IBM

e-business case studies

Mercedes-Benz U.S. International:
IBM technology helps MBUSI enhance the buying experience

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Putting e-business to Work

Contents

List of Figures

Overview

e-business Case Study: Mercedes-Benz U.S. International

Based in Vance, Alabama and employing 1,900 people, Mercedes-Benz U.S. International, Inc.(MBUSI) is a wholly-owned subsidiary of DaimlerChrysler AG (Stuttgart, Germany). Built between 1994 and 1996 at a cost of $300 million, MBUSI's 1.1 million square foot production facility for its upscale M-Class line represents state-of-the-art automobile manufacturing. This case study examines MBUSI's effort to create the first factory delivery program in the United States.

While MBUSI's Factory Delivery Reservation System (FDRS) was designed to emulate the success of a similar (and widely popular) program in Germany, its Web-based architecture sets it apart as unique and innovative. Built on the Lotus Domino platform and running on IBM Netfinity servers, the system has proven a technical triumph despite a series of daunting technical challenges, such as the need to seamlessly interface with MBUSI's ERP system. This case study manifests the value of IBM Global Services' experience in developing complex Web-based solutions in a multi-vendor environment.

Mercedes-Benz's e-business Solution

☐ Transform business processes

■ Build new applications

■ Run a scalable, available, secure environment

☐ Leverage knowledge and information

■ Primary e-business solution attribute
☐ Secondary e-business solution attribute

e-business Solution Profile

This case study profiles Mercedes-Benz U.S. International, Inc. (MBUSI), which developed an e-business solution known as the Factory Delivery Reservation System (FDRS) using Lotus Domino and IBM Netfinity servers. The FDRS allows buyers of the Mercedes-Benz M-Class (a line of high-end sport utility vehicles) to specify that they will take delivery of their new vehicle at the factory where it is produced, in Tuscaloosa, Alabama. While factory delivery has been a major program for Mercedes-Benz in Europe — with hundreds of vehicles delivered daily to the Mercedes-Benz European Customer Delivery Center in Sindelfingen, Germany — relatively few programs have been introduced in the United States, notes William Engelke, Assistant Manager, IT Systems at MBUSI. "We wanted to do on a small scale what our large plant in Germany is doing. Within the entire company, we are the only factory outside of Germany that is doing factory delivery."

Under the FDRS system, customers wishing to take factory delivery of their M-Class vehicles place their order at one of 335 Mercedes-Benz U.S. dealerships. Within a given dealership, an authorized employee enters the factory delivery order via a Web interface. Since the FDRS system is closely linked with MBUSI's vehicle production schedule, timing is an important dimension of the system's functionality. The first link in the chain of transactions is the actual purchase of the vehicle, at which point the Mercedes dealer orders the car through MBUSA (based in Montvale, New Jersey), whose role is to coordinate the distribution of vehicles to Mercedes-Benz dealerships across the United States. MBUSA then adds the order to its Baan Enterprise Resource Planning (ERP) system (recently installed by IBM Global Services), which then schedules the order for production.

Approximately three months before the scheduled date of production, a window of opportunity opens during which the dealer can schedule (via the Web) the exact date and time that the customer will arrive at the factory to take delivery of the new car. The FDRS system automatically computes this window, and shows the dealer several different options for delivery dates. In addition to scheduling delivery, the customer (through the dealer) can specify that various accessories be added to the car, and can request a factory tour.

The FDRS e-business solution was built using Lotus Domino, Lotus Enterprise Integrator and IBM Netfinity servers (the FDRS system also interfaces with an IBM S/390 Parallel Enterprise Server, Model 9672-R45 located in Montvale, NJ). Under the FDRS architecture, MBUSI operates two Domino servers — an IBM Netfinity 5500 and an IBM Netfinity 3000. The Netfinity 3000, acting as an "external Domino server," contains public information and also serves as the primary communication linkage for dealers. The Netfinity 5500, in its capacity as a "internal Domino server," sits behind a firewall and replicates databases through the firewall to the external server. This database replication, which is encrypted, represents the primary means by which the FDRS system achieves security.

