VF Corporation Leverages IBM/i2 Alliance to Take Retail Supply Chain to Next Level

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Countdown to Success

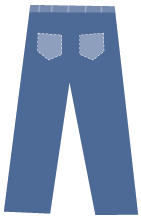
Spring 1997	VF Corporation and i2 Technologies, Inc. (i2) meet to discuss supply chain initiative.
July 1997	VF signs contract with i2 for its Supply Chain Planner solution
September 1997	Began work to move first operating coalition, VF Workwear, to i2 platform. Installed IBM's RS/6000 to provide infrastructure for the i2 solution.
October 1999	VF considers itself "live" with Supply Chain Planner in first coalition.
September 2000	VF begins to create private B2B exchange using i2's Collaboration Planner. Begins to electronically enable first supplier.
	First supplier is targeted to come online; VF continues to add three to five additional suppliers for direct purchasing on the private exchange in next several months.
2001	Rollout to additional direct suppliers of Web-based forecasting and electronic order-processing solution.

The Company

VF, the world's largest apparel manufacturer and innovator in the apparel manufacturing industry.

The Situation	VF needed to enhance its internal supply chain planning process across the organization to cut costs and drive an increase in sales through greater collaboration with its suppliers.
Solution Partners	IBM provided a scalable, reliable e-business server infrastructure. i2 provided its Supply Chain Planner and Collaboration Planner software solutions for optimization of the supply chain.
The Bottom Line	Inventory reductions of up to 10%, saving millions of dollars. Sales increase of up to 5% due to ideal inventory mixes.

Overview



Apparel manufacturer VF Corporation partnered with i2 Technologies, Inc. and IBM to develop a Web-based enterprise supply chain planning solution that streamlined internal processes and ultimately will connect VF more efficiently to its suppliers. VF implemented i2's Supply Chain Planner running on the IBM RS/6000 server to enable electronic forecasting and supply chain optimization for its internal divisions. The company is in the process of implementing i2's Web-based Collaboration Planner solution for forecasting and order management with its suppliers of fabrics and findings. Once implemented, the Web-based private exchange will enable suppliers to receive production forecasts and collaborate to dramatically improve cycle times, inventory mix, and enable VF to react much more quickly to changes in demand stream — making more accurate projections of dependent materials. VF expects to roll out its private B2B exchange for direct procurement to its supply base in the coming years.

IBM and i2 at VF Corporation

Applications	▶ Internal supply chain planning ▶ Private exchange for collaboration with suppliers
Business Benefits	▶ Up to 5% in additional revenue ▶ Improved service levels from suppliers ▶ Reduce inventory up to 10% through improved efficiencies
Software	▶ i2 Supply Chain Planner ▶ i2 Collaboration Planner ▶ IBM DB2 Universal Database ▶ IBM MQSeries
Servers	▶ IBM RS/6000 ▶ IBM S/390 Parallel Enterprise Server
Business Partner	▶ i2

VF is the largest jeans manufacturer in the United States and the world's largest maker of brand-name apparel. Founded in 1899 as the Reading Glove and Mitten Manufacturing Company, the company expanded production to include underwear and changed the name to VF Silk Mills in 1919. With 1999 revenues of $5.6 billion, the company today employs 73,000 worldwide and has six operating units, called coalitions, that manufacture such household apparel brands as Lee, Wrangler, VF (intimate apparel), Jansport (backpacks), Healthtex (children's), and The North Face (outdoor apparel). Long viewed as an innovator in the apparel manufacturing industry, VF has created industry-leading best practices, including being the first major apparel manufacturer to introduce vendor-managed inventory in the early 1990s. Through years of acquisition, growth, and restructuring, VF has remained focused on its customers, and all of its technology and business initiatives share the common goal of increased customer satisfaction and superior customer service. According to Terry Turner, Executive Vice President of Consumer Goods and Retail at i2, "The key to achieving success in retail is to have the right product in the right place at the right time."

