Table of Contents

Overview .................................................................................................................................................. 1

Synthesis of the Symposium ................................................................................................................... 2

1. Drivers Toward an Intersection ........................................................................................................... 2
   1.1. Collision of Strategy and Supply Chain Performance ................................................................. 2
   1.2. Demanding Customers ............................................................................................................... 2
   1.3. Globalization ............................................................................................................................. 3
   1.4. Spanning the Performance Gap ................................................................................................. 3
   1.5. Cycles of Vertical and Horizontal Integration, Shifting Power Structures .............................. 4

2. Integration on Multiple Levels ............................................................................................................. 4
   2.1. Integration of Supply Chain and Business Strategy, Multi-Level Integration ......................... 5
   2.2. Channel Integration ................................................................................................................... 5
   2.3. Peer Integration ......................................................................................................................... 5

3. Why Implementing Supply Chain Best Practices is Hard .................................................................... 6
   3.1. Accelerating Speed .................................................................................................................... 6
   3.2. Unpredictability .......................................................................................................................... 7
   3.3. Globalization of Supply and Demand ...................................................................................... 7
   3.4. Complexity and Control .......................................................................................................... 8
   3.5. Functional Silos ....................................................................................................................... 8
   3.6. Culture and Change ................................................................................................................. 8
   3.7. Distrust and Misalignments with Partners .............................................................................. 9
   3.8. Time ......................................................................................................................................... 9
   3.9. Expertise Gap: Seeing the Forest or the Leaves ..................................................................... 10

4. Prerequisites for Success ..................................................................................................................... 10
   4.1. Top Management Support ........................................................................................................ 10
   4.2. Aligned Incentives .................................................................................................................... 11
   4.3. Win-Win .................................................................................................................................... 11
   4.4. Technological Enablers .......................................................................................................... 11
   4.5. Process Design ....................................................................................................................... 12
   4.6. Avoiding Non-Value-Added Work ......................................................................................... 12
   4.7. Reducing Uncertainty ............................................................................................................. 12
   4.8. Understanding the Context .................................................................................................... 13

5. Future Issues ..................................................................................................................................... 14
   5.1. Virtual Integration: Vertical and Horizontal ............................................................................ 14
   5.2. From Product Utility to Time/Place Utility ............................................................................ 15
   5.3. Trends toward Service Supply Chains .................................................................................. 15
   5.4. New Opportunities .................................................................................................................. 15

6. Conclusion ......................................................................................................................................... 15
   6.1. The Five Characteristics of Leaders ...................................................................................... 15
   6.2. New Supply Chains, New Strategies ...................................................................................... 16

Summaries ............................................................................................................................................... 16

1. Dr. Susan Hockfield, President, Massachusetts Institute of Technology ............................................. 16
2. Bill Copacino, Chief Administrative Officer, C&S Wholesale Grocers ........................................... 16
   2.1. Supply Chain Management Becomes More Strategically Important .................................... 17
   2.2. The Growing Performance Gap ............................................................................................ 17
   2.3. Characteristics of Supply Chain Leaders .............................................................................. 18
   2.4. Interview with Kim Blanton, Boston Globe .......................................................................... 19
Overview

Supply chain management is not simply a cost-cutting tool or a channel for delivering products, but a vital source of competitive advantage. To this end, supply chain professionals should be included in critical business decisions and senior business leaders of all functions should have a deeper understanding of supply chain issues. Yet many companies continue to restrict their supply chain activities to routine operations and cost control programs. A much better understanding is needed of how supply chain management integrates with strategy and organizational structure to help enterprises compete and grow.

On March 1, 2005, the MIT Center for Transportation and Logistics (CTL) hosted a symposium “At the Crossroads of Supply Chain and Strategy” to directly address these issues. The symposium brought together over 170 leading thinkers and practitioners who shared their insights into the junction between corporate strategy and supply chain management. This was the first annual “Crossroads” event, with the 2006 “At the Crossroads of Supply Chain and Strategy” being scheduled for March 28-29, 2006. (Contact Jim Rice at <jrice@mit.edu> or visit http://web.mit.edu/ctl/www/news/calendar/crossroads.htm for updates).

This session also marked the launch a major publishing venture of a newsletter that will explore supply chain leadership as a primary element of business strategy, in many cases bringing competitive advantage to the firm. The newsletter – Supply Chain Strategy – will be published by a partnership between Harvard Business School Publishing and the MIT Center for Transportation & Logistics on a monthly basis.

About the MIT Center for Transportation & Logistics and Harvard Business School Publishing

The MIT Center for Transportation & Logistics is a world leader in supply chain education and research. CTL conducts research in transportation, logistics and supply chain management, and runs graduate logistics programs and an extensive program of industry outreach involving dozens of leading companies.


How to Use this Report

This report presents the proceedings of the symposium in two ways: first, a synthesis of the symposium, and second, a focused review of each speaker’s presentation. If the reader wishes to learn about the overall conference and the discussion, read this first section called Synthesis of the Symposium. If the reader instead wishes to learn about the comments of one specific speaker, use the index to find a review of the speaker’s comments in the Summaries section. These two ways to access the content will make it easier for the reader to use the report.
Synthesis of the Symposium

1. Drivers Toward an Intersection

Supply chain management is becoming an increasingly crucial and strategic element of modern business. Dr. Susan Hockfield, the new president of MIT, enumerated the motivations for exploring the intersection of supply chain and strategy. Lengthening supply chains, increasing complexity, demanding customers, and rising security issues drive companies toward more sophisticated and more strategic supply chain management. Even US Federal Reserve Chairman Alan Greenspan said that supply chain management might have been a factor in the longest economic recovery in the nation's history.

A number of drivers make the issue important for companies as they consider their own business operations in light of the business and corporate strategy.

1.1. Collision of Strategy and Supply Chain Performance

Failure to align the supply chain with business strategy can hurt companies. Dr. Michael Hammer noted the potentially unfortunate interactions between supply chain performance and business strategy with the case of Geon, now called PolyOne. In its early days, plastics maker Geon was a siloed operation with distinct divisions for each of the three stages of the manufacturing process: vinyl chloride synthesis, resin manufacturing, and compounding. Lack of coordination between the three stages meant poor performance. By reengineering processes and implementing an integrated ERP solution, the company created a more efficient enterprise.

Then Geon top executives, however, decided to sell the bulk/commodity chemical parts of the business (i.e., vinyl chloride synthesis and resin manufacturing). On the one hand, this step made great strategic sense because it allowed the company to focus on the higher-margin, value-added resin compounding stage of the business. On the other hand, when the previously integrated parts of the company became independent suppliers, all of the coordination problems from the early days of silos returned. In the end, the company created an integrated supply chain strategy that automated the connections in the now dis-integrated supply chain. This move undid the damage created by the business strategists, illustrating the importance of aligning supply chains with business strategy.

1.2. Demanding Customers

Rising customer expectations are driven by experiences in other industries. For example, Professor Yossi Sheffi of MIT noted that when he calls the local pizza place, they immediately ask if he wants another pepperoni pizza delivered, just like last time. When he calls his bank, in contrast, he is forced struggle with a confusing morass of phone menus. He expects the bank to be just as knowledgeable about him as his pizza purveyor. When Prof. Sheffi talked with the bank president about this gap, the bank president said that no other bank has that capability. But to the customer, such a point is irrelevant. If one company has the capability, why not others? Similarly, when a company assesses the performance of a supplier, it may compare the supplier to the performance of every other supplier, not just to the competitors of the supplier. Customers now set the performance bar to best-in-world, rather than just best-in-class.
Rick Ciccone, Director of Global Supply Chain Operations at Procter & Gamble, described the demands on consumer packaged goods companies. In the past, P&G marketed its branded goods to consumers and sold those goods through fragmented networks of retailers. P&G played a major role in defining how consumer packaged goods made it to consumers because of the fragmented downstream channel to the consumer. The rise of Wal-Mart changed that.

Mr. Ciccone explained that customers are becoming more demanding because there is really more than one customer involved in every transaction. P&G knows it must satisfy both the retailer (P&G's direct customer) and the consumer (the customer's customer). Moreover, consumers must be satisfied at two distinct points in time: when they choose the product and when they use the product. Thus, P&G must satisfy the combined needs of the retailer, the shopper, and the end-user of each product. It is thus the supply chain that enables the firm to satisfy the disparate needs effectively and efficiently.

1.3. Globalization

Many of the presenting companies, including IBM, Reebok, and P&G, noted the significant impact of globalization. P&G has been selling globally for many years. What has changed is that the retailing chains -- P&G's direct customers -- are now increasingly global. Wal-Mart, Tesco, ALDI, Ahold, Carrefour, and others have transcended their respective national borders to create global-spanning retail networks.

Globalization is a double-edged sword that entails challenges as well as numerous opportunities. The rise of a global workforce lets companies shift production, functions, and expertise around the world. Reebok, for instance, moves into and out of countries -- shifting sourcing from Vietnam, Honduras, El Salvador, and other countries. Bob Moffat, SVP Integrated Supply Chain at IBM, noted that protectionism is doomed to fail: the only way a company can compete in the global marketplace is to leverage the global supply base. With these opportunities come new complexities of site selection in foreign countries and global logistics.

Overall, globalization has made it harder for companies to deal with variations in customer demand. Worldwide media mean that fashions and customer needs move in lock-step around the world. If a product is a hit in one location, the surge in demand is soon global. If a product is a dud in one location, the company is not likely to find a market for it in another location.

Global competition and Wall Street's demand for shareholder value means an increasing emphasis on performance. Supply chain strategy, design, and operations impact crucial performance variables including the cost of goods, asset utilization, working capital requirements, and customer satisfaction. More companies are looking to boost their performance on a wide range of supply chain metrics.

1.4. Spanning the Performance Gap

Mr. Bill Copacino, Chief Administrative Officer of C&S Wholesale Grocers, presented data on the performance gap between supply chain leaders and median performers of various industries. On a metric such as the cash-to-cash cycle time, the best performers were 2.3 to 3.7 times faster that the median firms in their industries. Moreover, this gap appears to be growing -- the best are getting better and the mediocre continue to muddle along. In discount retailing, Wal-Mart's competitors improved inventory turns from 4.65 to 5.01. Meanwhile, Wal-Mart shot from 5.8
turns to 8.3 turns, further widening the gap and giving Wal-Mart a 40% improvement advantage over its competitors. Despite the growing gap, Mr. Copacino thought that laggards do have a narrowing window of opportunity for improvement.

1.5. Cycles of Vertical and Horizontal Integration, Shifting Power Structures

Professor Charlie Fine from the MIT Sloan School of Management described how industry operating structures go through a double-helix cycle from vertical to horizontal integration and back again. Consider the traditional vertically-integrated company – a company that makes all its own proprietary parts for its own full line of proprietary products. When massive vertically-integrated companies grow too big, they start to fall prey to small, specialized niche players. This happens because big companies can’t be best at everything. The rise of small players creates a trend toward modular products and specialization that leverages best of breed components from a wide range of companies. Over time, the vertically-integrated dinosaurs are forced to divest various non-competitive vertical subdivisions and return to core competencies.

Meanwhile, small niche competitors can grow and out-compete other companies in their horizontal category. As the once-niche players expand, they soon fill their horizontal slot in the industry -- each horizontal category becomes dominated by one or a few large players. With the maturation of their category comes a quest to expand vertically into other adjacent categories. As these companies expand, they recreate the vertical integration structures that started the cycle.

The on-going cycle between vertical and horizontal integration creates stress for all companies. Vertically-integrated companies feel pressure to divest when nimble, specialized start-ups attack in niches. Horizontally-integrated companies feel pressure to grow across their industry and then grow upward or downward vertically. The point is that industries face a constant shift in terms of dominant players and business models. P&G noted shifts in its industry that go beyond the emergence of a large customer like Wal-Mart. For example, the general trend toward private-label goods (retailers expanding vertically into consumer goods) has affected brand-dependent companies such as P&G.

