



Federated Department Stores: Sold on the Value of a Flexible, IBM-Powered Infrastructure

An IDC e-business Case Study

THE SUBJECT

With 460 stores in 34 states, Guam and Puerto Rico, Cincinnati-based Federated Department Stores is one of the nation's leading department store retailers. The company boasts such well-known retail brands as Bloomingdale's and Macy's, as well as the successful macys.com Web site and a thriving online bridal registry business through a partnership with WeddingChannel.com for all Federated brands.

THE GOAL

Federated sought to increase the flexibility of its e-infrastructure by adopting a service-based architecture. By reducing the time, cost and effort required to integrate new selling channels, Federated sought to position itself to take full advantage of new channel opportunities.

THE SOLUTION

Federated's solution integrates multiple selling channels (including Web-based, in-store, direct mail and call center-based) with backend applications via a common-services layer. Deployed in three tiers, the solution includes a variety of front-end selling channels, a custom-developed common services layer, and a new inventory and fulfillment application running on IBM DB2 and IBM eServer zSeries Parallel Sysplex.

WHY IBM

"IBM's expertise across all computing domains is truly unique. We were drawn by the opportunity to access IBM's engineers and senior management throughout the development process."

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Executive Summary

Innovation Spotlight

WeddingChannel.com, Federated's bridal registry partner, is fully integrated with Federated's backend systems. "We're not just sending files back and forth. The WeddingChannel.com is coming in and hitting our backend systems."

Federated sought to adapt its IT architecture to make it easier to seize new channel opportunities. The company embraced a flexible, service-based architecture that enabled it to easily support a wide range of channels and interfaces, and to quickly and easily integrate new channels. A key element of this architecture is the use of XML and the development of a centralized inventory and product information database serving all selling channels. By employing reusable components, Federated's architecture has lessened the company's integration burden and shortened the time required for adding new selling channels. Application development and support costs are expected to decline significantly.

Federated's Solution at a Glance

e-business Stage	Integrating (e-commerce channel partner's Web site integrated realtime with Federated's backend systems)
Core Functionality	Federated's solution—employing a service-based architecture—integrates multiple selling channels (including online, in-store and call center-based) to backend applications via a common services layer. The solution leverages a new inventory and fulfillment application known as FedFil. Previously accessible through a 3270 terminal interface, FedFil now supports a wide range of interfaces (e.g., Web browsers, PDAs and point-of-sale terminals). Transactions initiated by the various selling channels pass through a custom middleware layer which invokes specific services within the FedFil application. The solution also features a centralized inventory database, allowing 24 by 7 realtime inventory for all selling channels.
Software	IBM WebSphere Application Server, IBM WebSphere MQ (formerly IBM MQSeries), IBM DB2 Universal Database, IBM CICS, Lotus Notes
Servers	IBM eServer zSeries Parallel Sysplex (formerly S/390 Parallel Sysplex), IBM RS/6000
Services	IBM Global Services (Hosting Service), IBM Global Services Application Integration Middleware Group
Key Benefits	<ul style="list-style-type: none">• The macys.com and weddingchannel.com sites handle approximately 30 million hits from 260,000 unique visitors per day.• Via IBM WebSphere MQ, Federated was able to implement realtime inventory monitoring on a 24 by 7 basis.• By enabling 24 by 7 realtime inventory control, Federated is well positioned to improve the efficiency of its replenishment cycles.• Federated's service-based architecture improves overall application performance and makes it easier to support and integrate new channels.• By facilitating a flexible, customer-centric multi-channel strategy, Federated's service-based architecture strengthens the company's overall competitive position.• The use of reusable components within Federated's service-based architecture is expected to lead to reduced application development and support costs by as much as 50 percent.

