization. For a number of companies, however, specialized or other sophisticated advanced planning software is used and data is exchanged with the ERP system. These planning tools automatically extract data from the ERP and upload the output data back into the ERP for centralized planning and information sharing.

Sometimes APS technologies are not suitable or easily configurable for the task at hand. In these situations companies may use alternative planning tools that offer specialized planning capabilities that are more applicable to specific requirements of their business. For example, at one company the forecast is generated using specialized demand planning software and the values are loaded into the ERP system for integration. A second example includes another company where customized Microsoft Excel spreadsheets are used to generate the forecast offline for specific reasons or for convenience, and it is loaded into the APS system.
7.2 LEVERAGE THE POWER OF THE INTERNET

Over the past decade significant improvements have been made that make it easier, more secure, and more convenient to share planning information between partners over the Internet. Leading companies commonly create and administer web portals to exchange supply chain planning data and information with suppliers. This open-access format allows suppliers to download the data and incorporate it into their planning system or perform ad-hoc analysis.

Traditional methods of connectivity including Electronic Data Exchange (EDI) and email communications are also deployed. EDI has multiple data standards and can be more cumbersome sharing information than via the Internet, but it allows companies to communicate directly between ERP systems (or though an information clearing house). Communicating by email allows for easy access to data without physically connecting to an ERP system, but it requires manual intervention to widely distribute and share information.

7.3 PRIORITIZE INFORMATION VISIBILITY

A common best practice between collaborative partners is to prioritize the type of information that is shared from the customer to the supplier and from the supplier back to the customer. After understanding the practical usefulness of the data available to share in collaboration, companies determine the desired level of collaboration based on the strategic importance and direction of the partnership.

Excellent examples of data exchange from the customer to the supplier may include:

- Sales forecast
- Order forecast (supply plan)
- Actual or historical sales (Point-of-Sale)
- On hand inventory
- Backorders
- Planned events – promotions, product launches, maintenance schedules, etc.

Similarly, information that may be shared from the supplier back to the customer may include:

- Production or distribution capacity and/or schedules
- On hand inventory
- Estimated order arrival time
- Product road map or new product introductions
Since much of this information is highly sensitive, companies must decide the type of data that should be accessible to each partner. In cases of limited collaboration, only the sales forecast, order forecast, and actual sales may be shared from customers to suppliers. This decision may also be based on the information technology limitations or strategic decisions from the customer. Key suppliers with a more strategic relationship receive additional information for improved planning.

Sharing forecast and demand information from the customer demand back to the supplier is by far the more common flow of information between partners. Sharing of supplier operations data back to the customer is less frequently used. However, there are examples of leading suppliers that readily share sales forecast, on-hand inventory, production capacity and expected delivery times for items on backorder with customers. These relationships are more advanced and some of them include a quasi-S&OP/IBP process between customer and supplier.

In addition to transactional data, performance scorecards with metrics are shared between partners. These scorecards may be updated and reported daily, weekly or monthly depending on the business operation and technological capability. In some collaborative relationships, the customer is responsible for posting the scorecards and measuring performance, while in other relationships this responsibility is delegated to the supplier.

7.4 DEVELOP ROBUST ANALYTICS AND REPORTING

Good collaboration is predicated on the fact that accurate information is shared in a relevant and timely manner. Leading companies possess robust analytical capabilities to support faster decision-making based on an underlying set of detailed facts. Drill-down capabilities allow planners to quickly find and determine the root cause of an issue. For example, if product category sales are decreasing, having the ability to understand which customers, distribution locations or SKUs are driving the shift in sales provides valuable insight for better decision-making. Systems that provide exception management also alert planners to outliers and business events that require management attention.

Standardized, professional reports are part of the planned communication between collaboration partners and internal management teams. Dashboards, scorecards and customized reports are all part of monitoring and measuring the progress made between collaboration partners. While some companies have the ability to generate and share reports from business intelligence software or online, most companies still rely on Microsoft Excel spreadsheets. However, most of these spreadsheets are designed for specific reporting purposes.
Chapter 8 Performance Management

We discuss best practices in performance management for collaborative planning in this chapter. Good performance management programs include appropriate metrics and a timely feedback mechanism for partners to take corrective action to improve results. The very nature of collaboration adds a requirement to develop metrics across the entire supply chain, as well as the operational metrics for each partner. Partners should place this requirement in the forefront of all strategic discussions when setting collaborative goals and objectives.