Similarly, Prof. Fine delineated how the PC industry has seen several shifts in the dominant power. Swinging from an integrated offering to a modular offering allowed users to use off-the-shelf components, permitting the advent of PC clones. Finally, as the PC industry grew, the locus of power shifted to Dell because of that computer maker's superior supply chain efficiencies and ability to deliver the latest technology at the lowest cost. Ultimately, how and what companies integrate is both a strategic decision and a supply chain decision.

2. Integration on Multiple Levels

Dr. Hammer decried the divide-and-conquer approach created by the industrial era of management theory. Breaking the organization into hierarchical bite-size pieces may have created easily-managed, functional specialization, but it also created dysfunction at a very deep structural level. The current big trend in management is internal integration: breaking down the silos to create a coordinated, effective enterprise.
2.1. Integration of Supply Chain and Business Strategy, Multi-Level Integration

The most important element of integration is the alignment of business strategy with supply chain management. This alone is not the limit, as it is important to integrate with suppliers as well.

Companies can integrate with their suppliers to jointly manage the supply chain for higher performance. For example, HP evolved to a high level integration with suppliers, as it outsources 90% of the manufacturing of its computers and printers. The contract manufacturer, in turn, buys plastic cases for HP’s computers and printers from a network of injection molding companies. The case makers, in turn, buy resin from GE Plastics. In the past, frequent changes in product assortment, exterior styling, and production volumes wreaked havoc with the case-making portion of the supply chain. Changes in color, quantity and specifications took too long to wind their way through the supply chain to the resin suppliers. Amidst the confusion and delays, HP had to turn down orders that it had already accepted.

HP decided that it needed to more closely work with its deeper-tier suppliers in order to better coordinate case production. But HP went further than merely sharing information up into its supply chain. HP worked directly with GE Plastics, five levels deep in the supply chain, to negotiate orders for resin. Instead of having each small case molder do its own resin purchases, HP negotiated bulk purchases and had the case-maker order resin on HP’s account. The result is that HP gets the coordination and negotiation advantages of being a big, vertically-integrated maker of PCs and the advantages of buying from independent, competing suppliers and contract manufacturers. New supply chain management ideas and technology enable a third choice in the make-or-buy strategic decision: a buy-with-control strategy that provides the best of both worlds.

2.2. Channel Integration

Companies can also integrate with channel partners. For example, Dr. Hammer described how Kawasaki improved after-market sales of accessories for its line of motorcycles. Leather jackets, keychains, and other accessories can provide a significant source of profits for motorcycle retailers and companies: once customers buy a big bike, they often spend money to customize the bike or outfit themselves. Yet the rough-and-tumble characters that run the typical motorcycle shop are not interested in the fineries of managing inventories of what amounts to fashion apparel.

To solve this problem, Kawasaki created a channel integration program in which Kawasaki would hold and manage inventory of accessories on behalf of retailers. Retailers would receive a more limited sample stock of merchandise and display items. When a customer picked out a size XX-Large black leather jacket, Kawasaki would handle the fulfillment direct from its distribution center. In this way, everyone wins because the retailer makes more sales while avoiding the risks of aging inventory.

2.3. Peer Integration

Finally, companies can integrate with non-competing peer companies. For example, Dr. Hammer described how General Mills and Land O’ Lakes created a joint venture to deliver perishable dairy products (i.e., General Mills yogurt and Land O’ Lakes butter) to local grocery stores. In the past, each supplier made its own deliveries to all the grocery stores. General Mills
loaded a truck with yogurt and expected the truck to deliver to six stores per day. Land O’ Lakes did the same with butter. Given the traffic congestion in Los Angeles, however, the trucks were often late and didn’t necessarily reach all the stores. Moreover, the small quantities delivered per stop made the system inefficient. By merging the delivery function between the two companies, (loading a truck with both yogurt and butter), the two companies let each truck deliver more total product to fewer stores. Now each truck was fully loaded with a mix of butter and yogurt and had to deliver to only three stores per day. The companies then integrated even further by combining their order and billing functions. By doing this, they created one contact point for the customer.

The point is that the companies remain independent businesses but share a common face at the receiving dock, order entry and invoicing. The customer sees one point of contact for ordering yogurt and butter, one invoice for the purchase, and one delivery to the loading dock. To the customer, General Mills and Land O’ Lakes are one company, even though they are not. This example illustrates peer integration in which two non-competing companies with overlapping customers can effectively combine their downstream operations.

3. Why Implementing Supply Chain Best Practices is Hard

Despite the advantages, implementing various supply chain best practices is difficult. The highly successful supply chain strategies of companies such as Dell and Wal-Mart are no secret. Yet few companies have embraced these strategies to achieve the same level of performance as these leaders. A number of factors conspire to make supply chain management at challenging task, and changing the supply chain even more challenging.

3.1. Accelerating Speed

Several presenters highlighted speed -- the fast pace of the world continues to quicken. Mr. Ciccone of P&G said that during his 25-year career at P&G, the company has gone from monthly factory planning to daily planning. P&G has moved from long-lead batch manufacturing processes to being able to make any SKU on any day in many (but not all) of their businesses. Similarly, Dell changes its factory schedule throughout the day to meet the ever-shifting needs of online ordering patterns -- every two hours, the company pulls parts inventories from suppliers. When Wal-Mart had a disappointing day-after-Thanksgiving sales day, it knew that something was wrong by 10am that day and was able to change price, promotion, and marketing strategies in the following days. Each of these high-speed examples would have been impossible in years past.

Accelerating change gives rise to the Alice-in-Wonderland Red Queen effect: that the company must run faster and faster just to stay in place relative to competitors. In discussing the increasing gap between leaders and laggards, Mr. Copacino noted that the laggards are improving their performance. Unfortunately, for the laggards, the leaders are improving their performance even faster. Lagging companies will find themselves increasingly marginalized and devalued if they don't take strong measures to catch up.

Some companies want to slow down the cycle of industry change, according to Prof. Fine. Nokia, for example, is attempting to delay the process of disintegration by emphasizing brand. Getting consumers to buy the Nokia brand forestalls competition from potentially superior
component technologies (chipsets, operating systems). Brand keeps customers buying the integrated provider instead of seeking best-of-breed ingredients from a diversity of niche providers. That people buy P&G's Tide detergent instead of scrutinizing the detergent's ingredients is a testament to the power of brand.

### 3.2. Unpredictability

At the core of the supply chain and strategy challenge is the unpredictability of the future. Forecasting is easy unless it's about the future. Forecast errors, demand surges and sales slumps work their way through supply chains, creating the bullwhip effect. Strategy and supply chain management affect the sensitivity of the company to these variations. For example, in a fast-fast fashion-oriented industry, companies with long supply chains will face long lead times, whereas companies that employ a local sourcing strategy or use postponement strategies can out-compete others at high-speed replenishment.

Mr. Joe Keane of Reebok, VP of Operations and CFO of Reebok OnField Apparel, for example, described some of the issues in their On-Field Apparel product line and supply chain. Making sports team apparel for athletes and fans involves difficult forecasting and response-time issues. Understandably, when a star player sits out the season with an injury, sales of that player's jersey drop. When a new superstar appears or a team goes from losing to winning, then sales soar. The unpredictability of the athletic landscape drives the unpredictability of sales. The seasonality of sports creates an even greater time pressure on inventory, because Reebok does not know which teams will be hot the following year.

### 3.3. Globalization of Supply and Demand

Globalization exacerbates unpredictability, and many of the presenters described the supply chain challenges they face due to globalization. An increasing challenge is the lengthening of supply chains caused by global sourcing. The combined effect of having factories in distant lands and using maritime shipping means ever longer lead-times. This trend collides with customers’ increasing demands for service and consumers’ accelerating fashion cycles. Forecasting faster-changing demand over the horizon of slower-filling supply is difficult.

Non-monetary factors also complicate global sourcing, according to Mr. Keane of Reebok. First, Reebok is very sensitive to the human rights issues that have dogged Nike. Reebok wants to avoid employing sweatshop labor even as it seeks low labor costs. Local legal and employment law issues can also affect the company. Quotas, foreign ownership limits, and taxation can affect whether Reebok sources from a country and how it structures those foreign operations. Third, Reebok considers the local security situation; it looks for source countries that don't have high levels of executive kidnappings or political instabilities.

Finally, intellectual property rights issues also affect Reebok's decisions. In being the sole provider of NFL-licensed apparel, Reebok is the steward of many brands: its own brand, the NFL league brand, and the brands of the teams. Thus, Reebok is cautious about manufacturing apparel in countries with weak intellectual property protection even if those countries are less expensive on financial dimensions. Reebok also considers governmental trade preference issues, realizing that global sourcing has potential political and public relationship implications for the company.
3.4. Complexity and Control

Other presenters noted additional increases in the complexity of the supply chain. For example, P&G has doubled the number of SKUs in the last five years. Consumer behavior is also shifting -- consumers are less responsive to ads and more tied to retailers through loyalty card programs. Challenges of control, especially in complex situations, also impacts companies. Like so many consumer goods makers, P&G is at the mercy of retailers in terms of the consumer's first impression of the product. Although P&G offers 99.5% availability of products to its trade customers, there is still a 10-15% stock-out rate on retailers’ shelves. Moreover, P&G worries about damage to the product or its packaging -- consumers won't buy a $20 bottle of a facial cream that has a scratched or damaged box. P&G has found that product damage rates are 100 times greater on the shelves than they are when the product leaves P&G. With employee turnover running 100% at retailers such as Wal-Mart, the quality of stock-keeping may be low. The challenge is controlling the last 100 feet to the consumer.

3.5. Functional Silos

The quest for control in a complex world has driven management strategy toward hierarchies. The long history of top-down hierarchical management has created rigidly compartmentalized organizations. These silos impede the flow of information and the smooth execution of business processes. Turf wars, blame games, and a lack of cooperation hinder integration efforts.

Functional performance measures drive people toward siloed behavior and forestall integration. Regardless of the top-level directives issued by the CEO, employees will act in accordance with the performance measures used to judge their job performance, salaries, and bonuses. If transportation managers are judged on cost of transportation, they will balk at any supply chain or business strategies that call for more frequent or more timely deliveries of goods. Narrowly-constructed functional metrics lead to narrowly-optimized functional silos. IBM noted that too many managers follow a functional career path that entrenches siloed thinking. Narrow job experiences foster a blame-game “us vs. them” mentality that sabotages overall performance. But changing this culture is not easy.

3.6. Culture and Change

Twenty-five years ago, when a colleague first told a young professor by the name of Michael Hammer that “the technical problems were the easy ones,” Dr. Hammer thought the colleague was wrong. As Dr. Hammer thought about it more, he thought he was being insulted. But, with time, Dr. Hammer realized that changing people is harder than solving technical problems.

More than stubbornness or inflexibility makes change hard. Some laudable cultural qualities can stymie change, according to Mr. Moffat of IBM. Justifiable pride in a tightly-run silo makes people reluctant to abandon what they see as their well-run work methods. Moreover, breaking down silos does not mean breaking the deep functional expertise that those silos create. In an integrated company or supply chain, companies still must perform each function efficiently and effectively, even as those functions become subsumed within cross-functional end-to-end processes. In changing the IBM supply chain organization, Mr. Moffat spent 80% of his time on change management.
3.7. Distrust and Misalignments with Partners

The challenge of change management extends beyond the boundaries of the organization, too. Prof. Sheffi explained how a supply chain strategy can succeed in boosting performance but still fail due to conflicting interests among the participants. Prof. Sheffi gave the example of a supply chain innovation at Cadillac to illustrate his point. Cadillac automobiles come with a staggering array of possible options and styling variants. No dealer could ever hope to forecast demand for each variant or hold inventory in all the possible combinations that different customers might request. The problem is the customer's desire for instant gratification -- car buyers don't like waiting.