Situation Analysis

Background

Cincinnati-based Federated Department Stores, Inc. is one of the nation's leading department store retailers, with 460 stores in 34 states, Guam and Puerto Rico. Home to such well-known retail brands as Bloomingdale's and Macy's, Federated also operates the successful macys.com Web site, as well as a thriving direct-to-customer channel (through its Bloomingdale's By Mail and catalog businesses). Federated's most novel channel strategy has involved a very successful partnership with the WeddingChannel.com (a B2C e-commerce provider) that includes all Federated brands. Federated's diverse channel structure is in many ways a reflection of the new competitive reality prevailing among higher-end retailers—namely, the need to provide customers with more choice and flexibility as to how and when they shop. Because it provides customers with a wider, more convenient array of shopping alternatives, Federated is now better positioned to solidify its relationships with those customers.

Federated's diverse channel structure reflects the importance of providing customers with more choice as to how and where they shop.

Like most traditional “brick and mortar” retailers, Federated embraced e-commerce as a competitive necessity in the mid to late 1990s, largely in response to pure-play start-ups. Its initial implementation of macys.com—like those of its competitors—operated as a standalone initiative, essentially disconnected from the company's core business operations. However, before long, Federated abandoned this approach in favor of a more deeply integrated model, with linkages between its Web sites and its backend systems—a configuration referred to as “integrated multi-channel retailing.”

The Need: Improved Flexibility...for Faster Speed-to-Market

While this initial integration effort improved the performance and functionality of the solution, the customized nature of the integration limited its flexibility. As the ongoing importance of realtime integration became increasingly clear to Federated, so did the need for a more flexible, service-based architecture—based on reusable components—that leveraged a common set of business rules on the backend of the solution. Such an architecture would allow the retailer to more rapidly and cost-effectively integrate its sales channels (both current and future) with its backend systems. What's more, the pursuit of such an approach would fully align its core business strategy—providing customers with flexible channel options—with its IT strategy.

As the ongoing importance of realtime integration became increasingly clear to Federated, so did the need for a more flexible, service-based architecture—based on reusable components—that leveraged a common set of business rules on the backend of the solution.

By early 1999, Federated had begun to articulate a vision of a flexible IT architecture that could tie together its Web sites, its legacy inventory and fulfillment system, and a variety of geographically dispersed fulfillment and distribution centers. While such a wide-scale integration is a complex enough task, Federated's initiative was made even more so because of the need to integrate a third-party solution (WeddingChannel.com) with Federated's backend infrastructure. Considered the crown jewel of the company's Web-based services, the WeddingChannel.com is a partnership that allows brides-to-be to set up a wedding registry, and gift-givers to purchase through the

registry. While the site is managed by its third-party owners and hosted on the West Coast, it is nonetheless fully integrated with Federated's backend systems (located in Raleigh, NC) as well as Federated's customer service environment. This integration is crucial to Federated's ability to use WeddingChannel.com as a third-party sales channel.

The seamless integration of front-end e-commerce applications with backend legacy applications was critical because it supported Federated's central business-level goal—to allow customers to shop when and how they want to. In addition to integration, the company also saw the creation of centralized inventory and product description files—providing realtime inventory data for all channels and locations—as key to building an integrated e-commerce infrastructure. In early 1999, Federated began evaluating the technologies that would make its vision a reality.

Action Plan and Decision Process

First Steps

Federated's technology selection process focused on two primary areas:

- Middleware, to enable and control the flow of data between Federated's selling channels and its backend applications; and
- A database platform, on which to build centralized inventory and product description files.

Led by Federated Systems Group (FSG)—the company's IT support unit—Federated's decision process lasted just over six months. After evaluating “several” products, the Federated team selected IBM as its core technology vendor for the architecture redesign. Specific products selected included IBM WebSphere Application Server, IBM DB2 Universal Database and IBM WebSphere MQ (formerly known as IBM MQSeries). In selecting IBM, Federated sought to build on the company's long and successful relationship with IBM (which was then hosting Federated's mainframe environment and Web servers in its Raleigh, NC hosting facility). According to Larry Lewark, President of FSG and the company's CIO, the breadth and depth of IBM's experience in delivering industrial-strength e-business solutions was the driving force behind its selection. “IBM's expertise across all computing domains is truly unique,” says Lewark. “We were drawn by the opportunity to access IBM's engineers and senior management throughout the development process.”