In the mid-1990s, VF underwent a major restructuring effort aimed at being more responsive to customers. The company consolidated its 17 operating divisions into five "coalitions," organized around types of goods produced (e.g., VF Jeanswear contained all of the jeans products that VF produces. See exhibit A for additional information). In 1996, VF worked with outside consultants to closely examine its supply chain operations for improvements. Although the company had pioneered the use of vendor-managed inventory to increase customer satisfaction at its retail outlets and other channels, gross inefficiencies still existed in the process of planning for, ordering, and procuring the direct materials used to manufacture VF apparel. As a result, VF believed it was missing out on the opportunity to cut costs, increase customer satisfaction, and boost sales.

Exhibit A

VF reorganized its businesses in 1996 to streamline processes. The previous 17 operating divisions were consolidated into five new units, called coalitions, to reflect the unified vision VF had for each of its strategic markets. In 2000, an additional coalition was added, representing all six major lines of business in which VF operates:

- North and South American Jeanswear
- Imagewear*
- Playwear
- Global Intimates
- International Jeanswear
- Outdoor/Adventure products**

*In 2000, VF's Knitwear and Workwear businesses were combined into a new Imagewear coalition.
**Additionally, a new group was added (Outdoor/Adventure), representing the acquisition of The North Face and combining the Jansport/Eastpak unit as well.

Among its goals for an automated supply chain process, VF wanted to:

- Improve speed-to-market by reducing inefficiencies in the supply chain
- Reduce costs caused by inefficient supply chain processes
- Provide suppliers with electronic, 13-week projection forecasts for planning mill capacity
- Electronically forward purchase orders to suppliers on a weekly basis
- Create a private exchange where VF could communicate electronically with all of its direct suppliers, cutting costs and improving efficiencies

VF wanted to implement a supply-chain planning solution and collaborative direct procurement solution that would optimize internal manufacturing resource planning and provide electronic order entry, forecasting, and communications with suppliers to establish the standard for the entire retail manufacturing industry. Following is an account of how VF collaborated with i2 and IBM to develop an enterprise-scale supply-chain planning solution that eliminated inefficiencies in the supply chain planning and ordering process and enabled the company to continue its goal of improving customer satisfaction.

Step 1: Identifying the Broken Links in the Supply Chain

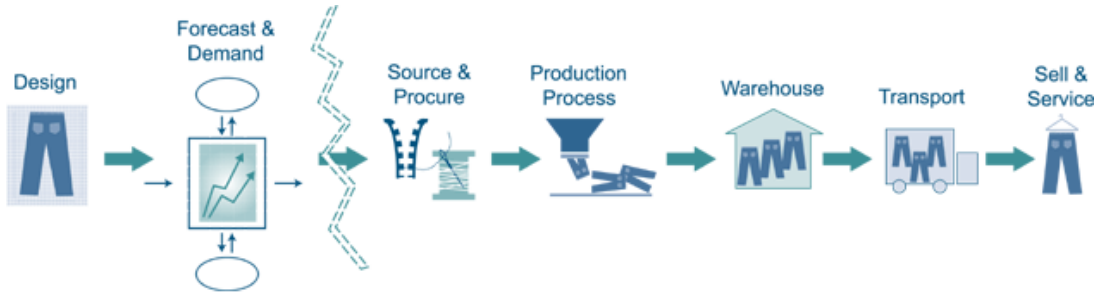


Diagram: VF's supply chain prior to i2 and IBM

As an acknowledged leader in the apparel manufacturing industry, VF launched an initiative in 1996 to take the next step for the industry and find new areas to improve efficiencies. Working with a consulting partner, VF identified several major areas for consideration, including supply chain planning, B2B e-commerce, and collaboration. The first area, supply chain planning, promised the most immediate improvements in efficiencies and cost savings.

Each of the five coalitions within VF at the time had its own legacy planning applications with varying degrees of automation and success. Many of these applications were homegrown. The coalitions consistently lacked the ability to truly model and optimize the manufacturing plans and production capacity plans around the constraints that existed (i.e., Are human resources available?, sewing machines available?, etc.). Around the time that VF was working with its consulting partner to optimize its processes company-wide, the central IT department received a number of requests from the coalitions for funds to implement new planning systems and replace older legacy systems. As a result, VF decided to choose a best-of-breed supply-chain planning application that it could implement across all of the coalitions.