Cadillac designed a potential supply chain solution to this problem and tested it in Florida, a state with high Cadillac sales. Cadillac would use a local distribution center to carry a wider inventory of the cars. By aggregating the forecasts for each variant across the entire state, the company could more accurately predict demand and stock a wider range of likely-to-sell models, colors, and options packages. Cadillac's pooling of inventory boosted availability and shortened delivery times for all dealers. With the new system, customers received their cars sooner.

Yet this example also illustrates the challenges of integrated management. Cadillac's new system of pooled inventories leveled the playing field for its smaller dealers over bigger dealers because the smaller dealers enjoyed access to the large distribution center (DC) inventories. Even though the solution aided large dealers too, those dealers lost some of the advantage of having their own large inventories on-hand for immediate sales. Larger dealers complained and forced Cadillac to return to the old system with its lower level of performance.

Distrust also limits information-sharing in many supply chains. Technology and data exist to help companies replace inventory with information. For example, P&G noted that it could maintain on-shelf availability better during promotions if it had access to real-time data. The impediment to implementing this idea was trust. Retailers fear that POS data that is given to suppliers could get into the hands of competing retailers that also buy from that supplier. A long history of tough negotiations and adversarial attitudes make integration between companies, suppliers, and customers difficult.

3.8. Time

Implementing a competent supply chain strategy is time consuming. Achieving performance enhancements requires much more than just a technological quick fix. Anyone who merely tries to implement software is likely to fail. Instead, companies must pursue the harder effort to design good processes, align incentive systems, and deploy technological solutions that support the organization. P&G's excellent supply chain, for example, is more the result of 20 years of thought, development and evolution than it is the adoption of a magic bullet. Because supply chain touches so much of the organization, as well as the organization’s suppliers and customers, changes to the supply chain require time.

Mr. Copacino joked that projections for tech adoption always optimistically say something like, “9% adoption today, 30% next year, 90% the year after that.” Then the next year, the new projection is still “9% adoption today, 30% next year, 90% the year after that.” Eventually, adoption is always slower than the projections and creates a perpetually receding projection of when that technology will be adopted in the mainstream.
One reason why technology adoption is slower than expected is that many companies prefer to wait for more evidence of the technology's value. For example, with regard to RFID, C&S Wholesale Grocers is taking a wait-and-see attitude toward the new technology. As with any new technology, RFID has its unknown risks and hassles that may dilute the touted business benefits. Rather than jump on the next fad technology, many prudent companies delay adoption.

3.9. Expertise Gap: Seeing the Forest or the Leaves

The final challenge to combining business strategy and supply chain management is the gap that occurs in the middle of the spectrum of management between high-level strategy and low-level daily organizational operations. At the strategy end of the spectrum, the strategic thinkers have too little experience with the real work to craft practical strategies. At the operations end of the spectrum, the front-line is too mired in day-to-day trench warfare to consider broader strategy issues. The result is that mid-scale management decisions – such as supply chain strategy – don't receive the attention and expertise that they need. The business strategy people think supply chain is an operations issue, and the operational people don't have the mandate to make strategic business decisions.

According to Mr. Copacino, supply chain leaders can bridge this gap with a combination of big-picture strategic insight and an appreciation for the needs and constraints of daily operations. One of the reasons that supply chain is rising to the forefront of management thought is its ability to bridge the top and bottom of the organization as well as its ability to connect the inbound and outbound portions of the company. Some companies are surmounting all these challenges to create competitive combinations of supply chain and strategy.

4. Prerequisites for Success

The presenters listed several keys to successfully combining business strategy and supply chain management.

4.1. Top Management Support

Everyone stressed the crucial role of top-management support for supply chain integration efforts. In some cases, such as at IBM, the CEO mandated the broad supply chain integration projects. High-level support is also a crucial part of driving process change. Dr. Hammer recommended creating process owners who were not junior-level personnel. The process owner must have the power and respect to implement potentially unpopular changes across the organization and across the supply chain.

Some companies don't have the luxury of supply-chain-enlightened top executives, and participants asked the presenters how to solve this problem. Mr. Keane of Reebok suggested that supply chain managers need to build a strong business case. Documenting the risk of lost sales, the risk of customer disenfranchisement, or the money lost on mis-coordinated promotions helps prove the impact of supply chain. Showing the CFO why supply chain makes such a big difference to the bottom line, or showing the CEO how a proposed initiative supports strategic business objectives can help make supply chain issues more meaningful to top executives.
4.2. Aligned Incentives

Creating broader performance metrics helps align the disparate silos in a company to a common goal. Even with top-management support, the specific incentives and performance metrics used in the organization can derail a strategic realignment or supply chain design change. Often, companies use narrow, functional metrics that encourage silos and discourage cooperation. To combat this issue, IBM created organization-wide metrics that focused on customer-facing performance and shareholder performance. With its new metrics, IBM’s supply chain was able to improve customer satisfaction, which was credited with adding $6 billion in sales to the company.

IBM suggested that managers can gauge progress on the silo problem by looking around the tables of the lunch room or a company meeting. In a siloed organization, people cluster by department or geographic site. In an integrated, cross-functional organization, people's social bonds range across the organization and thus the seating chart reflects that broader integration. IBM also built an online community around creating a set of shared values for the whole company.

4.3. Win-Win

The need for aligned incentives occurs across organization boundaries, too. If a company wants to coordinate activities with supplier or customers, it needs to ensure that those parties have a reason to do so. Although companies can – and do – threaten to take their business elsewhere, the tactic can often create resentful change. The forced partner will do the minimum commanded and will develop a mistrust of the stronger partner. Supply chain integration, especially, requires deeper interconnections and changes than can be created by bullying.

One mechanism for creating win-win is to create a relationship that shares both risks and revenues. Prof. Sheffi delineated how Blockbuster restructured its payment terms with Paramount Studios and revolutionized the video rental business. In the past, video rental companies paid a large upfront price to buy tapes from Hollywood -- a pure purchase model. In buying the tapes outright, rental outlets bore all the risks of the success of the release in the rental market; rental outlets would lose money unless each tape rented at least 20 times. The risks and high upfront price limited the number of tapes that the rental outlet would hold in inventory. This limited the availability of popular titles when they were most wanted, during the surge in rentals that occurs shortly after the release of the movie to the rental market.

Blockbuster convinced Paramount to try a different revenue model: Blockbuster would pay a much lower wholesale price and then share 50% of the rental revenue with the studio. This shared the risk and rewards of rental volume between Blockbuster and the studio. Moreover, the lower wholesale price would mean that Blockbuster could buy a much larger inventory of tapes, mitigating the revenue loss to the studio due to the lower wholesale price. The result of the new model was higher profits for Blockbuster, the studios, and better availability for renters.

4.4. Technological Enablers

Technology enabled the Blockbuster model: studios would never have trusted Blockbuster (and never did trust the smaller mom-and-pop rental places) without the technology to accurately track rentals. And technology has enabled many companies to radically improve their supply
chain performance. Enterprise Resource Planning (ERP) software, electronic data interchange (EDI), electronic procurement, exception management, collaborative design, and software to support a broad range of supply chain initiatives that can help companies manage faster, better, and more cost effectively. Technology supports business strategy and enables new strategies that can only function with low-cost, high-speed data access and communications.

Yet, all the presenters stressed that technology is merely an enabler, not a standalone solution to a company's supply chain and performance problems. Leaders in supply chain performance are not necessarily the most technological advanced companies, according to Mr. Copacino. Rather, the leaders focus selectively on a few key technologies, implement those technologies very thoroughly, and then reap the rewards of their more judicious technology investments.

4.5. Process Design
One factor that can make or break the benefits of any technology initiative is process design. Dr. Hammer stressed the importance of designing and implementing good supply chain processes. This means looking beyond narrow functions to the end-to-end flow of activities that create value. The steps for this include:
* design repeatable process
* ensure compliance
* measure performance
* isolate and solve execution problems
* make improvements to design
* redesign the process for ongoing improvements

4.6. Avoiding Non-Value-Added Work
Associated with process design is the quest to eliminate waste. Dr. Hammer noted the issues with redundant, non-value-added activities that add cost without adding value. All manner of jobs such as expediter, reconciler, and liaison arise from the inefficiencies of not having integrated boundaries between companies. End-to-end process design and IT-enabled information flows help eliminate the errors and delays attendant with transactions in a supply chain.

Companies can also reduce redundant or wasted labor. For example, IBM worked with suppliers and contract manufacturers to reduce useless touches. IBM also worked to reduce the time its salespeople lost talking with internal order clerks and to increase time they spent with the customer. By doing this, IBM was able to improve the productivity of its sales force by 25%.

4.7. Reducing Uncertainty
Prof. Sheffi discussed some of the methods that companies use to ameliorate the unpredictability of the future. One key approach is aggregate forecasting: pooling the risks of demand variations across time, regions, or SKUs. For example, Intel consolidated the number of different types of resistors in its products from 2,000 types to 35 and thereby reduced forecast errors.

Aggregation is most useful when a company can use the forecast in a meaningful way. For instance, postponement lets a company use aggregate forecasting to create undifferentiated
products and then use a last-minute process that creates product variants on-demand. For example, Prof. Sheffi described how HP faces forecasting problems when selling printers in Europe -- each country has its own power cord, labeling, and language requirements. Forecasting aggregate sales for Europe is easier than forecasting sales for each country. In order to use the aggregate forecast, HP ships printers without the country-specific parts to a DC in Europe. The DC then customizes the printer for each country when demand from that country becomes more evident.

Companies can also embrace uncertainty using range forecasting. By forecasting the high and low (or the high-, median-, and low-estimates) for demand, capacity, or price, a company can better understand the demand uncertainty and could then potentially develop contingencies for dealing with uncertainty. For example, companies can create split-sourcing strategies that enable them to achieve both low cost and greater flexibility. HP, for instance, makes printers in both Singapore and Vancouver. With a range forecast, HP can commit to making some number of printers at the low-cost, long-lead-time Singapore factory. It can then fill last-minute demand variations from the more expensive but closer Vancouver factory.

Finally, companies can reduce uncertainties by creating the historical data they need to predict future demand. Nine West, a fashion shoe company, never knows which new styles will be hits and which will be duds. The long lead-times for low-cost manufacturing would seem to force the company into taking costly gambles or losing sales. Instead, the company makes a small batch of shoes early in the season, seeds a few selected shops with those new shoe styles, and watches the sales patterns. Early hits get expanded production and early duds have their production halted, and any already-made stock of the duds are sent direct to lower-tier discount shoe outlets. Creating a small batch of shoes creates the historical data needed to gauge the likely success of the new product. A company can choose among these uncertainty-reducing tactics based on its particular context of supply dynamics, demand dynamics and business model.

4.8. Understanding the Context

Prof. Fine noted that some companies perform poorly if they fail to appreciate the nature of their position in the supply chain. For example, a study of GDP fluctuations, automobile sales fluctuations, and tool manufacturing sales fluctuations shows a predictable bullwhip-like pattern. Whereas GDP follows a relatively gentle business cycle of plus or minus a few percent, car sales show an accentuated cycle of booms and busts that follow the economy's health, and machine tool makers see the largest fluctuations being at the end of the ‘bullwhip.’ For tool makers, swings of 50% or more are common every five to seven years.

When Cisco Systems was struck by the end of the dot-com boom, the CEO claimed it was like a 100-year flood for the company. The switch from booming growth to a dearth of sales caught the computer networking equipment company by surprise. Prof. Fine suggested that Cisco was not aware that it was in the same position as the tool makers, in that Cisco sold capital equipment to other companies who were, in turn, dependent on the whims of consumers. Had Cisco understood the true nature of its position in the industry, it would have been more prepared for the types of booms and busts that afflict all tool makers.