“We saw a strong alignment between where IBM was heading architecturally and where we needed to go. We got a good feeling from our high-level discussions with IBM's senior management team, and became even more comfortable after more granular discussions with senior architects.”

— Larry Lewark, President ,
Federated Systems Group
and CIO, Federated
Department Stores

IBM's technology resources and experience were strong pluses, notes Lewark. But the Federated team was won over by the degree to which IBM's architectural vision—to support integrated multi-channel retailing—mirrored its own. “We saw a strong alignment between where IBM was heading architecturally and where we needed to go,” says Lewark. “We got a good feeling from our high-level discussions with IBM's senior management team, and became even more comfortable after more granular discussions with senior architects.” On the technology side, the selection of a database platform—on which the company would build a centralized inventory and product description file accessed by all sales channels—was arguably its most important decision. The

“The combination of DB2 and the zSeries provide us with unparalleled performance and availability .”

— Ken Garnto, Manager of Infrastructure, Architecture and Services, Federated Systems Group

key criteria sought by the Federated team were overall availability and performance in a high transaction environment. According to Ken Garnto, Manager of Infrastructure, Architecture and Services, IBM DB2 Universal Database emerged as the clear choice because of outstanding performance on the IBM eServer zSeries Parallel Sysplex (which runs Federated’s legacy systems). “The combination of DB2 and the zSeries provide us with unparalleled performance and availability,” explains Garnto.

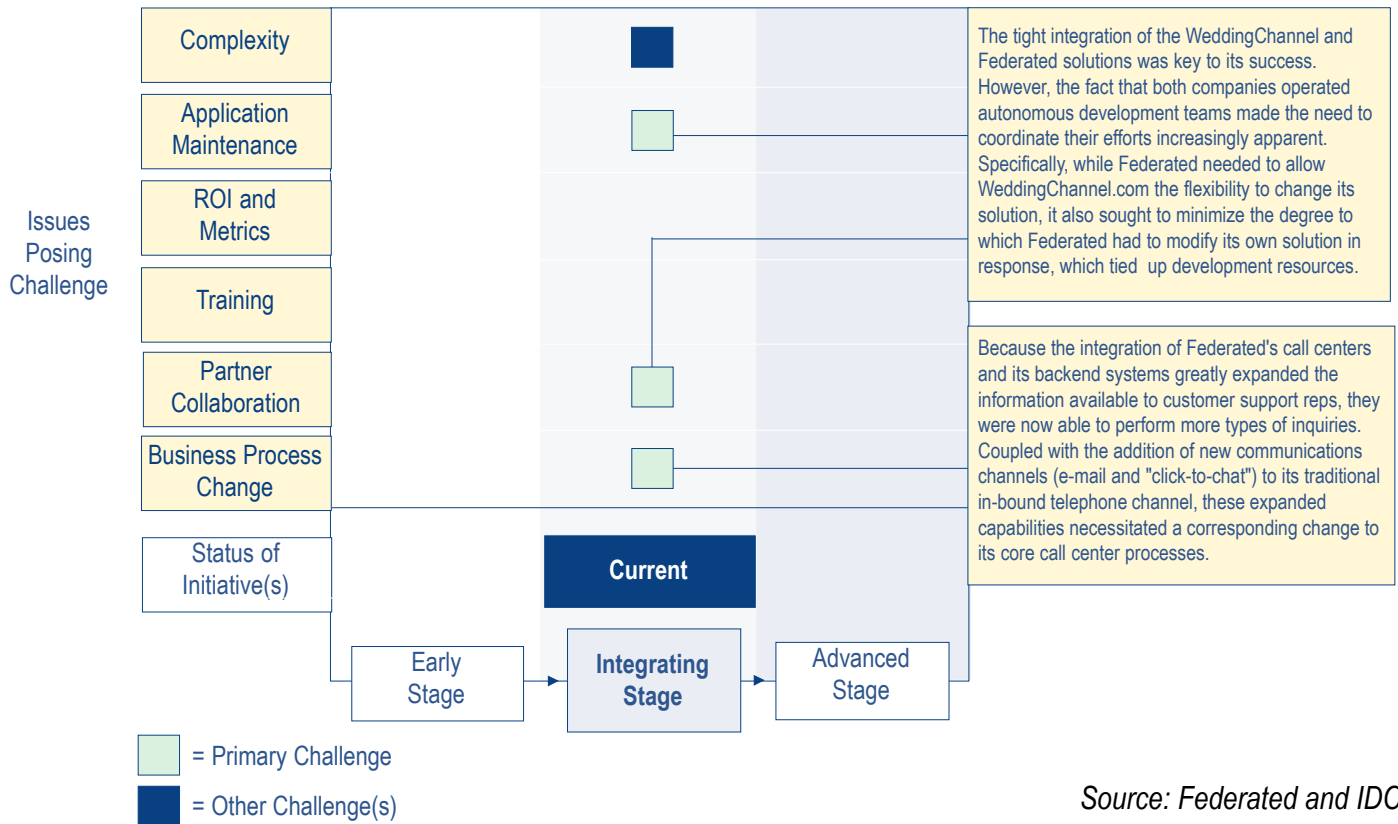
Federated selected IBM WebSphere MQ as the platform on which to build a set of middleware services that would allow the selling channel applications on the front end to communicate with its backend systems. In choosing WebSphere MQ, Garnto points to its maturity, reliability, and overall performance as the key drivers behind its selection. “Because MQ is the most established and proven messaging middleware on the market it was a clear choice for us,” says Garnto. “We saw its solid reliability and assured message delivery as ideal for the infrastructure we were building.”