> *"While we originally started using Domino as a document management solution, we soon found that it had many other practical uses, and we have since been expanding the Domino infrastructure in our company. Our very positive experiences with Domino made it an easy choice for us."*
>
> — William Engelke,
> Assistant Manager,
> IT Systems, MBUSI

In the back end of the FDRS system, an Oracle database updates the internal Domino server database with order information using Lotus Enterprise Integrator (formerly NotesPump, a server-based data distribution product that enables the exchange of data between Lotus Domino and a large number of host and relational applications). Examples of data replicated to the internal Domino server include lists of valid dealers and lists of order numbers. When a dealer makes a reservation using the FDRS system, the data is first stored on the external Domino server, after which it is replicated to the internal Domino server, and then replicated to the back-end database via Lotus Enterprise Integrator. While replication between the Notes servers occurs every 15 minutes, the exchange with the back-end database occurs three times per day.

The back-end database is also linked via a T1 line to an IBM S/390 located at MBUSA headquarters in Montvale, NJ, which manages the flow of vehicles to Mercedes dealers across the United States. Known as VISTA, the mainframe-based system receives new vehicle orders (as opposed to factory delivery reservation requests) from individual dealers, which are then sent to MBUSI's Baan system as well as to the back-end database. The vehicle ordering and factory reservation data are reconciled when the back-end database uploads the data to the internal Domino server, thus bringing production and delivery information into accord.
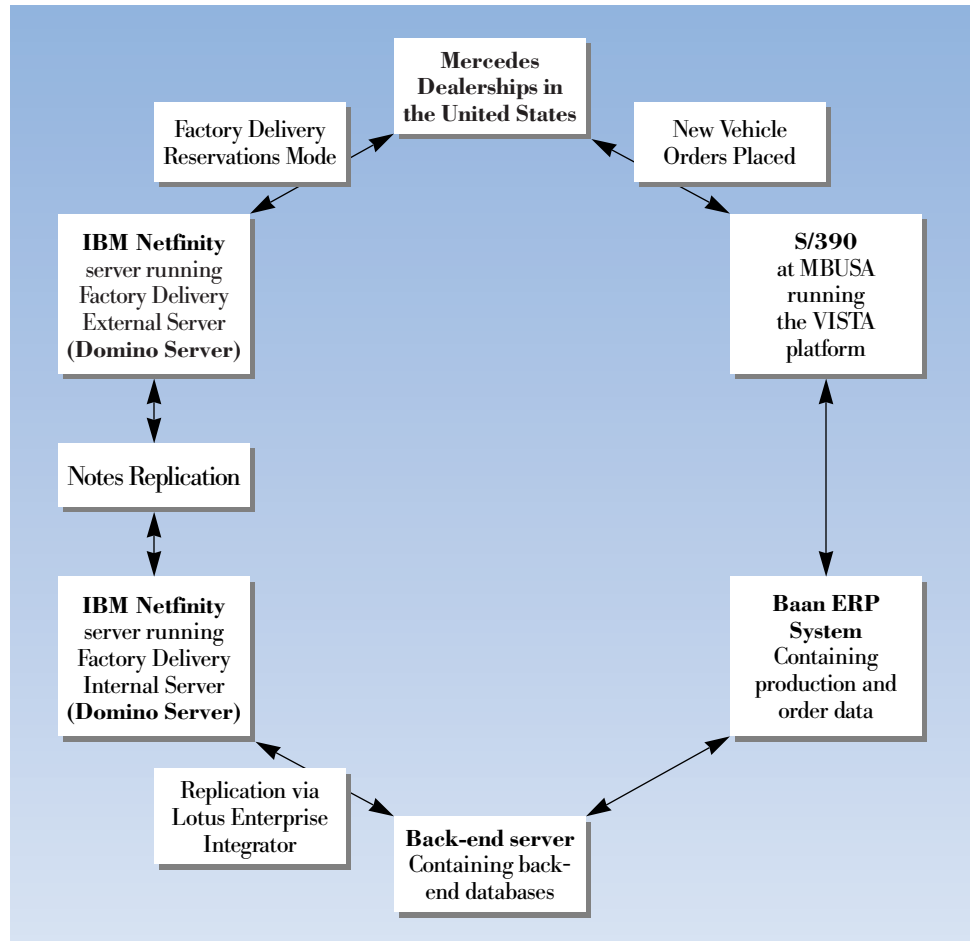
Source: Mercedes-Benz U.S. International, Inc.

Figure 1. Basic System Architecture of the Mercedes-Benz e-business Solution

Planning and Decision Environment

According to Engelke, the initial idea of developing a factory delivery program was initiated by MBUSI's president, who wanted to be the first international automobile manufacturer in the United States to deliver finished vehicles to customers at the factory. From the start, however, there was doubt as to the feasibility of the project, given the technical and logistical complexity that such a program would entail. "When the idea of a factory delivery system was first proposed, some of our executives didn't feel it was possible," says Engelke. "They felt that a computer-based solution would be really problematical." Despite some lingering doubts among business-level executives, the question of how to build the system was eventually posed to Engelke's team in the IT department. "Our initial thought was that it could be done through an Internet-based solution," notes Engelke. "Once we communicated this, the president's office then issued the directive that we go and try to do it. So at that point, it was really a question of figuring out how to best accomplish it."