Context affects strategy and supply chain management. Depending on the structure, dynamics and differences between companies and industries, different supply chain strategies are required. Mr. Ciccone from P&G stressed that the excellent supply chain strategy of Toyota won't
necessarily work in the U.S and the innovative strategy of Dell won't work for Toyota. As companies move into the future, they must craft their own combination of strategy and supply chain practices.

5. Future Issues

The symposium highlighted a number of issues that will affect the future of business strategy and supply chain management. Trends such as virtual integration, cycle time compression, information sharing, intra- and inter-enterprise alignment, and the reordering or relocation of activities will change how companies look and operate. Changes in supply chain management enable new business strategies, new business models, and new opportunities.

5.1. Virtual Integration: Vertical and Horizontal

In the past, companies had a stark strategic choice when sourcing the components and raw materials that went into their products. They could make products internally or buy them externally. That is, the company could either be vertically integrated by making everything themselves or buy best-of-breed components from independent, often horizontally-integrated, suppliers. Both strategic options had significant advantages and disadvantages. Vertical integration provided tight control of the internal operations but created high fixed costs and a lack of flexibility. Horizontal strategies, in contrast, provided access to best-of-breed innovations generated by healthy competition between suppliers but suffered from non-value-added activities, conflicts of interest, high coordination costs and delays at the interfaces between the companies.

In the past, whether a company chose one strategy or the other, growing often meant mergers and acquisitions -- buying suppliers or customer companies to grow vertically or buying peers to expand horizontally. These strategic moves represented a quest for economies of scale and scope. Given that 70% of mergers fail, the track record for using M&A is poor.

Now this stark choice is blurring as a new kind of integration appears. Inter-enterprise integration is a virtual integration in which the company integrates new functionality without integrating in the financial or strategic sense of vertical or horizontal integration. Examples of this virtual integration include multi-level integration (e.g., HP and its resin suppliers), channel integration (e.g., Kawasaki and its independent motorcycle shops), and peer integration (General Mills and Land O' Lakes).

Virtual integration represents an expansion of the scope of the end-to-end in process design. In the past, process redesign was an internal activity – coordinating end-to-end stopped at the boundaries of the organization. In the future, more companies will coordinate end-to-end within the supply chain. Integrating from the suppliers' suppliers to the customers' customers represents the next phase.

Perhaps the most interesting aspect of virtual integration is the increasing disconnect between outward supply chain appearance and internal strategic structure. In crafting an inter-enterprise integrated supply chain, companies can build a relationship with customers or suppliers that bears little resemblance to the underlying ownership structure of the companies. In many ways,
virtual integration is just another example of the shift from product-centric business to service-centric business.

5.2. From Product Utility to Time/Place Utility

The ideas and innovations discussed at this symposium represent part of a shift in how manufacturing companies think of themselves. In the past, manufacturing was about making product -- mass-producing the proverbial better mousetrap was the key to success. Now companies are seeing the power of the services associated with delivering the product to the right place at right time. IBM noted that 70% of what it now sells is solutions, not products.

Reebok stressed that although dollars count, quality and timely delivery are essential to the company's success. The fickle world of fashion means having to respond to shifting demands while being in the public eye. Reebok would suffer lasting damage and could lose its lucrative exclusive licensing deals if the company failed to deliver high quality goods on time.

5.3. Trends toward Service Supply Chains

As the U.S and the world shift from a manufacturing-based economy to a service-based one, companies will begin to create and manage service supply chains. Already, IBM buys $6 billion in technical services as part of its supply chain spending. Getting the right person to the right place at the right time for the right price is not that much different from moving product effectively and efficiently. Although no one is envisioning a pick-n-pack warehouse of human resources, many of the same notions needed to deliver the right product can be used to deliver the right person.

5.4. New Opportunities

Increasing global competition is creating new opportunities for companies, especially companies with competent supply chain strategies. Although Wal-Mart is a formidable competitor, it has created new opportunities, even for companies that don't do business with Wal-Mart. For example, C&S Wholesale Grocers has grown to be the eighth largest privately-held company in the country by providing distribution services that help smaller grocery chains compete with larger competitors like Wal-Mart.

6. Conclusion

Mr. Gene Long, President of UPS Consulting, closed the symposium by noting that strategy and supply chain must complement each other. The intersection of strategy and supply chain is more of a merging point than it is a crossing point. Leading companies will combine all the ideas of the two fields and craft new models that continue to drive higher performance.

6.1. The Five Characteristics of Leaders

Mr. Copacino, from his years of experience at Accenture and other companies, summarized the five characteristics of leading companies. First, leaders combine business strategy with supply chain management into a coherent approach to business. Second, leaders connect the front and the back of the organization to integrate supply and demand planning. Third, leaders use IT selectively and effectively as an enabler, not an end unto itself. Fourth, leaders use metrics to
drive performance in every domain, but then align the overall organization. Fifth, leaders emphasize people and capability development.

6.2. New Supply Chains, New Strategies

The presenters at this symposium showed how advances in supply chain management provide new strategic tools for business leaders if those leaders recognize the potential power of the supply chain to enhance business performance. Novel process designs that span suppliers and customers are the next big thing. The key is recognizing the value latent in the middle -- the part of the organization that can bridge the strategic long-term and the operational short-term. New strategic options, especially virtual supply chain integration, let companies create a combination of speed and low-cost that creates new forms of competitive advantage in a global business environment.

Summaries

1. Dr. Susan Hockfield, President, Massachusetts Institute of Technology

“The supply chain management topic is an increasingly strategic topic, and it is helping to shape current research,” said MIT President Susan Hockfield. “Current supply chains are longer and more complex, while customers are more demanding. Public awareness of the importance of the supply chain -- and its vulnerabilities -- is growing. It is complex problems like these that we like to tackle at MIT.”

MIT is known for crossing interdisciplinary boundaries, for crossing the engineering and management disciplines with a deep social context and real-world problems. MIT's approach to engineering, for example, is to emphasize innovation and discovery along with problem solving new ways to solve complex issues. For example, MIT's Radar Lab -- the first lab inside a university -- helped the Allies win World War II. Today, the university is tackling issues like sustainable development by working on the research across all the life sciences disciplines.

“One hundred and fifty years ago, the founders of MIT saw a need to serve industrialized America, to bring knowledge to bear on the world's greatest challenges. Work with institutions in business and government -- serious engagement with public and private sectors -- ensured positive impact,” President Hockfield said. “The Center for Transportation and Logistics resides in this tradition across fields. From the Sloan School to Architecture and Planning, Humanities, and Social Sciences, MIT educates supply chain professionals who can think strategically, who are at home with the analytic but also have management tools and understand the complex policy context.”

2. Bill Copacino, Chief Administrative Officer, C&S Wholesale Grocers

Supply chain management is becoming an increasingly important strategic and competitive variable, Mr. Copacino said. It is much more important to a company’s business and financial
success. What's more, the performance gap between leading companies and average players is widening – that is, the best companies are getting better faster than the average company. Therefore, average-performing companies have a window of opportunity to catch up, or they face being marginalized in the marketplace.

2.1. Supply Chain Management Becomes More Strategically Important

There are many reasons for, and significant evidence of, the increasing strategic importance of supply chain management. One driving force is the increase importance and focus by most companies on shareholder value, and its key drivers—cost, customer service/revenue generation, and asset productivity. Supply chain management impacts each of these drivers. For example, the operating costs of most companies are dominated by supply chain costs. Moreover, as companies globalize, supply chains lengthen and costs—on the sourcing side as well as on the customer side—increase significantly. Supply chains also impact customer satisfaction and therefore revenue. In addition, supply chain performance has a dramatic influence on fixed asset and working capital investments.

We are also seeing evidence of the increased focus by senior executives on the growing importance of supply chain management. Empirical research by firms like Accenture has demonstrated the explicit link of supply chain performance on the overall financial performance of companies. Just a few years ago, US Federal Reserve Chairman Alan Greenspan commented that supply chain management might have been a key factor in the longest economic recovery in our nation's history. And we see more and more CEOs increasing the time and attention devoted to supply chain management.

2.2. The Growing Performance Gap

As supply chain becomes more important, we are also seeing a growing gap in supply chain performance between leading firms and average performers. For example, a study by the Performance Measurement Group across five different industries shows that the best-in-class supply chain performers are 2.3 to 3.7 times better than median performers, as measured by cash-to-cash cycle times.

Moreover, we are finding that this performance gap is growing, and it is getting harder for the average performers and the laggards to catch up. This is because superior supply chain performance requires that companies do many things well—just one thing. In addition, it takes a long time to build a great supply chain capability—to assemble and hone the tools, business processes, skills and capabilities, supporting technologies, collaborative culture and infrastructure needed for supply chain excellence. Supply chain management is a learned skill that takes a long time to develop -- it can't be just turned on or improved overnight.

In addition, the area is dynamic and changing. A host of new capabilities have been created in the past decade, including new strategic sourcing approaches, new sourcing tools like e-RFP and auctions, enhanced inventory and event management tools, enhanced optimization techniques, network planning tools, new approaches to collaboration and cross-enterprise planning, and web-based processes and tools that allow trading partners to work together in the areas of product design, new product introduction, transportation and delivery planning. And we are seeing the
evolution of new capabilities continuing at a rapid pace. So the average performing companies and the laggards have a challenge to catch up.

2.3. Characteristics of Supply Chain Leaders

Supply chain leaders have five distinguishing characteristics, according to Mr. Copacino. First, leaders incorporate supply chain management into their business strategies. Whereas most companies do a good job at strategic planning -- thinking through which products to offer and which markets to serve -- and most also do a good job at detailed process design. However, few companies excel in a key area that links these areas which I call operating model design. This is because most strategic thinkers don't have the depth of operating knowledge to think through operating strategies, and most operational people are not trained nor involved in strategic processes in a meaningful way.

Operating model design involves carefully thinking through how operations can be used for strategic advantage and how a company can leverage operating strategies such as alternative product flows (like the customer direct approach developed by Dell), the “flow distribution” approach which eliminates the double handling of a product and dramatically lowers inventory requirements, and channel integration and shared operations with channel partners (which reduces redundant inventory, handling and fixed assets).

I have found that the leading companies explicitly focus on operating model design, and they think through how they can use their operating capabilities as a source of strategic differentiation. For example, most of the fashion industry has embraced low-cost sourcing from distant countries. Zara bucked this trend. The European fashion retailer has sourced goods more locally, has built strong linkages with their suppliers, shortened replenishment lead times, developed visibility into item movement at stores and developed strong replenishment planning systems. This allows rapid, in-season replenishment of hot fashion items and rapid discounting of slow sellers, which has positioned Zara to be the industry leader in growth and profitability, and outperform all contenders with the old operating model.

By rethinking its operating model, Saturn improved spare parts inventory held at its dealerships. Typically, inventory at a dealership turns 1.0 to 2.0 times --that is, dealers have up to a year's worth of spare parts in inventory. Saturn re-thought this process and created a centralized inventory function—staffed by well trained inventory experts--that coaches and helps dealers manage their inventory. Saturn designated some dealerships to be “master distribution points” which holds safety stock for all dealers in the region. The master dealer can transfer that stock among multiple facilities as needed. Moreover, dealers have visibility into this spare parts inventory. Dealers make their own decisions about which inventory to hold at their own location, but the central function gives each dealership recommendations and coaching. As a result of this new thinking, Saturn dealerships now have up to seven inventory turns a year.

The second distinguishing characteristic of leaders is that they focused on building processes to integrate supply and demand planning. This is an area that most companies do poorly and which offers great benefits. Keys are focusing on shortening cycle times for both planning and execution activities, integrating sales planning and marketing closely with operations, and
driving processes, including a sales and operations planning process, that closely tracks and integrates supply and demand planning.