Challenges

While Federated’s architecture redesign was complex in its own right, one particularly challenging aspect of the initiative related to its close relationship with WeddingChannel.com. As discussed, the WeddingChannel.com and Federated sites were tightly integrated—a key factor in the success of the relationship. However, for Federated, the fact that both companies operated autonomous development teams made the need to coordinate their development efforts increasingly apparent. Specifically, while Federated needed to allow WeddingChannel.com the flexibility to change its solution, it also sought to minimize the degree to which Federated had to modify its own solution in response, which tied up development resources. According to Lewark, Federated’s approach to balancing these issues was to create a sufficiently generic set of services without compromising on functionality. “We resolved the issue by developing standards and communications methods that govern how we interact,” explains Lewark. “It’s been very successful because it provides WeddingChannel.com with the flexibility it needs, while delivering very robust services on the backend to manage high-volume transactions.”

In addition to IT and integration issues, Federated’s strategy of linking all of its customer channels to a common service infrastructure also posed a series of business-level challenges. For instance, because the integration of Federated’s call centers and its backend systems greatly expanded the information available to customer support reps, they were now able to perform more types of inquiries. Coupled with the addition of new communications channels (e-mail and “click-to-chat”) to its traditional in-bound telephone channel, these expanded capabilities necessitated a corresponding change to its core call center processes. “By plugging call centers into our new Web-based infrastructure, we have both empowered our call center agents and altered our customers’ behavior,” says Lewark. “Our challenge was to reengineer our processes to reflect this new state.” To this end, Federated created a series of groups within call center operations to better meet a broader and deeper range of customer service inquiries.

Challenges Encountered in Federated's's e-business Evolution



Solution Profile and Implementation Strategy

The Solution: Functionality and Architecture

The key functionality highlighted in this case is the ability of Federated's solution to allow multiple channels—physical stores, online stores, telephone-based sales and call center agents—to access the same base of product, inventory, and shipping information. Within physical stores, end user interfaces include cash registers, PDAs and wireless scanning devices used by associates and kiosks used by customers. Federated's corps of call center reps (which serve all of its individual retail units) interface with the legacy data through their workstations as they take orders and customer inquiries via telephone.