8.1 DEVELOP COMPREHENSIVE PLANNING METRICS

A meaningful collaboration performance measurement system spans end-to-end supply chain planning processes within and between supply chain partners. Developing a set of incomplete or disconnected functional metrics sub-optimizes supply chain performance. In collaboration, one partner may benefit at the expense of the other partner. Leading companies establish demand, supply and inventory planning metrics to drive performance and facilitate process improvements across functional boundaries. Table 8.1 outlines a partial list of these metrics.

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Demand</th>
<th>Inventory</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational</strong></td>
<td>• Forecast error – MAPE, etc.</td>
<td>• OH Inventory – finished product</td>
<td>• Fill rate – order, line or quantity</td>
</tr>
<tr>
<td></td>
<td>• Forecast bias</td>
<td>• OH Inventory – raw material</td>
<td>• On-time delivery</td>
</tr>
<tr>
<td></td>
<td>• Forecast value add (FVA)</td>
<td>• Inventory in-transit</td>
<td>• Customer wait time</td>
</tr>
<tr>
<td></td>
<td>• SKU segmentation</td>
<td>• Safety stock inventory</td>
<td>• Backorders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Inventory turns</td>
<td>• Packaging and carrier compliance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Days of supply inventory (DSI)</td>
<td>• Production, warehousing and transportation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>capacity utilization</td>
</tr>
<tr>
<td><strong>Financial</strong></td>
<td>• Revenue or Profit</td>
<td>• OH Inventory</td>
<td>• Supply chain cost</td>
</tr>
<tr>
<td></td>
<td>• Opportunity cost of missed sales</td>
<td>• Cash conversion cycle</td>
<td>• Opportunity cost of carrying inventory</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Asset utilization</td>
</tr>
</tbody>
</table>

Table 8.1 - Collaboration Operational and Financial Metrics
8.1.1 Demand Planning

Demand planning metrics are used to focus on reducing forecast error and increase planning effectiveness. **Two common metrics used to monitor forecast error are Mean Absolute Percent Error (MAPE) and Bias.** MAPE is a measure that defines forecast error as a percentage of actual demand. The lower the value of MAPE indicates a more accurate forecast. Other measures for forecast error include Mean Percent Error (MPE), Mean Absolute Deviation (MAD), Mean Squared Error (MSE), etc. Forecast bias is used as a good directional indicator of whether the forecast is consistently less than or greater than the actual demand. Leading companies define MAPE and bias targets to guide and motivate demand planners to perform better. Some companies define threshold values for MAPE and bias to determine which items can be reliably managed using a statistical forecast. Both metrics can be applied to the SKU level and aggregated to higher levels.

As previously described in this paper, Forecast Value Add (FVA) is a metric used to improve planning accountability and effectiveness. Forecast Value Add measures the forecast error of the updated forecast as compared to that of the statistical forecast. This metric can be expressed as a percentage difference or percentage change to understand the additional accuracy, or “value add”, made to the revised forecast.

SKU segmentation provides an analytical perspective for demand planners to understand performance and most effectively spend time and attention to improve the forecast. Both a Pareto analysis and volume-variability analysis are good approaches to segmenting SKUs. Tracking changes to SKU classifications overtime can also be an interesting metric to monitor. This is a good indicator of how demand is changing and planning adjustments can be made.

8.1.2 Inventory Planning

**Inventory planning metrics relate to inventory level and inventory velocity.** On hand inventory quantity, inventory turnover and Days Supply Inventory (DSI) are fundamental inventory metrics. Collaboration should improve the effectiveness of inventory by achieving desired service levels with less inventory investment. This assumes better forecast accuracy, better visibility to demand and aligned supply.

Calculating the optimal safety stock inventory is a critical component to the inventory equation required to meet desired service levels. Sophisticated inventory optimization models should be deployed to calculate safety stock levels to meet service levels given demand variability and supply uncertainty. Safety stock level is rarely reported as a separate metric as it usually comprises a smaller percentage of the inventory pipeline. However, it may be useful to evaluate changes in safety stock
investment with changes in forecast error and supply consistency. Inventory investment may increase or decrease if safety stock levels have not been optimized in accordance with changes in the supply chain.