Step 2: Selecting the Right Supply-Chain Optimization Partners

VF knew that it needed to select best-of-breed technology and infrastructure partners to create a leading edge supply-chain management (SCM) system for its complicated retail manufacturing needs. "Within VF we understood that the foundation of our e-business infrastructure needed to be an effective supply chain planning system," states Ellen Martin, Vice President of Supply Chain. "Therefore, we looked carefully for the vendors that could provide that critical supply chain infrastructure, both from an application perspective as well as a server infrastructure perspective."

Although none of the current solutions on the market had the functionality that VF needed, the solution from i2 came closest. When VF first met with i2 in late spring of 1997, the Supply Chain Planner solution was one of the most robust SCM solutions on the market. However, the solution did not completely map to VF's complicated supply chain. For example, in the retail manufacturing industry, there are often three or more constraints (labor, machines, fabrics, plants) as well as several variables for an order (style, color, and size). The resulting sheer volume of transactions was atypical from most other supply chain implementations. These multiple constraints added volumes of complexity to VF's processes, because it meant that one system had to be able to coordinate fabric

The Makings of a Supply Chain

Hurwitz Group defines supply chain management (SCM) as the management of the physical flow of goods and services, cash or cash equivalents, and associated information between the points of purchase and points of final sale, with the objective of minimizing inventory and optimizing asset utilization throughout the supply pipeline in the process of meeting customers' requirements. In other words, efficient "supply chain management" would ensure availability of the right inventory at the right time in the right place and of the right quantity — all at the right cost!

SCM diffuses "functional silos" and forces organizations to think from a process perspective as it cuts across more than one function. For example, the supply-chain planning process uses demand information generated by marketing, in conjunction with material availability and plant capacity constraints, to produce a highly optimized manufacturing and operations plan for the entire enterprise. Shortened product life-cycle times coupled with mass customization initiatives are driving enterprises to extend supply chain optimization beyond the enterprise. Hence, availability of real-time information and the automation of associated workflows across an industry value chain have become prerequisites for successful supply chain management.

supplies with the available sewing machines and operator times, as well as at the right location at the right time, all of this coinciding with meeting customer demands, which are constantly shifting.

According to Bruce Wiley, Sub Process Expert for Production Planning and i2 Project Team Leader at VF, "One of the objectives of our supply chain initiative was to meet the differentiated service level goals of our customers, such as guaranteeing that we can meet 85% of our plan for this product, while guaranteeing 90% levels for others. Meeting any service level plan is so dynamic, it is difficult to find a planning system that can fully automate this. Changing any of a number of inputs can affect the service levels."

None of the SCM solutions on the market could offer VF a solution that could handle such an incredibly complex internal supply chain environment — and as large of a problem as that which VF presented — given the performance requirements identified. Through several months of meetings, i2 worked hard to prove its ability to extend its solution suite to meet VF's specific needs, and in July 1997, VF signed a contract with i2.

The decision regarding the e-business server infrastructure on which the Supply Chain Planner solution would be built was more straightforward. VF was already a satisfied IBM customer, with IBM systems running its mainframe and legacy applications. VF was convinced of the strong enterprise-scale capabilities of IBM e-business server infrastructure solutions, and believed that IBM was the only company for the job of running its supply chain planning solution. According to Ellen Martin, "We went with IBM because of the proven speed of its RS/6000 processor, its ability to handle 64-bit, and its fit with the rest of our infrastructure."

"For the supply-chain planning project, IBM was the logical choice for our server infrastucture based on our needs and current environment."