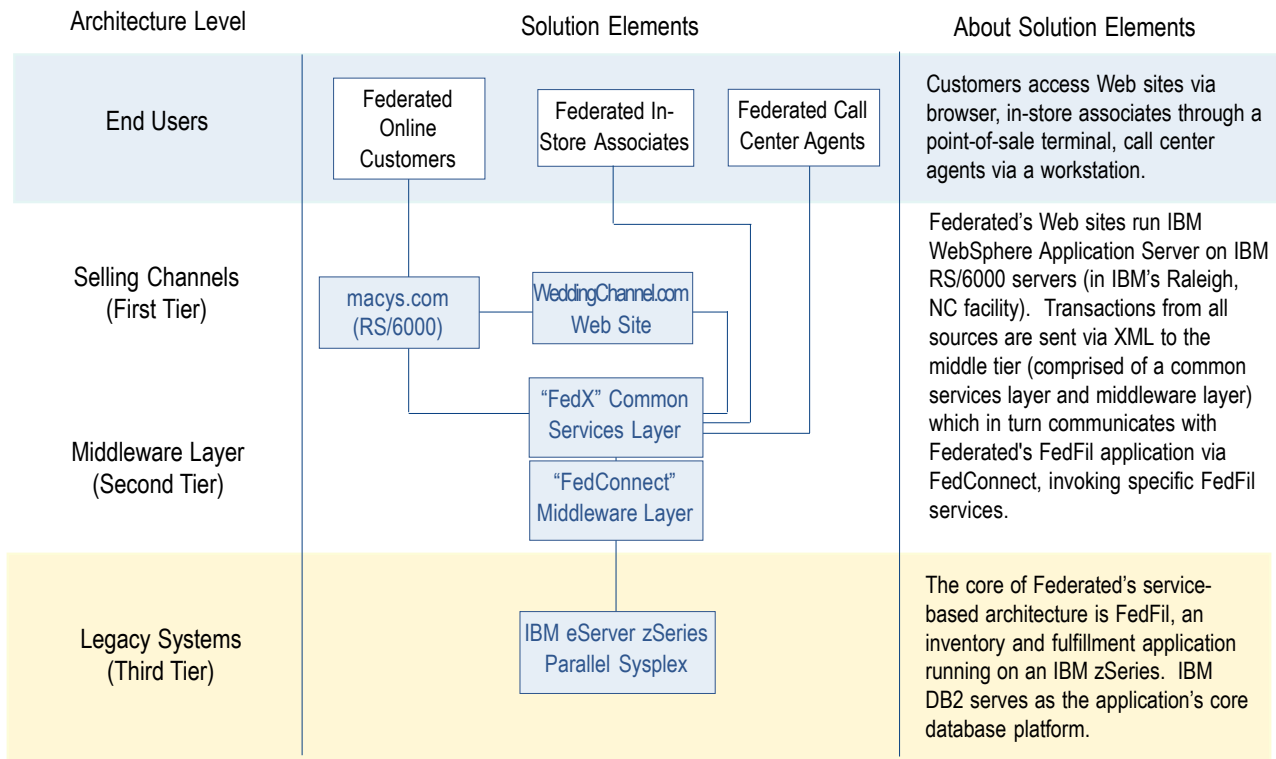
Users of the WeddingChannel.com site (e.g., a bride) can set up a wedding registry, while gift givers can access the registry information and buy merchandise online. Customers can access the WeddingChannel.com site either directly (www.weddingchannel.com) or through any of a number of Federated sites (macys.com, macysweddingchannel.com, bloomindalesweddingchannel.com, richsweddingchannel.com, lazarusweddingchannel.com, goldsmithsweddingchannel.com, burdinesweddingchannel.com and bonmarcheweddingchannel.com).

Federated's solution employs a service-based architecture that allows any of the front-end selling channel applications to interact with its backend systems. The solution employs a three-tiered architecture, comprised of the various Web sites (first tier), a common services and middleware layer (second tier), and legacy applications residing on an IBM eServer zSeries Parallel Sysplex (third tier). Federated's macys.com commerce site is hosted on IBM RS/6000 servers at IBM Global Services' Raleigh, NC hosting facility. The site employs a custom, Java-based commerce server application running on IBM WebSphere Application Server. The WeddingChannel.com's Web servers—also in the solution's first tier—are located at the company's headquarters in Los Angeles.