8.1.3 Supply Planning

Supply planning metrics reveal a company’s ability to consistently meet the expected demand. Common metrics include derivations or combinations of service fill rate, customer wait time, on-time delivery, backorders, packaging and carrier compliance and supply chain asset utilization.

Customer service levels, or supply availability, are often measured by fill rate and on-time delivery, or customer wait time, which is the weighted average time a customer waits from order placement to receipt, including backorders. Fill rate is measured by order, line or unit quantity whereas customer wait time is usually measured by order or unit quantity. On-time delivery includes orders or quantity shipped and delivered to the customer on time. Both the quantity of backorders and the expected wait time until the backorder is filled are measured.

Packaging and carrier requirements are usually established to facilitate order fulfillment, replenishment and distribution for collaborative partners. Supply chain asset utilization may include production, warehousing and transportation capacity utilization.

8.1.4 End-to-end supply chain planning

The previous sections have discussed metrics that are associated with individual company processes in the supply chain which are certainly important. However, the benefits touted by collaboration center on the ability to improve the availability of supply to the customer while reducing the overall supply chain cost. To accurately measure this it is important to consider the scope of the end-to-end supply chain processes.

Additional end-to-end supply chain metrics may include:

- Total supply chain response time
- Total supply chain cost to serve the customer
- Total current asset utilization and working capital
- Total fixed asset utilization
- Total supply chain inventory
- Total revenues and profits
- Total lost revenues or missed sales opportunities
8.2 LINK OPERATIONAL AND FINANCIAL METRICS FOR A CONVINCING BUSINESS CASE

Changes in operational performance must be translated into the financial language spoken in the executive suite to make a convincing business case. Collaboration partners should demonstrate how changes in supply chain practices and processes affect their respective financial condition. Financial metrics must be defined by revenue, cost and asset utilization as outlined in Table 8.1.

Return on Investment (ROI) and Return on Net Assets (RONA) are key financial indicators of a company’s operating performance. Based on the aforementioned supply chain planning metrics used in collaboration, profit and loss financial measurement should consider performance in revenue, profit, cost-to-serve and opportunity cost (missed sales or inventory carrying cost). Financial measurement relevant to the balance sheet should pertain to inventory, working capital (cash conversion cycle) and fixed asset utilization. Figure 8.1 illustrates a financial model linking operation performance to financial value.

Figure 8.1 - Financial Benefits from Operational Value Drivers
8.3 FOCUS ON DESIRED OUTCOMES

Collaboration partners should not lose sight of the big picture by myopically focusing on the measurement of transactions and activities. More value can be created between partners by defining and focusing on desired outcomes, that is, measurable objectives based on accomplishments. The purpose of emphasizing desired outcomes is to achieve the results both partners seek with less scrutiny as to how the work is performed.

There is a growing trend among leading companies to establish collaborative relationships focused on desired outcomes that are designed to enhance the revenues and profits of both partners and to evaluate potential risks. This concept has been defined as “vested outsourcing” between outsourcing partners, where both partners have a mutual operational, financial and risk management interest in working together. These companies experience increased supply chain innovation and better relationships as there is more flexibility to create new ways of doing business, including structuring alternative pricing models and risk management agreements.

Consider the example of a distributor that supplies spare parts to a maintenance service provider responsible for maintaining the public vehicle fleet for a major U.S. city. As part of an outsourcing contract agreement with the service provider, the city has defined a desired outcome to have all police cruisers repaired to fully-operational condition within 48 hours. The distributor, who sources parts from dozens of suppliers, sets a performance target for its suppliers to have stock available in order for the maintenance service provider to achieve its performance goal. The distributor’s requirement for suppliers is to stock a 98% unit fill rate with no backorder wait time longer than 48 hours. In the event of a service failure, the city penalizes the maintenance service provider. If the failure is attributed to not having the spare part on time, the maintenance provider penalizes the distributor, and the distributor in turn penalizes the part supplier. However, the distributor may not necessarily penalize the supplier if they did not achieve a 98% unit fill rate for a period of time as long as the supplier performance did not affect the 48-hour customer wait time.

8.4 EMPHASIZE AND MONITOR RELATIONSHIP INTANGIBLES

Leading companies are aware of the intangible benefits of collaboration that influence behavior and strengthen the relationship. The working relationship between collaboration partners should improve over time, but may be difficult to measure or translate into traditional performance metrics. Established guidelines and shared
experiences between collaborative partners reinforce positive behavior and a mutually acceptable way of doing business.