Third, leaders leverage IT selectively. They don't buy every tool; rather, they select a few tools and follow rigorous program management and change management approaches to implement those tools.

Fourth, leaders have achieved functional excellence in key areas of supply chain, and they have created a collaborative culture and metrics to encourage teaming behavior. Finally, leaders focus more attention on developing their supply chain people and their capabilities.

2.4. Interview with Kim Blanton, Boston Globe

_Wal-Mart has completely changed retailing. As Wal-Mart now moves into the grocery business, how will it change the grocery business?_

“Wal-Mart is a great supply chain company and a formidable competitor,” Mr. Copacino said. “They have moved aggressively into the grocery arena through Supercenters and now other formats. Nonetheless, C&S has grown rapidly over the last decade, over a 20% compounded rate, by helping our customers achieve a lower-cost model and compete more effectively. We've been effective in helping our customers achieve significant change in their distribution profile and costs,” Mr. Copacino said, “and we will work hard to continue this success.”

_The grocery business is not known for cutting-edge technology. Tell us about RFID and as RFID becomes widely used, how it will change the supply chain._

“There are great opportunities for improvements in the grocery industry. The degree of integration among players in the channel has been modest at best, which has led to missed opportunities. With growing economic pressures on this channel, manufacturers and retailers can respond by fighting or by collaborating. I feel the opportunity is in collaboration.”

“Over time, RFID will have a significant impact on the supply chain. Currently there are problems -- problems in reading chips through liquids and metals, mis-reads and multiple reads, and other issues. C&S is currently spending limited money on RFID because it is too early, but we will stay close to the developments and pounce on them when the time is right. But I don't see it as coming as quickly as others think it will.”

_How can supply chain professionals convince top management of the need for differentiation through the supply chain?_

“There is an increasing number of articles being written in the press about these ideas,” Mr. Copacino said. “The first step is to get a process in your company to think the operating model design--these cross-enterprise issues with key functional executives. The supply chain consists of a million details, and these details need to be thought through. They are not trivial to set up. What C&S has done is to start with the top 20 suppliers and work on simple things first, to get communication and visibility across the partners and simplify business processes. We're not
necessarily using technology here, but processes. We start small and then look to proliferate those wins.”

3. Yossi Sheffi, MIT Engineering Systems Division

Failed products such as the Ford Edsel, New Coke, Crystal Pepsi, and Microsoft Bob illustrate the perils of forecasting. For example, when Flu Mist came out, the company expected to sell four million doses. In reality, only 50,000 sold; and even when the company gave away the product for free, only another 100,000 units were moved. Prof. Sheffi discussed the difficulties of forecasting and provided five strategies for mitigating the effects of forecasting errors.

3.1. Intersection of Expectations, Uncertainty and Globalization

Customers are becoming more demanding: when they receive good service in one industry, they expect it in all industries. Prof. Sheffi contrasted his local pizza place to his local bank. When he calls for a pizza, they answer, “Would like another pepperoni pizza delivered like you got last time?” This sets his expectations, which are then disappointed when he calls his bank is forced to struggle through layer after layer of impersonal phone menus. When Prof. Sheffi mentioned this contrast to the bank's president, the president replies that “no other bank can do it, either.” But such an answer is not good enough, because the bank is disappointing customers' expectations.

Globalization brings two additional challenges. First, global supply and distribution brings with it long lead-times. Second, the rise of global connectedness leads to homogeneous demand patterns - if a gizmo fails to sell in Japan, it is unlikely to succeed elsewhere.

3.2. Truth About Forecasting

Prof. Sheffi listed six key truths about forecasting:
- Point forecasts are always wrong: demand will never be exactly what you thought
- Aggregate forecasts are more accurate: demand is smoother over large geographic areas, multiple SKUs, etc.
- Forecasts over short horizons are more accurate: the near future is more knowable than the distant future
- Long history helps: data provides insight into likely demand patterns
- Trading partners have information: valuable data resides outside of the organization
- If one trading partner bears all the forecast risk, they will hedge: concentrated risks lead to suboptimal behaviors

Prof. Sheffi then described some solutions for dealing with these truths.

3.3. Range Forecasting

To aid in planning for forecast errors, companies can create a range forecast that represents the likely interval of outcomes. For example, Ford estimates the statistical standard deviation of possible outcomes for financial planning purposes. Companies can use range forecasts to establish contingencies with suppliers. The low-end of the range, (the demand that the company
is confident about), can be ordered from long-lead, low-cost suppliers. The high-end of the range, (the demand that has a low chance of occurring), can be satisfied with last-minute flexible suppliers. For example, Jabil uses flexible contracts that might specify a +25% capacity boost with one-week notice and a +100% boost with four weeks’ notice. By using a range and establishing supply contingences, companies are prepared when the forecast is wrong.

3.4. Risk Pooling

Cadillac's wide variety of models, styles, colors, and add-on options -- along with all its dealer locations -- make forecasting hard at the dealer level. Each dealer's forecast carries high risk. Dealers cannot accurately know demand for each variant and cannot carry stock in every variety. Cadillac prototyped a system in which a distribution center in Florida would aggregate demand and inventory for all of the state's dealers. By averaging demand across the state, the car maker could more accurately forecast demand and stock cars with a high likelihood of sales. The state-wide forecast had lower risk. A dealer could then get the car from the local DC, satisfying the customer sooner than if the dealer had to order the car from Detroit.

3.5. Postponement

Companies can gain the benefits of both risk pooling and a shorter forecasting horizon by using postponement: creating bulk quantities of a generic version of a product and then customizing that product at the last minute. HP uses postponement for its printers in Europe to avoid the problems of forecasting demand for each country over the long-lead times required by the company's off-shore manufacturing sites. HP first forecasts aggregate European design, and then it builds and ships printers in bulk to a DC in Holland. Once HP knows demand in each country, it can put the right localities labels on the printer and add the right power supply, power plug, and manuals for that country.

3.6. Creating History

Prof. Sheffi showed a slide of two women's shoe styles and asked the audience which style would be more popular. The audience picked the wrong shoe, illustrating how new product introductions have very high forecast risk because companies have no historical sales data to use. Yet companies need to commit to low-cost volume production for the product launch to satisfy expected demand.

Nine West created a system that helps give the shoe retailer some data about the likely sales of new, fashionable women's shoes. Nine West does the usual pre-launch forecasting and places orders for volume production. But the company also makes a 1000 pairs of shoes early in the process, sends them to selected retailers, and then tracks the sales. If the product sells well, Nine West continues with volume production and distribution of the shoes, boosting production if the shoe looks like a hit. If the early sales go poorly, Nine West kills production and shunts any already-made shoes to lower-tier discount outlets.

3.7. CPFR: Sharing Data

Collaborative planning, forecasting, and replenishment (CPFR) is a business process for merging forecasts between supply chain partners and coordinating supply with demand. Because each company in a supply chain knows different facts (e.g., about upcoming promotions, sales
predictions, etc.) the entire chain can function better if the partners share data. CPFR, and the software tools associated with it, let partners share data, detect exceptions when forecasts don't match, and resolve discrepancies in the expected supply and demand. Timely, automated processes for coordination help reduce the bull-whip effect.

3.8. Risk Sharing

When one partner is forced to assume all of the risk of an inaccurate forecast, that company will hedge its bets and under-forecast. For example, video rental stores pay a high price for tapes from the studios without knowing the actual rental demand. This leads to severe understocking, particularly when a videotape is first released, and disappoints customers when the most popular movies aren't available. Rental firm Blockbuster created a new model in which it paid a lower up-front price for the tape and then shared 50% of the rental revenues with the studio. This approach shared the risk and rewards of the rental market. It also let Blockbuster boost the inventory of tapes and cover the surge in rental demand when a new release first comes out.

3.9. Conclusion

Although the world is increasingly uncertain, companies can create business strategies and supply chain designs that tackle that variability. Prof. Sheffi recommended embracing uncertainty with range forecasting and flexible contracts; pooling risks and using postponement; creating sales data in test markets; collaborating with partners on forecasting issues; and sharing risks and rewards. These five strategies help reduce the business impacts of an uncertain world.

4. Joe Keane, VP Operations and CFO, Reebok OnField Apparel

Reebok is a licensed provider of sports apparel for the NFL, NBA, and NHL. The fates of individual athletes and teams determine the fate of Reebok's sales. Player injuries, rising stars, scandals, and team performance all impact whether consumers want to wear a particular team's colors or a player's jersey.

4.1. Objectives

Reebok's goals are to maximize financial performance, with the recognition that if the company does not deliver and maintain a good reputation, it could lose its licenses. Delivering to meet demand, especially of the official apparel worn by the athletes, is a challenge. Reebok's sports apparel is seasonal, being tied to the playing seasons of the various sports leagues.

4.2. About the Apparel

Mr. Keane displayed some of the apparel that Reebok makes and explained the differences and supply chain issues associated with each of the different items. For example, Reebok's NFL hats are a very stable item: Reebok consistently sells a million pieces a year for the bigger teams. Reebok uses long-lead, low-cost sources and holds some excess inventory because it knows that the hats will always sell.

Reebok also makes shirts and jerseys. These range from a logoed $25 long-sleeve tee-shirt to a $250 authentic jersey (resized to fit the average consumer). Demand for jerseys is less predictable because the jerseys carry the name and number of a specific athlete on a particular
team. Also, jerseys come in three different color schemes defined by how the team colors are used.

Mr. Keane described how one of the $75 jerseys includes silk-screened player names and numbers. Given all the teams, colors, players and sizes, stocking these jerseys is a potential inventory nightmare. To reduce the problem, Reebok makes both completed shirts (those with a player’s name and number) and blank shirts (those without). The shirts are made overseas at low cost, but only 40%-50% are completely finished. The rest are kept blank until Reebok knows the demand. At the last minute, the blank shirts are sent to a silk-screener in the U.S. for finishing with the in-demand names and numbers.

4.3. Country Selection

Like other apparel makers, Reebok sources from countries with low labor costs. Mr. Keane showed pie charts illustrating the breakdown of sources for U.S. apparel imports, with 56% coming from Asia and 37% of Asian imports coming from China. But price is not Reebok's only concern. Quality, local employment practices, taxation, legal and trade preferences all enter into Reebok’s calculations when determining where to locate its factories.

Because Reebok represents the brands of the sports leagues and the teams, the apparel maker is concerned about reputation. Reebok evaluates potential source countries on human right issues. Reebok, and the sports leagues, are also concerned with counterfeiting. Thus, Reebok avoids sourcing from countries with poor respect for trademarks. Special sensitivities also arise due to the history of the country. For example, Reebok specifically asked the NFL if Vietnam was an acceptable manufacturing location, given the prevalence of veterans in the NFL's fan-base.

Finally, Reebok considers trade preferences. Quotas, import duties, and trade treaties sway the company. For example, Central America has more expensive labor rates, but the terms of the NAFTA treaty reduce the total cost. Central America also helps Reebok shorten its supply lines and improve response time.

When setting up manufacturing in a foreign country, Reebok faces an age-old question: should the company create a direct presence or should it use a contract agent as its representative. In deciding how to structure its presence, Reebok considers the number of manufacturers located in that country and the volume of business.

4.4. Speed to Market

Because of the dynamic nature of demand for sports apparel affiliated with particular teams or players, speed to market is a big issue for Reebok. The company looks for partners that can be fast and flexible when needed.

Picking an offshore manufacturer involves more than just scrutinizing the manufacturer. Mr. Keane noted that Reebok considers the length of its deeper supply lines; for example, Reebok is concerned about getting raw materials to sewing partners. If raw materials supplies aren't nearby, then Reebok looks elsewhere.