— Ellen Martin
VP of Supply Chain

Critical Infrastructure Requirements for VF that IBM Had to Meet	
Speed	✓
Ability to handle 64-bit processing	✓
Fit with VF existing infrastructure	✓
Reliability	✓

Step 3: The Real Work Begins: Mapping i2's Supply Chain Planner to the Coalitions

In September 1997, VF and i2 began in earnest to move the first operating coalition, VF Workwear (now part of VF Imagewear), to the Supply Chain Planner platform. The company chose VF Workwear because that area had a very mature supply chain with one of the most advanced planning systems of all the coalitions. Since supply chain optimization is such a complex undertaking, VF chose this area of the company to demonstrate that even the ablest planning group would receive benefits from implementing i2's Supply Chain Planner. VF also knew that VF Workwear was typical of the other coalitions in terms of structure, and that a strategy implemented with the VF Workwear coalition could be applied to the rest of the company.

Mapping the internal supply chain to i2's solution was an extremely complex undertaking. Every facet of VF's production operations had to be mapped to an electronic system that would provide better insight and visibility into the entire process. This meant that every single resource, all items in inventory, and the entire labor force needed to be accurately represented in the system. The benefits, however, were potentially enormous. Currently, VF was running into typical supply chain nightmares such as having a production run short because it did not receive the correct quantity of fabric from a supplier, and thus the company would have to "short" one of its customers on an order for jeans without any advance warning. Supply Chain Planner would eliminate these last-minute crises, and provide a much smoother flow of goods and demand planning that would ultimately impact both suppliers and customers. As i2's Turner liked to say, "How quickly can you drive looking in your rear view mirror? Supply Chain Planner lets you anticipate what is up ahead so you can make the appropriate turns and navigate the terrain of your business more effectively." The following table illustrates the types of benefits related to a Supply Chain Planner implementation.

Supply Chain Planner Provides Benefits That Include:	Which Leads To:
Better visibility into inventory and more appropriate inventory levels	Lower cost of sales
Better insight into supply chain processes	Ability to react quickly with the right information
Ability to achieve better mix of products	Better customer service and increased sales
Knowledge of all constraints and historical insight into supply chain	Ability to make intelligent decisions that impact customer satisfaction
Optimization of systems	Greater efficiencies, lower costs, better sales

As mentioned above, RS/6000 proved the most robust infrastructure for the Supply Chain Planner application, being the only one at the time to support 64-bit, which was critical given the complexity of VF's supply chain and the tremendous volume of transactions anticipated for the Supply Chain Planner solution. In addition, VF needed to integrate its new Supply Chain Planner solution with some of its back-end systems, most notably an implementation of SAP and its legacy supply chain systems. This was critical because it provided the historical perspective that is so valuable to a supply-chain planning process. This critical integration link between SAP and legacy systems was enabled through IBM's MQSeries, which effectively provided access to the back-end data that was essential for supply chain planning.

SAP is currently being implemented across coalitions at VF to move much of the manufacturing resource planning information from legacy systems. When it is completely implemented, SAP will more effectively feed this critical information into Supply Chain Planner. The SAP database server and the current legacy supply chain applications are running on another IBM infrastructure solution, the S/390 Parallel Enterprise Server, with information stored in IBM's DB2 Universal Database. This database stores data critical to supply chain, including on-hand inventories, bills of material, prioritized routings, demands, inventory targets, capacities, work in process, and plant calendars. "The combination of the S/390 and DB2 infrastructure has and will continue to provide the robust scalability, availability, and manageability required for our critical SAP environment," states Ellen Martin. The application servers are running on IBM RS/6000 SP2 AIX nodes. Therefore, tight integration is needed between Supply Chain Planner and the SAP and legacy systems.