Intangible benefits from a successful relationship include:

- Earned trust by consistently performing to expectations
- Improved communication through joint planning; better quality of meetings and fewer misunderstandings
- Reduced risk through better visibility and sharing of resources
- Expanded knowledge base between collaboration participants
- Improved morale and job satisfaction through a more enjoyable working experience

The importance of emphasizing and monitoring positive behaviors between collaborative partners should not be underestimated. The ability of partners to work together, especially through difficult challenges, builds trust for improving performance in the future. The way partners manage the “soft” side of a collaborative relationship is as important as managing the “hard” goals and objectives of the partnership. This perspective recognizes that people make the difference and focuses on the question of “How” the partnership is managed in addition to “What” the partnership is solving for.
Chapter 9 Relationship Management

The benefits of collaboration have been previously divided into tangible and intangible benefits received by each company. Best practices have shown that the level of benefits come from the number of partners each company engages in collaboration with and the quality of each relationship. It is imperative for companies that are trying to maximize the returns from collaboration to focus their relationship management on improving the quality of relationships to build trust and joint planning capabilities, and then to systematically extend this knowledge to a greater number of collaborative partners. In this chapter we present multiple best practices for managing and improving relationships between collaborative partners.

9.1 DEVELOP A SUPPLIER RELATIONSHIP MANAGEMENT PROGRAM

Leading companies are able to facilitate collaboration and accelerate new collaboration partners more quickly by having an established Supplier Relationship Management (SRM) program. SRM is a formal, comprehensive approach taken by a company to effectively and efficiently manage its supply base and work with collaboration partners. Dedicated management resources oversee and administer the SRM program to develop relationships and improve supplier performance. For one medium-sized company, 3-4 full-time employees are dedicated to managing their SRM program. Their responsibilities include coordinating monthly supplier meetings, sharing information and reporting performance metrics with suppliers, administering penalties to suppliers that underperform, and in general, assisting suppliers with miscellaneous issues that might negatively impact supply chain performance or the collaborative relationship.

Collaboration relationships take time to develop and mature. Suppliers or customers may not have the people, processes and technology to swiftly and cost-effectively engage in a new collaborative relationship. SRM can assist by providing a common framework to make process improvements and define goals for collaborative partners to work toward.

9.2 DEFINE AND UNDERSTAND PARTNERSHIP ROLE

Companies that exhibit best practices understand their role and position in the collaborative relationship. Not all collaborative relationships are created or
maintained equally. Some supply chain partnerships are balanced while others are disproportionately one sided. Companies closest to the end-customer typically have an inherent advantage and additional leverage over suppliers further upstream in the supply chain who do not readily have access to customer information and a direct customer relationship. Relationship leverage can also be influenced by the volume of business, operational capacity, competitive positioning or planning expertise offered by each partner.

**Leading companies understand collaborative relationships are dynamic and change over time based on demonstrated performance, new capability development and market conditions.** Consider an example of a collaborative relationship where both customer and supplier create sales forecasts. For many years, the customer created the sales forecast and held the supplier accountable for planning and replenishment based on the customer forecast. The supplier’s forecasting capability was recognized as less advanced than the customer’s forecasting capability. Over time, the supplier made significant investments to enhance its forecasting sophistication to the point where the supplier’s forecast is now more accurate than the customer’s forecast. This change in planning capability and expertise challenges the traditional role and responsibilities of the relationship when reconciling the forecasts. Supply chain partners must be willing to acknowledge their strengths and weaknesses, and adjust their roles and responsibilities to successfully develop collaborative relationships and achieve the maximum benefits from working together.

### 9.3 ESTABLISH GUIDELINES

It is widely accepted that companies that wish to enter into a collaborative relationship develop a front-end agreement. Companies recognize the importance of supply chain integration but are less certain as to how to best manage a collaborative relationship. However, unlike formal contractual agreements defined between parties doing business, such as an overarching Master Service Agreement or Service Level Agreement, *collaborative relationships are often ambiguously defined*. Companies with leading practices develop formal guidelines and processes for fostering, managing and monitoring collaborative relationships.