Finally, Mr. Keane worries about transportation time. Transportation time includes the time goods spend waiting in port, on the vessel, at the port of entry, and going through customs. Even minor issues, such as receiving deliveries from the packing material supplier or missing the
departure date of a vessel, can adversely affect transportation time and thus impact total lead-time. If needed, Reebok will air freight high-demand goods.

4.5. Conclusion

Site selection is a dynamic exercise, Mr. Keane said. Reebok has been into and out of Honduras and into and out of Vietnam. Reebok constantly adjusts its sourcing. Supply chain management can have a significant impact on the company to help the best stay the best.

4.6. Interview with Julia Kirby, *Harvard Business Review*

*Is supply chain management becoming more critical to your business?*

“In our business, specifically, we have spent more time looking at each step in the supply chain to really maximize our business. For example, when making decisions regarding which functions to keep in the US, we look not just at the profit aspect but also at what's best to serve the marketplace. Keeping functions in the US gives us flexibility, which is extremely important. We look at supply chain as a competitive edge and a strategic initiative in our company. In our blended apparel business, for example, we're competing against private label suppliers. The supply chain is important for us to be competitive today. You don't get anywhere if supply chain is not a big part of your strategy.”

*When you say that supply chain "has to be on top management's agenda," how do you get it there if it's not there already?*

“Top management listens when they hear about the risk of lost sales or of consumer disenfranchisement with the brand. If you have a great marketing campaign but the product is not there, it will thud. And, you have to show top management the dollars. If you’re evaluating whether to open a new office in this country or another country, the way to do it is explain how much money will be saved in Year 1, Year 2, and so on. If we open the office in this country, I know we will be able to deliver more product on time because our own people will be controlling it the whole time. So I recommend getting in front of top management with numbers, with ROI, with the dollars on the bottom line. You also have to show that the plans are integral to supporting the company's mission and objectives.”

*Your slide about Country Risk (whether the company should have a direct presence or work through a contracted agent) listed many valuable factors, but it struck me that the risks encompassed many areas. Does risk management reside at Reebok in one place?*

“The slide on Country Risk pertains to the apparel industry, but our own company has a specific way to set up in a country. We try to set up shared resources, but all of these issues are reviewed with the president and the CFO to show what we are thinking and why. There's top management oversight. We don't have a prescribed list, but this list is consistent with what we do at our company.”
How do you enforce intellectual property issues in different countries?

“The product Reebok makes is a fairly simple product; it's not turbine engines or computers, its clothing. All you need is a sewing machine and access to fabric. So we have a big intellectual property risk, and Reebok is an international brand. All of our product line has multiple brands on it. We need to ensure who the supplier will be, where raw materials will be coming from, and who secondary suppliers are and where they're located. Trademarks must be registered in all the countries. We considered making the NBA product line in China, but we saw that the NBA marks weren't registered in China, so we can't produce the product in China because anything could be sold by someone else and we couldn't defend it.”

Are you moving slowly in China?

“China's production of apparel will dwarf other countries and put them out of business. Countries like Pakistan and Bangladesh won't be able to compete with the Chinese. We have a good model for where we are today. There's no immediate need or requirement to go into China just to chase cost. We're hearing talk of wage inflation, power outages in apparel regions, and huge demands for energy in the country. So we'll take a wait and see approach, and we'll see what the US government does after the huge inflow of additional goods from China. We're treating China like RFID: it's coming, but we don't want to be the first to run into it.”

We've heard about the importance of speed to market. What factors guide your decision to go with a supplier? How do you vet a supplier or help that supplier improve on speed factors?

“We have a partner factory in Korea, and then Vietnam and then Honduras. We work collaboratively with them to improve speed to market. We've also done something unusual: we have three suppliers for a major product. If they collaborate among themselves using the same suppliers, that's great. But they have to hit our requirements. We will help our partners, but we have no long-term manufacturing agreements. It's all done with gentlemen's agreements for three years, but on paper it's only from purchase order to purchase order.”

5. Dr. Michael Hammer, CEO, Hammer & Co. and Senior Lecturer, MIT Sloan School of Management

Supply chain is a metonym for operations, and Dr. Hammer argued that Michael Porter was wrong in saying that operational effectiveness is not strategy. In many cases, operations is the essence of strategy, as evidenced by the success of companies like Dell, Wal-Mart, and Toyota.

5.1. Power of Process

The “current big thing” is process -- at this symposium, the word “process” had been mentioned 43 times so far, noted Dr. Hammer. “Process is reversing the industrial revolution,” Dr. Hammer said. Industrialization led to specialization: breaking up tasks into functional,
Crossroads of Supply Chain and Strategy

assembly-line bits. This was a great idea at the time, but it also created disconnected, siloed organizations. The result has been delays, complexity, and cost.

Rather than organize a company into a myriad of fragmented functional silos, companies should turn the organization 90 degrees and organize by a select number of end-to-end, value-creating processes. For example, in the past, order handling at Shell Oil bounced around seven different departments. By focusing on the whole process, not the individual functions, Shell made one person accountable for each order and thereby reduced the cycle time by 75%, cut costs by 45%, and improved customer satisfaction by 100%.

The new big idea is to extend the notion of end-to-end processes outside of the company — redesigning processes across the entire supply chain. Georgia Pacific, a paper maker, called this integration from the suppliers' suppliers to the customers' customers a matter of going “from stump to rump.” Dr. Hammer list four key themes in inter-enterprise process integration:

* streamlining transactions
* sharing information
* eliminating duplication
* relocating work

5.2. Integration, De-integration, and Re-integration

Geon, now called PolyOne, illustrates the clash between supply chain and strategy in the context of processes and integration. The company consisted of three units: vinyl chloride monomer manufacturing, resin manufacturing, and compound manufacturing. Initially, these units were run as independent silos that had no knowledge of each other’s demand or supply. The company then pursued an internal integration, replacing 3 sets of information with one integrated one using ERP. The business units now operated through an integrated end-to-end process. The result was a 15% reduction in inventory, lower working capital requirements, and a 70% reduction in customer complaints. Expedited freight dropped 99%. The company enjoyed a 13% increase in production without upgrading its capacity because the company no longer had to do so many emergency small-batches.

Then the business strategists came in with a grand plan. Strategists argued, rightly, that the vinyl chloride and resin units were commodity functions that should be divested. So the company sold the units. All of the problems that had been solved by integration suddenly reappeared. The strategic initiative re-created the disconnects that had plagued the company earlier. To solve these problems, the company pursued inter-enterprise integration: sharing forecasts, using electronic ordering, and sending ASNs between the now separate companies. Error rates went back down to zero, order cycle time was restored, inventory went down and costs went down. Moreover, the inter-enterprise integration freed people from doing duplicate tasks and non-value-adding activities like expediting and reconciling. As Dr. Hammer put it, inter-enterprise integration let the company paste Humpty-Dumpty back together again.

5.3. Inter-Enterprise Integration

Inter-enterprise integration can come in multiple forms. For example, HP pursued a multi-level integration across 5 layers of its supply chain to better coordinate the manufacture of plastic computer cases. In the past, the compounders, (small suppliers deep in HP's supply chain),
bought the resin from GE. The typical order changed four times and led to expediting costs and lost orders for HP when it could not get cases made in time.

HP decided to manage the entire chain itself, buying resin directly from GE and then having the compounders order resin on HP's account. With streamlined transactions and better information sharing, the new approach meant that demand and supply information and order-changes rippled quickly and efficiently through the system.

With the new multi-level integration, the compounders win because they can buy resin less expensively (HP shares its savings with the compounder). HP gets lower prices, and GE wins because instead of seeing dozens of orders from small companies it receives one large order from creditworthy HP. GE's costs also go down because it needs to process a only single bill and single payment.

Channel integration means integrating with channel partners. For example, Kawasaki enjoys nice profits from sales of accessories for its motorcycles. When customers buy a Kawasaki motorcycle, they often want branded apparel to go with the bike. In the past, apparel was an inventory nightmare for the motorcycle retailers, who weren't the sort of folks who were into fashion. To improve the situation, Kawasaki took over fulfillment of the orders and centralized the inventory. The result was a win for everyone: Kawasaki boosted sales of accessories, the customers got the size and styles they wanted, and the retailers got a cut of the profits without the hassles of inventory.

Peer integration occurs when non-competing companies that have overlapping customers integrate together. For example, General Mills sells yogurt and Land 'O Lakes sells butter to grocery stores. In the past, each company had trucks that tried to make deliveries to all the stores in the Los Angeles area. Traffic made these routes time-consuming, inefficient, and prone to delays. To combat the problem, General Mills made a deal with Land O' Lakes to pool the delivery routes. Each truck could then deliver twice as much product (both yogurt and butter) to half as many stores. The companies went beyond delivery to integrate other elements of customer-facing processes as well, allowing stores to send one combined order, get one invoice, and pay one bill.

In all of these examples, inter-enterprise integration let companies achieve new levels of performance without traditional mergers and acquisitions. The assumptions of strategy about vertical integration are irrelevant with these new supply chain design concepts.

Companies can integrate processes, whether within or across enterprises, if they achieve four prerequisites. First, the company needs process owners who have the power and respect to drive change. Second, new metrics and rewards must be used to shift people's actions from seeking functional performance to creating end-to-end process performance. Third, a staged implementation ensures that early results help sustain the larger effort. Fourth, change management is an underappreciated element of the effort. Dr. Hammer noted that technology was not on the list because it was only an enabler.

5.4. Culture: Harder than Technology

Dr. Hammer related a story from his early days. A colleague informed him that “technical problems are the easy ones.” As a college engineering professor, Dr. Hammer was convinced
that the colleague was wrong. Finally, the lesson dawned on him: cultural change was the
hardest but most important part of company transformation.

The old culture of supply chain and business needs to change. The adversarial, win-lose,
transaction-oriented relationships with suppliers and customers doesn’t allow companies to
maximize end-to-end performance. Instead, companies need an inter-organizational culture
based on partnerships, cooperation, and trust. This pushes companies to move from sharp, us-
vs.-them boundaries to the fuzzier boundaries of integrated processes.

Dr. Hammer concluded that the most essential prerequisite was to create “executive belief in the
dominant part of operational innovation and a commitment to making it happen.”

6. Professor Charlie Fine, MIT Sloan School of Management

If companies are reaching a crossroads for strategy and supply chain, then they need a road map
for the intersection. Elements of the map include industry structure dynamics, corporate strategy
dynamics, technology and innovation dynamics, customer preference dynamics, business cycle
dynamics, and government dynamics.

6.1. Industry Dynamics: Who Let Intel Inside?

Prof. Fine illustrated the unintended consequences of poor value chain design with the history of
the IBM PC. For IBM, the PC was a phenomenally successful product design but a disastrous value chain design. Twenty-five years ago, when IBM created the PC, the computer industry
was ruled by vertically-integrated companies such as IBM and DEC. These companies made
proprietary components, peripherals, operating systems, and applications for tightly-integrated products.

In creating the PC, IBM chose off-the-shelf parts, including microprocessors from Intel and
software from Microsoft. This enabled a massive shift in the industry, in which specialized companies competed in horizontal product categories for a piece of the PC industry pie. Microsoft and Intel rose to power while IBM lost power to competing PC assemblers such as Compaq, HP, and Dell. The PC industry continues to evolve as Microsoft expands into game consoles, cell-phones, hand-held computers, Internet search sites, and an increasing amount of applications. Meanwhile, Dell has risen in power in a further industry shift -- some would say that Intel now must follow Dell's marching orders rather than vice versa.