The middle tier of the architecture consists of two functional components. The first is a common services layer (known internally as FedX) whose function is to accept incoming XML documents from the first tier (e.g., macys.com), decode them and generate business logic (which may include requests for zSeries data). FedX resides on a small cluster of Windows NT servers at FSG's headquarters in Duluth, GA. The second component is a custom middleware program (known as FedConnect) that accepts and processes the requests for zSeries data received from the common services layer (i.e., FedX). FedConnect processes these requests through a Windows NT gateway farm (also located in Duluth) that controls access to the zSeries.

Federated's legacy applications, running on is an IBM eServer zSeries Parallel Sysplex located in IBM's Raleigh hosting facility, constitute the third tier of the

Basic Architecture of the Federated Solution



Source: Federated and IDC

architecture. The critical element within this third tier is FedFil, a new application (based on IBM DB2 and CICS) that performs inventory monitoring, price lookups and shipment reservations (for direct-to-customer shipments). As initially designed, FedFil allowed in-store associates (its primary users) to interface with the system via point-of-sale terminals or 3270 terminals. As part of its architecture redesign, Federated saw the opportunity to expand the role of FedFil—which had until then been functioning in the background—by allowing its sales channels to leverage its core functionality. As outlined below, the key to creating this common services layer was to establish linkages between the requests coming in from the various sales channels (e.g., macys.com) and specific FedFil applications.

The Solution in Action

In addition to supporting public users of its various e-commerce sites, Federated's service-based infrastructure also supports its internal users—call center agents and in-store associates. Call center transactions include telephone-based orders and customer inquiries, both of which are facilitated by the integration of agents' workstations with backend systems. For store-based transactions, the integration of point-of-sale terminals with backend systems enables the delivery of pricing and product description information. The basic data flows for transaction processing are essentially the same for all of Federated's sales channels. Once a transaction is initiated, the front-end application (macys.com, call center, etc.) sends an XML-based request to the middle tier. Upon receiving the request, the middle tier validates it and—based on internal information within the document—determines which specific business applications need to be launched for the transaction to proceed.

In addition to providing realtime inventory data for all locations through all channels, the centralized DB2 database also holds product description data used for signage, receipts, and point-of-sale display.

Upon launching the business application and determining that the transaction is valid, the middle tier program then sends a message to the zSeries, thus invoking one of several FedFil applications. In cases where a request does not require a response (i.e., asynchronous), the middle tier will accept the request and—upon validating the data in the request—deposit it into a WebSphere MQ message queue and then send it up to the zSeries. For online purchase transactions, Federated automatically delivers order confirmations to customers by taking data from the zSeries, depositing it in a WebSphere MQ message queue, and then sending it out via Lotus Notes. These confirmation messages are triggered each time the FedFil application registers a transaction. The FedFil application accesses Federated's centralized inventory file (housed in a DB2 database) on a 24 by 7 basis. In addition to providing realtime inventory data for all locations through all channels, the centralized DB2 database also holds product description data used for signage, receipts, and point-of-sale display.

The Project: Approach and Timetable

After being selected by Federated in early 1999, IBM Global Services assisted the company in the early development and architectural design of the solution. This was accomplished through several meetings involving Federated's IT staff and several senior IBM architects during which the team sought to establish a roadmap for the project. Key IBM Global Services organizations involved in the engagement included the Application Integration Middleware (AIM) group

Development Timetable for Federated's e-business Solution

	1Q99	2Q99	4Q99	2Q00	3Q00
Federated begins technology and provider selection process for its architecture reengineering initiative.	■				
Federated selects IBM to provide core technology and architecture planning/design services.		■			
Federated begins the development of the solution, starting with the common inventory and product description files and the integration of WeddingChannel.com.			■		
Federated completes the integration of the WeddingChannel.com site, begins integrating macys.com site.				■	
Federated completes the integration of the macys.com site.					■

Source: Federated and IDC

and personnel from the WebSphere Lab. At the end of the planning stage (late 1999), Federated's IT staff (which performed the majority of the development work) began the process of integrating the various channels and—in parallel—building the centralized database. After completing the integration of the WeddingChannel.com solution in early 2Q2000, the Federated team then integrated the macys.com site. The integration phase of the project was completed in 3Q2000.