Guidelines include joint operating policies and procedures clearly defining how to manage both routine tasks and unexpected events. These guidelines set expectations to avoid confusion and facilitate communication and conflict resolution. They may also provide grounds for terminating an unproductive relationship. In these situations, since collaboration guidelines are not part of a formal contract, companies simply reduce their level of resource investment in joint planning activities and share information selectively.
9.4 DEVELOP A TRAINING PROGRAM

Training expands the knowledge base of collaborative partners and improves internal and external collaboration. A formal company training program designed to educate personnel from both the company and its supply chain partners, and supported with proper documentation, is characteristic of the best collaboration programs. Training may be comprised from a combination of instructional documents, reference guides, online tutorials, meetings, seminars and partner conferences. As the collaborative program grows and changes, it is important to update training content and incorporate lessons learned from past experiences.

*To participate in one company’s collaboration program, new suppliers must complete training and become certified.* As part of training, these suppliers must explain how they perform their supply chain planning and how they will incorporate the customer’s information and requirements into their planning routine.

9.5 SHARE RISKS AND REWARDS

Collaboration is a cooperative means of linking two or more companies together for the sole purpose of increasing benefits to both. This process contains many risks and rewards. Many of the rewards have been previously discussed, while little attention has been given to the potential risks. The financial investment required to develop capabilities to properly engage in collaboration can be extensive and if quality relationships are not developed the benefits may never be realized. Companies should seriously evaluate the collaborative effort and determine if the “cost of doing business” will surpass the investments required. This analysis should be based on the type of relationship and expected benefits for each prospective collaborative partner. *When defining their goals and objectives upfront, collaborative partners should understand how risks will be shared and mitigated.*
Chapter 10 Summary

The purpose of this paper is to share best practices used in collaborative demand and supply planning between supply chain partners. Our intent has been to structure and present these practices so that all companies, regardless of their collaborative relationship maturity, technological capability or planning complexity, benefit from this discussion. While each chapter is designed specifically to address a particular area of collaboration, the best examples of successful collaboration are from companies that execute best practices across many, if not all, categories of the framework. We cannot overemphasize the importance of strategic alignment and resource commitment for collaborative planning efforts to truly succeed. Investing in advanced planning technology and sharing information is only the beginning of developing effective collaborative planning and building collaborative relationships. Performance and relationship management help collaborative partners build trust to adequately share risks and achieve substantial operational and financial benefits.

A list of the best practices in collaborative demand and supply planning between partners are presented in Table 10.1.