6.2. The Double Helix Cycle of Industry Dynamics

The evolution of the PC industry is far from unique. Industries pass through a characteristic cycle, according to Prof. Fine. When industries become dominated by vertically-integrated companies, they often soon see the rise of niche competitors that out-perform the big dinosaurs of the industry. This pushes the industry from closed, proprietary standards toward a more open, modular product design. It also undermines the vertically-integrated companies because it is too hard for the massive, slow-moving companies to stay best-in-class in every product category. The big companies disintegrate, divesting or dissolving under-performing business units and refocusing on core competencies. The industry then evolves toward a horizontal structure with multiple companies competing in each of a set of component technologies.
The horizontal industry structure then shifts again as some companies grow and gain control of their respective categories. These category leaders soon look for additional growth or control by expanding vertically into other categories. Companies may recreate proprietary systems for technological reasons or to help lock-in customers. Companies may buy suppliers or channel partners to control the lines of supply and demand. In short, incentives to integrate will drive the value chain structure back toward the vertically-integrated structure and the cycle starts anew.

6.3. Clockspeed and its Toll on Titans

Prof. Fine noted that the larger point is that competitive advantage is temporary. In every industry, dynasties have risen and fallen. In cars, we had Ford in 1920 and GM in 1955. In computers, there was IBM in 1970 and DEC in 1980. The only difference between industries is the clockspeed of the rise and fall of titans. The fast pace of computer innovation means that companies in high-tech industries rise and fall faster than their counterparts in more sedate industries such as automobiles, airplanes, or commodity materials.

6.4. Customer Preference Dynamics

Changing customer preferences can be seen in the relative role of brand versus product features. For example, few consumers read the ingredients label on laundry detergent when making their buying decisions -- they tend to keep buying the same brand of detergent year after year based on long-standing brand images and names. In contrast, people scrutinize the ever-increasing array of features on new cell-phones, paying less attention to brand.

Companies can affect this dynamic -- Wal-Mart and other retailers have driven the increasing presence of private labels that compete, on price, with premium national brands. In the cell-phone industry, Nokia would like to sustain consumers’ preferences for brands. Strong competition from niche companies in chipsets, operating systems, and handsets is affecting the vertically-integrated Nokia. Prof. Fine suggested that Nokia would like to slow down the clockspeed of the industry by sustaining consumers’ demand for brand.

6.5. Dynamics of Disruptive Innovations

Innovations underpin the shifting fortunes of companies and industries. In some cases, such as the integrated circuit, PC, or jet airplane, a radical product innovation creates a new industry or remakes an old one. Radical process innovations, such as lean production or the Dell operating model, support new business strategies or provide radical changes in performance. Incremental innovations also affect the fates of businesses. Ongoing improvements in products such as semiconductors (the high rate being predicted by Moore's Law) or improvements in internal combustion engines provide a basis for ongoing product development and competition. Similarly, incremental process innovations -- such as corn output per farm acre or semiconductor production yields -- can shift the cost structure, employment patterns, and competitiveness of industries.

Innovations can arise from three sources, according to Prof. Fine. First, performance pushes arise when new inventions come from suppliers and inventors -- e.g., nobody asked for penicillin. Second, customer pull can create innovation when a new need drives demand -- e.g., wireless phones evolved under customer demand for mobility. Third, organizational
competencies create internal performance advantages -- e.g., the Dell supply chain model let the company do what incumbents could not.

6.6. Business Cycle Dynamics

The bullwhip effect occurs in supply chains when a combination of information lags and delivery lags lead to forecasting errors, ordering errors and the build-up of excess supply and demand in the chain. The audience members who have played the MIT Beer Game (modeling a simple supply chain) have all seen the bullwhip effect. Even when customer demand varies little, those variations will amplify as they propagate up the chain.

For example, Prof. Fine showed graph of changes in GDP, changes in automobile production, and changes in machine tool orders. Whereas GDP only varies by a few percent, changes in automobile orders oscillate by 10% or 20%. The machine tool industry sees demand fluctuations of over 50% every few years as the surges and slumps of the broader economy propagate from consumers to carmakers to tool makers.

6.7. Supply Chain Architecture

Supply chain architecture can be integral or modular in the same way that products can be integral or modular. Companies need to align the architecture of their supply chains to suit the style of product. For example, Dell uses a modular supply chain architecture to source interchangeable parts from interchangeable suppliers for its highly modular products. Mercedes and BMW, on the other hand, make highly integral products -- all of the parts and fittings of their cars are specifically designed for those cars in an integral way. These car makers also run highly integrated supply chain architectures with tight, long-standing relationships with suppliers. In contrast, Polaroid made an integral product but tried to create a modular supply chain and saw performance suffer.

7. Rick Ciccone, Director, Global Supply Chain Operations, Procter & Gamble

P&G is a global company which sells to five billion consumers in 160 countries. Sixteen of its brands each deliver a billion dollars in annual sales. Overall, 250 brands provide net sales of $52 billion. The company is organized around Global Business Units. Whereas the GBUs focus on categories, the company's Marketing Development Organizations focus on local customers and consumers.

7.1. Serving the Customer, Shoppers, and Users

P&G has two bosses: the customer (retailer) and the consumer. The consumer is the ultimate boss. According to P&G's Chairman A.G. Lafley, P&G must deliver at “two moments of truth”: when the consumer chooses P&G’s product and then when the consumer uses P&G's product. The store shelf is a critical point for consumer choice. P&G has found that out-of-stock rates run 10%-15%, even though P&G offers 99.5% availability. Second, appearance is crucial when selling a $20 beauty product -- damaged or dusty packaging causes consumers not to buy. P&G found that damage rates on retailer's shelves were 100 times greater than at the DC.
Mr. Ciccone explained that even as the consumer remains boss, change in the industry has increased the power of the customer, namely, the retailers. The growth and globalization of big retail chains such as Wal-Mart, Tesco, Boots, Carrefour, and ALDI means greater customer power due to volume buying. Bigger, more powerful customers have meant a doubling of P&G's SKUs in the last five years. Second, private labels created by the retailers, such as Costco's Kirkland brand, create new sources of competition. Third, retailers are creating stronger ties to consumers through loyalty card programs.

For example, Target ads may mention P&G brands, but the real point of the ad is to sell the Target brand. Wal-Mart now has plasma TVs mounted in stores that play promotions direct to the consumer. Wal-Mart's TV network is the 4th largest in the U.S. due to the high volume of traffic in its stores.

7.2. Consumer-Driven Supply Network

Mr. Ciccone shared P&G's supply network strategy. He could share this key information because every company needs to create its own approach. Just as Dell's strategies wouldn't work for Toyota, P&G's strategies are not for everyone. P&G's notion of a Consumer-Driven Supply Network (CDSN) includes a triangle of three core elements. The first element is business integration: the supply network strategy must mesh with the business strategy. The second element is the commercial dimension of co-creating value with the customer. The third element is the supply network and its ability to create time compression and differentiation.

Measurement is a key part of CDSN. These measures assess whether the company is delivering the right product to the right place at the right price and right time to create the right value. The measures combine assessments of product quality, service quality, cost, and cycle times. P&G uses process-oriented performance measures and a reward structure that helps breakdown silos.

7.3. Transitioning to a “Pull” Supply Network

P&G has a strong external focus due to the critical importance of customers and consumers. Thus, the company has worked hard to shift from long, slow, costly, inventory-laden “push” supply chain. The ongoing goal is a short, slim, consumer-driven, end-to-end, high-velocity supply network. This focuses the supply network on the retailer's shelf -- the point at which consumers choose products -- and on the supply network processes behind the shelf. This means extending what P&G measures -- e.g., measuring quality at the retailer's shelf rather than at P&G's factory.

Time compression is another crucial element of P&G’s ongoing work on its supply network. The scorecards of the company's General Managers and Supply Chain Directors include incentives for time compression. Reducing cycle times, eliminating non-valued added tasks, and replacing inventory with information are all part of P&G's shift from an internally-focused, push-oriented supply network to an externally-focused, pull-oriented supply network.

7.4. Sensing & Responding to Demand

The shift to a pull supply network lets P&G sense and respond to consumer demand more effectively, but it means that business processes across the supply network need to change. The sense-and-respond model requires that business processes change. Understanding consumer
demand in the store, collaboration on promotions, flexible manufacturing, supplier integration,
and reliable speed in the supply system will all support a faster, leaner, more-responsive supply
network at P&G.

For example, when holiday sales at Wal-Mart failed to meet expectations, the retailer knew
something was wrong by 10am on the Friday after Thanksgiving. Using data such as that could
help P&G respond more effectively to the needs of retailers and of consumers. Such data would
also help P&G respond to surges in demand caused by promotions. Getting the data is hard,
however. Due to issues of confidentiality, retailers are reluctant to share such confidential data
for fear that competing retailers could benefit from the data.

Mr. Ciccone noted numerous changes at P&G in his 25 years that the company. For example,
production planning used to be a once-a-month process; now it takes only 8 hours, and in many
businesses P&G can make any SKU on any day. Web portals to suppliers have enabled the
supplier to see demand at P&G and become more responsive. The company has also doubled the
number of SKUs in the past five years to meet a greater variety of consumer needs.

7.5. What's Next

P&G's next generation supply network concept is currently being designed and prototyped.
P&G expects to develop a breakthrough plan for one of the business units by June 2005 and
achieve company-wide implementation by July 2006. Part of this effort will go toward working
with individual General Managers to help them understand the power of the new ideas.

7.6. Interview: Bill Breen, Fast Company

Given that buy-in from the top is important, can you give an example of how A.G. Lafley has
championed innovation?

“It comes back to the model of the supply network and how it helps you or hurts you. Seeing
how it hurts you helps you learn lessons of how to improve. For example, our performance in
Western Europe was plagued by obsolescence. We'd launch a new product and find that we had
six months of product at the retailers. That meant we had to bring old inventory back and lose
those sales, or we had to delay the introduction of the new product and lose those new sales. We
were close to selling off the perfume and cosmetics business, but the key supply chain folks had
some good ideas that spawned other ideas of how to make it work. Those small wins expanded.”

We're heard about the overall goal of replacing inventory and time with information. That's a
clear goal, but it's tough. What's the single biggest obstacle to reaching that goal?

“The biggest obstacle is integrating the customer's culture and our culture. The technology is
there - it's not an IT issue -- it's a trust issue. How to do things so that we both can win. There's
a long history of those relationships not being positive, so we don't have a winning solution.”

Wal-Mart is your business customer, but they are also a competitor with their private label
products. How do you compete with Wal-Mart's supply chain?

“First, we've come to realize that for Wal-Mart to win, we have to win. It can't be combative.
Wal-Mart is a tough customer, but so is P&G. If you're playing with someone way better than
you, you don't win. We are two formidable competitors, but we're competitors that make each other better. Wal-Mart is learning some things from us, and we're learning from them. When we bring that together in joint business teams, we both win. We have a Kmart joint business team, a Target team, an Ahold team and a Wal-Mart team, each located at the headquarters of those customers. There may be day-to-day squabbles, but we have common business plans.”

Can you tell us about an example when a supply chain issue came up with Wal-Mart, and how you resolved it?

“We launched a new skincare product, Regenerist, with 3 SKUs. It's a very premium product in the Olay line. We realized that we were shipping 248% of estimate, so we knew it would be a supply chain issue. The question was, what to do. With Wal-Mart, we asked to use POS data. In our naïveté, we had looked at 3 SKUs: lotion, cream and serum, and we had estimated 1/3 sales between them. That didn't happen. Cream sold 15%, lotion sold 35% and serum was new and sold 50%. We saw that, and Wal-Mart wasn't even aware of it. We were able to tell them what was going on and have them change their orders so that they could better meet their own needs. That relationship was stronger because we provided them with the right product to meet consumer needs, and we got them more sales.”

Can you tell us about the drivers behind the Gillette acquisition?