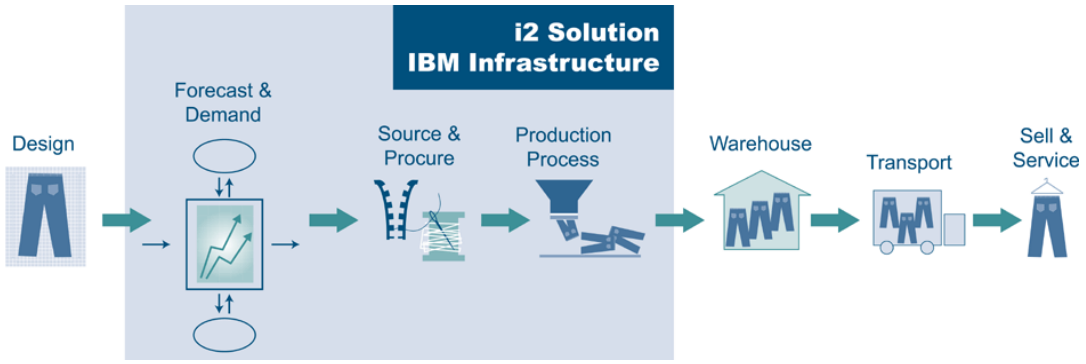


Diagram 2: VF's Optimized Supply Chain with i2 and IBM

Following the VF Workwear unit, VF began moving its VF Intimates coalition over to Supply Chain Planner in March 1998, followed by VF Knitwear in November 1998, and VF Jeanswear in August 1999. VF Playwear had implemented i2 Factory Planner prior to this project. VF considered itself live on its first Supply Chain Planner coalition, VF Workwear, in October 1999, two years after launching the i2 implementation.

The company has found that a very high volume of transactions, large planning model sizes, and a substantial amount of stock-keeping units (SKU) have to be built into the models for supply chain planning. An example of the high volume is VF Jeanswear, with over 70,000 SKUs of finished goods, each of which contains five operations per unit plan to produce (cut, sew, wash, finish, and transport); this can represent one million plans in each production run. This situation was new territory for i2, which was more familiar with industries that had much lower complexity volumes. i2 worked diligently to continue extending Supply Chain Planner's functionality and was able to deliver a leading-edge solution for VF.

Since then, VF has continued to grow, acquiring a number of companies to add to its coalitions, and combining its VF Workwear and VF Knitwear coalitions into the VF Imagewear coalition. This amount of change has been challenging, because every time a new company is added, it brings its own systems and processes that need to be mapped to VF's supply chain initiative, which could be overwhelming. However, the company has managed to stay on track with its supply chain planning initiative because of the strength of the i2 system and the tremendous capacity the IBM e-business server infrastructure provides. This enables VF to continue to operate effectively in the dynamic business world of retail manufacturing. i2 and IBM delivered a leading-edge solution for internal supply chain planning that not only set the stage for other internal coalitions to follow, but also led to the inevitable linking of suppliers, which is the ultimate goal of a supply chain.

Step 4: From Internal Supply Chain Planning out to the Suppliers

Once VF began implementing its supply chain solution to automate and optimize its internal supply chain processes, the company wanted to extend that automation out to its suppliers. In 2000, VF began to expand its solution to include collaboration with suppliers. This initiative was even more ambitious than the internal supply-chain automation project, largely due to the fact that now VF would be connecting to hundreds of external systems, all of them different and with their own complexities beyond VF's control. "We probably have between 300 and 600 fabric suppliers across the various coalitions," claims Wiley. "However, we have no insight at a corporate level into our supply base. There is supplier overlap between coalitions, but it is not managed at the corporate level, which affects our chances to negotiate better terms. Our supplier collaboration initiative is to make the entire supply base visible to the company and see if there are opportunities for consolidation."

i2's Collaboration Planner is a solution for procurement of direct goods that integrates purchasing with supply-chain planning capabilities to optimize the entire procurement life cycle, from sourcing through negotiation, planning, and ordering. Collaboration Planner is currently being hosted by i2 for VF, and the first pilot was launched in September 2000 with a fabric supplier.

Denim suppliers need to coordinate production of fabric so that they can meet the demands of customers like VF. Traditionally, VF maintains a quarterly contract with denim suppliers that gives an estimate of requirements for fabric over 13 weeks, sets the price of the fabric, and has suppliers commit to a certain amount of fabric on a weekly basis based on mill capacity. This was administered through phone, fax, and e-mail. On a weekly basis, VF communicated to the supplier what was needed early the following week on the Friday before. This automatically puts VF's fabric suppliers in a reactive position because while the mills have a general idea of VF's overall needs, they don't get actual orders until four days prior to expected delivery of the fabric.