Table 10.1 - Collaborative Planning Best Practices

<table>
<thead>
<tr>
<th>Category</th>
<th>Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Strategy</td>
<td>• Selectively choose collaboration partners</td>
</tr>
<tr>
<td></td>
<td>• Define goals and objectives</td>
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<td></td>
<td>• Determine the level of collaboration</td>
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<tr>
<td>2. Planning Process</td>
<td>• Develop an integrated planning process</td>
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<tr>
<td></td>
<td>▪ Design a formal collaborative planning process</td>
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<td></td>
<td>▪ Integrate external and internal collaboration processes</td>
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<td></td>
<td>▪ Understand planning processes between partners</td>
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<tr>
<td></td>
<td>• Focus and prioritize demand planning efforts</td>
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<td></td>
<td>▪ Analyze the demand profile</td>
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<td></td>
<td>▪ Conduct a Pareto analysis</td>
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<td></td>
<td>▪ Perform SKU segmentation</td>
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<td></td>
<td>▪ Develop strategies for planning effectiveness</td>
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<td></td>
<td>▪ Identify “forecastable” versus “non-forecastable” items</td>
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<td></td>
<td>▪ Perform “active” versus “passive” demand planning</td>
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<td></td>
<td>▪ Manage by exception</td>
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<td></td>
<td>• Create the demand forecast</td>
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<td></td>
<td>▪ Generate the quantitative demand forecast</td>
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<td></td>
<td>▪ Lay the foundation: Determine the hierarchy, level, horizon, interval and frequency</td>
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<tr>
<td>Category</td>
<td>Best Practice</td>
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<td>----------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------</td>
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<tr>
<td></td>
<td>− Utilize sophisticated forecast methods</td>
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<td></td>
<td>− Plan for independent versus dependent demand</td>
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<td></td>
<td>▪ Develop the qualitative forecast</td>
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<td></td>
<td>− Use human intelligence to enrich the forecast</td>
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<td></td>
<td>− Document and discuss assumptions (and actions)</td>
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<tr>
<td></td>
<td>− Assign a process owner to the forecast</td>
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<td></td>
<td>− Take a risk management approach</td>
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<td></td>
<td>• Evaluate and improve the demand forecast</td>
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<td></td>
<td>▪ Determine the value added of forecasting changes</td>
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<tr>
<td></td>
<td>▪ Minimize bias as part of reducing forecast error</td>
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<tr>
<td></td>
<td>▪ Analyze actual demand variability versus forecast error</td>
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<tr>
<td></td>
<td>▪ Critically examine the statistical forecast methods</td>
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<tr>
<td></td>
<td>• Plan supply and inventory requirements</td>
</tr>
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<td></td>
<td>▪ Determine supply and inventory positioning strategy</td>
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<tr>
<td></td>
<td>▪ Provide visibility to supply availability and inventory</td>
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<tr>
<td></td>
<td>▪ Perform multi-echelon inventory optimization</td>
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<td></td>
<td>▪ Plan inventory across the extended enterprise</td>
</tr>
<tr>
<td></td>
<td>▪ Run “What-If” scenario analysis</td>
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<tr>
<td>3. Resource Structure and</td>
<td>• Obtain executive-level sponsorship</td>
</tr>
<tr>
<td>Communication</td>
<td>• Align and empower functional resources</td>
</tr>
<tr>
<td></td>
<td>• Balance demand planning workload</td>
</tr>
<tr>
<td></td>
<td>• Communicate frequently and with purpose</td>
</tr>
<tr>
<td></td>
<td>• Standardize communication tools and meetings</td>
</tr>
<tr>
<td>4. Technology and Information</td>
<td>• Invest in and utilize advanced planning systems</td>
</tr>
<tr>
<td></td>
<td>• Leverage the power of the Internet</td>
</tr>
<tr>
<td></td>
<td>• Prioritize information visibility</td>
</tr>
<tr>
<td></td>
<td>• Develop robust analytics and reporting</td>
</tr>
<tr>
<td>5. Performance Management</td>
<td>• Develop comprehensive planning metrics</td>
</tr>
<tr>
<td></td>
<td>▪ Demand planning</td>
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<tr>
<td></td>
<td>▪ Inventory planning</td>
</tr>
<tr>
<td></td>
<td>▪ Supply planning</td>
</tr>
<tr>
<td></td>
<td>▪ End-to-end supply chain planning</td>
</tr>
<tr>
<td></td>
<td>• Link operational and financial metrics for a convincing business case</td>
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<td></td>
<td>• Focus on desired outcomes</td>
</tr>
<tr>
<td></td>
<td>• Emphasize and monitor relationship intangibles</td>
</tr>
<tr>
<td>6. Relationship Management</td>
<td>• Develop a supplier relationship management program</td>
</tr>
<tr>
<td></td>
<td>• Define and understand partnership role</td>
</tr>
<tr>
<td></td>
<td>• Establish guidelines</td>
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<tr>
<td></td>
<td>• Develop a training program</td>
</tr>
<tr>
<td></td>
<td>• Share risks and rewards</td>
</tr>
</tbody>
</table>
ENDNOTES:


ABOUT THE AUTHOR

Devin Shepard is the Founder and President of Supply Chain Acuity, a supply chain management consulting firm focused on supply chain strategy and end-to-end supply chain planning. Through his experience, leadership and creativity in supply chain management and consultative sales, Devin has developed innovative solutions to address supply chain challenges helping dozens of clients deliver hundreds of millions of dollars to top line revenue growth and bottom line cost savings.

Devin has managed numerous supply chain strategy and planning projects helping clients in multiple industries design, optimize and transform their global supply chains to achieve significant cost reductions and process improvements. He has been a guest speaker at supply chain conferences both domestically and internationally. He has also worked collaboratively on research and publications with universities.

Devin earned an M.B.A. in Supply Chain Management, Marketing and Finance from The Eli Broad Graduate School of Management at Michigan State University and a B.S. in Chemical Engineering from Iowa State University. Devin’s continuing education efforts include attending the Massachusetts Institute of Technology Supply Chain Executive Program and regularly participating at the University of Tennessee Supply Chain Forum. He is a certified IQF Lean Six Sigma Master Black Belt, CPIM, CSCP, and his firm is also a member of various professional organizations including CSCMP and APICS.