“Only a handful of people were involved in the acquisition, but the information I have is that Gillette is an excellent company. We have a lot in common, but we are also very complementary. P&G’s lifeblood is excellent brands, and Gillette has research and knowledge that we don't have. They have expertise in making blades, metallurgy. We don't have that, but we can now apply that expertise to appliances like Braun. We can take ideas from the toothbrush and then apply it to a Tide spinbrush for clothes or to skincare for dermatological abrasion. The knowledge goes through the company and helps you innovate in other areas, which is a huge opportunity. P&G is a big company in many areas of the world. Greater China has 97 cities of 3 million people or more. (The US has only 5 cities of that size.) P&G has a big business in China, but Gillette is new there. We see a huge opportunity -- like the example of yogurt and butter on the same truck -- there's a huge opportunity to come together with Gillette and that will help us on both sides.”

8. Bob Moffat, SVP Integrated Supply Chain, IBM

In the fourth quarter of 2004, IBM reported its highest profits ever. Looking back to December 2001 shows what a long way the company has come. For 70 years, before 2001, IBM ran its supply chain independently -- each unit did its own thing. Moreover, inside each independent business unit were independent functional units -- procurement was independent of customer fulfillment, for example. Mr. Moffat is now surprised that the company survived for so long with such a fragmented approach to its supply chain.
8.1. The Slowing Tech Sector

Mr. Moffat presented data on the slowing of the tech sector. Since 1996, the sector has underperformed growth estimates. For example, 1998 was supposed to bring 11% growth but saw only 6% growth. The year 2000 was supposed to have 11% growth, but only had 1%. Even during the recovery, 2002's 9% expected growth only amounted to 5%. Now, growth is only expected to average 5% to 6%. With the slow-down, IBM's margins dropped 1% per year. Each percentage point drop represented nearly a billion dollars in profits lost.

Even as tech sector growth slowed, the industry changed character. Global competition rose, open standards took hold. Vast new markets of financial and human capital appeared and the character of demand also changed -- customers no longer wanted the latest and greatest technology, they wanted solutions to business problems.

8.2. IBM's Response

IBM’s response was to make its supply chain run on demand, not vertically by silo but horizontally from an end-to-end standpoint. Mr. Moffat related his initial resistance to CEO Sam Palmisano's plan to create an Integrated Supply Chain organization that spanned all the product divisions. At the time, Mr. Moffat was running three divisions and told the CEO, “no way, Sam, over my dead body.” Mr. Moffat argued, initially, that the move would undermine his ability to run his product division. But the old silo-based supply chain design had to go because it created an internal blame game between sales, procurement, and manufacturing in each division.

IBM's goal was not to have the “best” supply chain strategy, but to determine how the supply chain could support the company's strategic goals. In moving to become an on-demand company to serve customers better, IBM embraced on-demand concepts for its supply chain.

8.3. Results

IBM garnered four categories of benefits from its transformation. First, it improved efficiency. Hands-free procurement transactions increased. Logistics costs dropped even as volumes increased. Second, the company created a more variable cost structure to help weather business cycles. IBM decreased fixed spending for manufacturing and moved vendor-managed warehousing.

IBM's results went beyond simple financial measures. The third category of benefit was an improvement in responsiveness and flexibility. IBM was able to respond more rapidly to shifts in demand, turn orders faster, shorten cycle times, and improve customer satisfaction. Fourth, the changes also brought better business process controls such as reducing maverick buying and improving compliance on its internal business controls audits.

8.4. How IBM Integrated its Supply Chain

Creating an on demand supply chain network meant integrating all of IBM's supply chain activities into a single organization. This included integrating customer fulfillment, global logistics, manufacturing, and procurement. Underneath was a layer of common processes enabled by technology. Mr. Moffat argued that too many companies start with the technology and get a negative return on investment if they forget processes.
Integrating the supply chain meant more than just a reshuffle. IBM created a common governance structure. Realigned incentives and measurements encouraged a focus on end-to-end behavior. The shared measurements included financial metrics (cost reduction and cash generation), operational results (demand/supply synchronization, cycle time, and quality), and client-facing results (client satisfaction, ease of doing business, and sales force productivity).

Mr. Moffat noted that when the organization was first formed his own position in the company paralleled the shifting focus of the company. On the one hand, he had new responsibilities for the end-to-end integrated supply chain organization. On the other hand, he remained head of his three product divisions. This dual role forced him to make careful decisions about how to make end-to-end supply chain work without destroying the product divisions and not sacrificing IBM's broader performance for the sake of the narrow interests of one division. Mr. Moffat noted that companies can't simply smash the silos because the silos provide best-of-breed operational performance; the end-to-end process still has to get the work done efficiently.

After six months, even though the supply chain organization was integrated, the different functions were not always operating in an integrated way. So Mr. Moffat formed three cross-cutting teams to deal with operations, strategy, and talent. Mr. Moffat picked talent in building his teams, not seniority. In the past, managers in the various supply chain functions at IBM stayed within their silos for an average of 18 years before becoming executives. This entrenched managers' viewpoints of their narrow functions and increased the ‘us-versus-them’ mentality of the silos.

Mr. Moffat estimates that he spent 80% of his first year on change management -- a much higher percentage than he ever expected. He encountered strong pockets of resistance to the reinvented supply chain -- decades of functional subdivisions had created justifiable pride in how things were done. To help cope with this, he worked to sell a common vision and common measurements.

He also created community via a range of mediums designed to stimulate dialog and cross-functional communications. When the supply chain organization launched its strategy, for example, it took the unique approach of relying on a group of managers, not executives, to communicate it, first to their peers, and then to entire organization. Mr. Moffat said that one key was to communicate the strategy so that every person in every country understood what the organization was trying to do. “If it’s not understood, it can't grow,” Mr. Moffat said.

Mr. Moffat informally gauged the success of the integration effort by how people sat together at a meeting of the company's 300 top managers for the effort. At the beginning of the integration initiative, everyone clustered with people from their own site or silo. As the integration effort progressed, the people integrated, too. By the third year, people at these meetings were sitting in cross-functional, process-oriented groups.

### 8.5. Continued Focus of Efficiency, Growth, and Culture

The transformation continues at IBM along several dimensions. The company continues to seek new efficiencies and cost savings while trying to ignite growth. Further business optimization will target full synchronization of supply and demand. Finally, IBM's continued focus on culture targets three areas: community, communications, and talent.
This emphasis on people is leading to the notion of a labor-based supply chain. Some 70% of what IBM sells now are solutions, not point products. On the supply side, the company spends $6 billion a year procuring technical human resources. To stay in sync with business strategy, IBM's supply chain is looking at the workforce management analogs of supply chain management. This includes resources management strategy, resource capacity planning, execution, and resource operational optimization. Future supply chains will have a much greater labor-based or service supply chain component.


You talked about 11 different elements of talent and changing culture. What was the toughest to change, how did you do it, and how would you do it differently?

“The toughest thing was to get people out of silos. You can't disassemble silos because the deep functional expertise is critical, and the pride is critical, too. But you need people to have a shared vision. Communicating a shared vision to 19,000 people from clerks to Ph.D.s is hard. So we had to relate that broadly, to give people the power to translate that strategy to the job. In terms of what I would have done differently, I would have done it faster. It was a daunting task, to change an organization with $40 billion in spend and 19,000 people, but I would have made change faster.”

Did you lose people along the way?

“No. There were a few who couldn't make the change, and they left for competitors; we're happy with that. It may explain the problems our competitors are having. In the past, when you thought of people in the supply chain, they were like plumbers -- the only time you heard about supply chain was when something was wrong. That was never the case, of course, but now others recognize it. Supply chain has been elevated; they have a seat at the executive table, their performance is talked about in shareholder meetings. They can see directly how their day-to-day jobs translate to quarterly business results. Now people are turned on. We've got more people wanting to work in supply chain than leave it. Also, we have had one of the highest variable pay scores in the company in the last three years. People see supply chain as place where they can make a difference.”

The lead article in the inaugural issue of the Supply Chain Strategy newsletter talks about applying supply chain thinking to labor and HR. IBM is applying supply chain thinking to services more generally. Can you tell us more about that?

“The idea is based on the realization that 50% of IBM is a service business, so how can we support services to drive its profitability and drive its growth. We're applying supply chain to the services business -- I've taken a lot of our people who used to support the products business and moved them over to drive supply chain procurement strategy and other things we buy. We've moved people to services, doing strategic sourcing for IBM and for the customers who have outsourced that function to us.”

How do you change incentives to align with strategy?
“In the past, every functional silo was paid according to the performance of its Business Unit only. So if you worked on PCs, you got a bonus based on the PC business. The first thing we did was align bonuses in the Integrated Supply Chain on IBM's measurements, to get us to think across the silos completely from the start. We aligned on growth, innovation, profitability and cashflow. The first task is to get things done efficiently for the company, and second is innovation. Breaking down the silos is easier said than done, because everyone has to get appraised. We forced the measurements to be crossfunctional as opposed to siloed. If a part of our organization failed, then everyone who was involved fails -- not just one function, because it's everyone's business, an end-to-end process. Our Day Sales Outstanding measure has reduced more in the last 3 years than in the last 30 because we now have a fixed process from order to cash.”

You said you hated the word "outsourcing." What have you outsourced and how have you done it? Are there new ways to talk about outsourcing?

“Outsourcing is about economies of scale. We outsourced manufacturing of the PC because the vendor was better at it than we were. But outsourcing gave us the ability to take cost out of our system and have the people we kept inside the business have more time to focus on more important things. They don't have to schedule manufacturing lines; they can schedule customer orders. When you component-ize the business model, people can add greater value. We connected the end-to-end process. The performance speaks for itself. Our performance metrics are up. In terms of speaking about outsourcing differently, there are labor pools worldwide and industry standardization lets you employ them.”

You’re integrating strategy and talent inside your company -- how about your suppliers?

“Our supplier strategy has been based on relationships, so it was a normal expectation. When we component-ize the business model, we look into their supply chain and then eliminate the useless touches and redundancies. We look at how integration of our two companies can truly add value.”

9. Gene Long, President, UPS Consulting

Mr. Long provided a summary of the themes that had surfaced from the day. Overall, he noted that the implication of the symposium title, “At the Crossroads of Supply Chain and Strategy,” is that supply chain and strategy must not only just intersect, but that a company's general business strategy won't succeed unless it has an integrated and consistently-managed supply chain underpinning it.

Mr. Long's takeaways from each of the sessions were:

* From Bill Copacino: the gap between supply chain “leaders” and “laggards” is widening because supply chain leaders are able to plan well and use their supply chain to support their business mission. They are able to change plans as a situation changes, which lets them perform predictably. The ability to perform predictably is of key importance to Wall Street.
* Prof. Sheffi's presentation made it clear that we live in an uncertain world and that forecasts are inevitably wrong, but he presented tactical and practical ideas for how to forecast in the face of that uncertainty.

* Joe Keane discussed the challenges faced in the branded apparel industry as well as by companies in all industries that want to compete on a global level. He gave insight into the broader focus on governance and the political environments in which companies operate when they set up operations around the globe.

* Dr. Hammer said that the “next big thing” is still an extension of the current big thing, namely process improvement. Companies are getting good at improving processes within their own companies, but the next wave is to do it well across enterprises. Inter-enterprise process improvement will be a much harder challenge, but the value is evident in being able to take out duplicated work and improve cycle times.

* Prof. Charlie Fine showed how market leaders can shift radically within an industry, based on which company owns the locus of power. His examples made it clear that yesterday's followers can become the dominant players tomorrow. Companies need to pay attention to their supply chain planning in order to make decisions that move them into a position of greater influence within their industry.

* Rick Ciccone talked about supply chains as networks, not chains. Companies operate in relationships with other business. Even though there are many moving parts in these networks, P&G stays focused on the needs of the customer (retailer) and the needs of the consumer, continually assessing how it can help both customers and consumers meet their needs.

* Bob Moffat shared the cultural evolution of IBM and how IBM was able to get new sustainable profitability, new market offerings and new market levels. In order to change a company, it's vital to pay attention to the people side. The next migration of the culture will be to inventory, deploy and distribute human capital.