With the Collaboration Planner from i2, VF can share forecasting information of material requirements with its suppliers to enable its fabric makers to better understand VF's demands in real-time and better plan mill capacity. In addition, VF will electronically forward its purchase orders for fabric to its suppliers on a weekly basis to automate the direct procurement process. This process will move VF's suppliers out of reactive mode and enable the mills to deliver higher service levels to VF, which ultimately brings VF closer to its goal of delivering the right product at the right time to its customers. VF has launched a number of these efforts with suppliers to measure the value it receives from this initiative. VF is rolling out its supply chain initiatives to more of its direct suppliers over the next 12 months.

Measuring Success

It is still early in the game for VF to measure the success of its supply-chain planning initiative. With complete rollout not yet finished, the company is still in the speculative stage of anticipating benefits of the system. However, Bruce Wiley anticipates benefits in the following areas:

Objectives of Supply Chain Management
Reduce inventories
Achieve better product mixes
Forecast and demand visibility throughout supply chain
Improve asset management
Increase revenues/sales
Improve customer service

- **Inventory reductions.** By being able to plan plant capacity better, and optimize the manufacturing process, VF anticipates it will be able to dramatically affect its current inventories of direct materials, including fabrics and findings. The company anticipates reducing inventory up to 10%, which could ultimately save VF millions annually. This will enable the company to reduce unused inventory and meet customer demands with the most current products to offer the market.
- **Higher service levels for customers.** VF anticipates that through its collaboration with suppliers, the company will be able to deliver higher levels of service commitments to its customers. The system will also assist VF in prioritizing customer demands more effectively.
- **Overall lower costs within the supply chain.** Ultimately, the successful implementation of the supply-chain planning solution will drive costs down across VF's supply chain. Not only will this be achieved through inventory reductions, but also potentially through consolidation of direct suppliers to drive better prices and contracts, and through the ability of VF to respond more immediately to consumer demands and deliver the right product to market at the right time — the key to success in retail.

- **Increased sales through better mix of products.** One of the anticipated benefits of the supply-chain planning solution that adds to the bottom line is VF's ability to achieve better mixes of products that it sends through its channels. Combining improved planning, production, and delivery will enable VF to respond to market needs more effectively, and deliver the right product to the right location at the right time to achieve maximum selling potential.

Zeroing in on ROI

Hurwitz Group ROI Metric	Potential ROI for VF's Supply Chain Initiative
Attract and Retain Retail Customers	Improved service, faster throughput times, optimized inventory mix to meet requirements of retail world: Getting the right product in the right place at the right time.
Increased Revenues	VF estimates that the supply-chain planning solution can contribute to as much as a 5% increase in sales for the company, by having the ideal inventory mix available to the retail world.
Decreased Time-To-Market	Capacity for forecasted orders that improve VF's ability to deliver the right products faster to market through automated flow of goods and materials through the system.
Improved Efficiencies	The company anticipates reducing inventory up to 10%, which could ultimately save VF millions annually.

Conclusion

VF is a shining example of a company that has embraced e-business throughout its organization. The company understands the competitive advantage available if it can crack the e-business code. Therefore, VF has invested aggressively in building an e-business infrastructure from the inside out to cut costs, improve efficiencies, and ultimately deliver the highest levels of customer service to the market. By effectively mapping all resources, constraints, and processes internally, VF is gaining the insight into its supply chain that will help it perform more efficiently upstream (with suppliers) and downstream (to its retail outlets). Through its partnership with IBM and i2, VF is setting the standard for e-business adoption in the retail manufacturing industry. VF implemented i2's Supply Chain Planner using an IBM e-business server infrastructure to:

- **Optimize the supply chain**
- **Reduce unnecessary inefficiencies and costs throughout the supply chain**
- **Enable the company to respond to market needs with more agility**
- **Drive e-business adoption in the retail manufacturing industry**

"IBM and i2 have been two of the key ingredients to our success with the supply-chain optimization project," claims Ellen Martin. "Core to our common systems rollout is the infrastructure provided by IBM, which has enabled VF to utilize best-of-breed technology in support of the scalability requirements of i2's Supply Chain Planner." Using the IBM/i2 partnership, VF is well positioned to lead retail manufacturing into the next century.

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