Business Results

Federated's reengineering initiative has delivered major improvements in the functionality and flexibility of the company's architecture. Take the example of Federated's DB2 and zSeries-powered central inventory and product databases—the linchpin of the company's plan to enable realtime inventory monitoring on a 24 by 7 basis. By using IBM WebSphere MQ to queue inventory transactions, notes Garnto, Federated was able to implement a more useful and efficient inventory monitoring process. "Before, we had to take a CICS region down on the zSeries to validate inventory numbers," says Garnto. "With MQ in our solution we've gone from being fundamentally a batch-based environment to a realtime, 24-by-7 environment—which was exactly our goal." The most prominent business-level benefit arising from the addition of realtime inventory is tighter supply chain management—manifested by more efficient replenishment cycles and an improved in-stock position in its stores.

Federated's move to a service-based architecture has also produced a raft of benefits, spanning both the IT and business-level domains. Among IT-oriented

Overview of Federated's Business Results Achieved

Business Process Area/Issue	Nature of Benefit	Description or Metric
Site Volume	High Levels of Performance and Availability	Federated's B2C sites handle approximately 30 million hits from 260,000 unique visitors per day.
Inventory Management	Increased Timeliness of Data Tighter Supply Chain	IBM WebSphere MQ enabled Federated to deploy realtime 24 by 7 inventory monitoring, thus improving the efficiency of its replenishment processes.
IT Infrastructure	Increased Flexibility Improved Application Performance	Federated's service-based architecture improves overall application performance and makes it easier to support and integrate new channels.
Market Position	Increased Competitiveness	By facilitating a flexible, customer-centric multi-channel strategy, Federated's service-based architecture strengthens the company's overall competitive position.
Application Development / Application Support	Cost Reduction/Avoidance	Federated expects the use of reusable components within its architecture to reduce application development and support costs by as much as 50 percent.

Source: Federated and IDC

benefits, Garnto sees the improved flexibility of Federated's infrastructure as paramount. "By deploying a service-based architecture, we can now easily manage all of the service objects coming in from different devices and user interfaces," explains Garnto. "It allows us to take the superior maintainability, reliability and scalability of the zSeries, and to apply it to all the disparate devices seeking to access our legacy systems." Over time, Lewark expects this added flexibility to significantly improve the retailer's ability to quickly seize the business opportunities presented by new selling channels. "When new channels emerge—and we don't know what they're going to be—we can connect very fast to whatever evolves," adds Lewark. "We can now put a new channel up in days instead of months." Another benefit is the "dramatic" reductions in application development and support costs (by as much as 50 percent) that Federated's service-based architecture is expected to enable.

Case Epilogue

Going forward, Federated plans to adhere steadfastly to its customer-focused multi-channel strategy: namely, selling merchandise the way the customer wants to buy it. Because of its service-based architecture, says Lewark, Federated is now far better suited to meet the requirements that such a strategy

“The landscape is changing as to how people shop. By building a selling infrastructure that is second to none in the retail industry, Federated is well positioned to adapt to these changes.”

— Larry Lewark

entails—supporting new channels and, in some cases, new interfaces. “The landscape is changing as to how people shop,” says Lewark. “By building a selling infrastructure that is second to none in the retail industry, Federated is well positioned to adapt to these changes.” On the business side, Federated has begun to place an even stronger focus on improving the efficiency of key operational areas such as inventory and supply chain management. Here again, Federated expects to leverage its recent investments in centralized inventory and product information databases as it redesigns and streamlines processes in these areas. Lewark lauds IBM for the architecture planning and design assistance rendered early in the implementation, as well as the performance and reliability of the IBM technology underpinning its solution. “Our goal is to continually improve the way we use technology throughout the value chain to achieve our business goals,” says Lewark. “IBM has been a great partner to us and will continue to play an important role in our ongoing evolution as an e-business.”

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