Engelke points out that from the outset, he and his team had a relatively clear idea of how the solution would work, but would need help in fleshing out the details. Despite some ambiguities about the proposed system's parameters, Engelke decided early on that the system would be built using the Lotus Notes and Domino platform. While Engelke attributes much of his favorable inclination toward Notes and Domino to MBUSI's heavy usage of IBM products and services, he further emphasizes his positive experience with the specific products themselves. "While we originally started using Domino as a document management solution, we soon found that it had many other practical uses, and we have since been expanding the Domino infrastructure in our company," says Engelke. "Our very positive experiences with Domino made it an easy choice for us."

In selecting IBM Global Services as MBUSI's solution provider, Engelke cites the importance of leveraging IBM's proven expertise in integrating complex, multi-vendor platforms as the key factor. "It was clear to us from the start that the FDRS platform would require close connection between Domino and our Baan ERP system," says Engelke. "When we combined the fact that IBM was our outsourcing partner — and built our ERP system — with their expertise on the Domino platform, it became fairly obvious that they were best positioned to build the advanced system that we required."

Featured IBM Technology

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*www.ibm.com/services*

Goals and Business Drivers

MBUSI's goals in developing its factory delivery program were focused in two main areas: strengthening the Mercedes-Benz brand and enriching the experiences of Mercedes-Benz customers. "One of our most fundamental goals in developing the system was to strengthen and market the Mercedes-Benz brand in the United States," says Engelke. "The fact that we would be one of the first car manufacturers in the United States to have a factory delivery program would be seen as a very positive thing in this regard."

On the customer side, Engelke sees the FDRS program as yet another example of why Mercedes-Benz customers pay a premium price for their automobiles. "The factory delivery option give Mercedes-Benz customers something that they do not get from other automobile manufacturers," says Engelke, "which is why we think the program will resonate with our customers. We think that having the factory delivery program available to Mercedes customers adds to the overall experience of the customer."
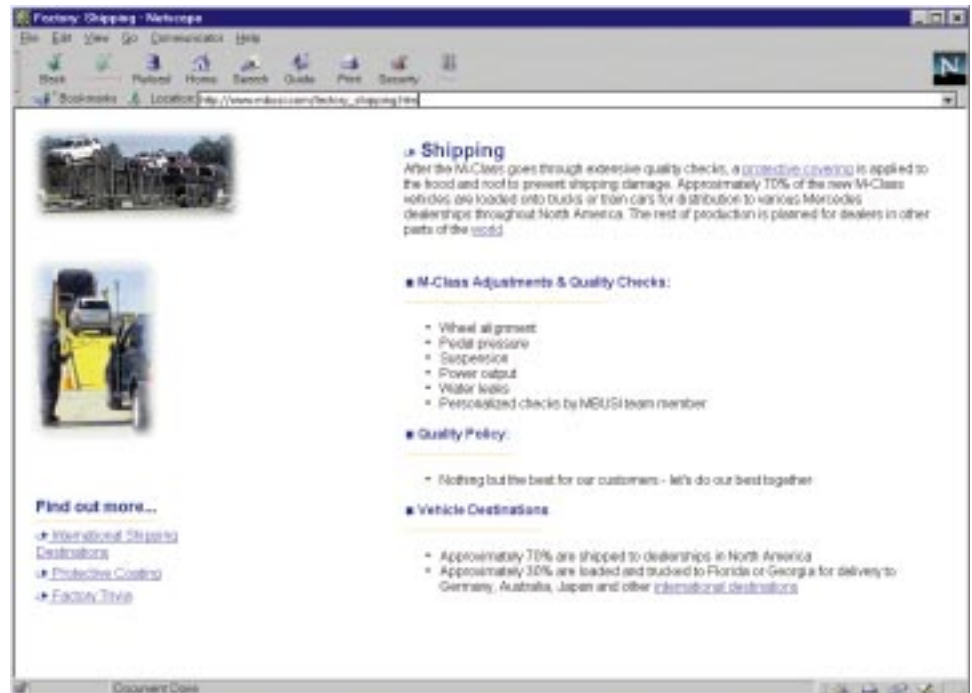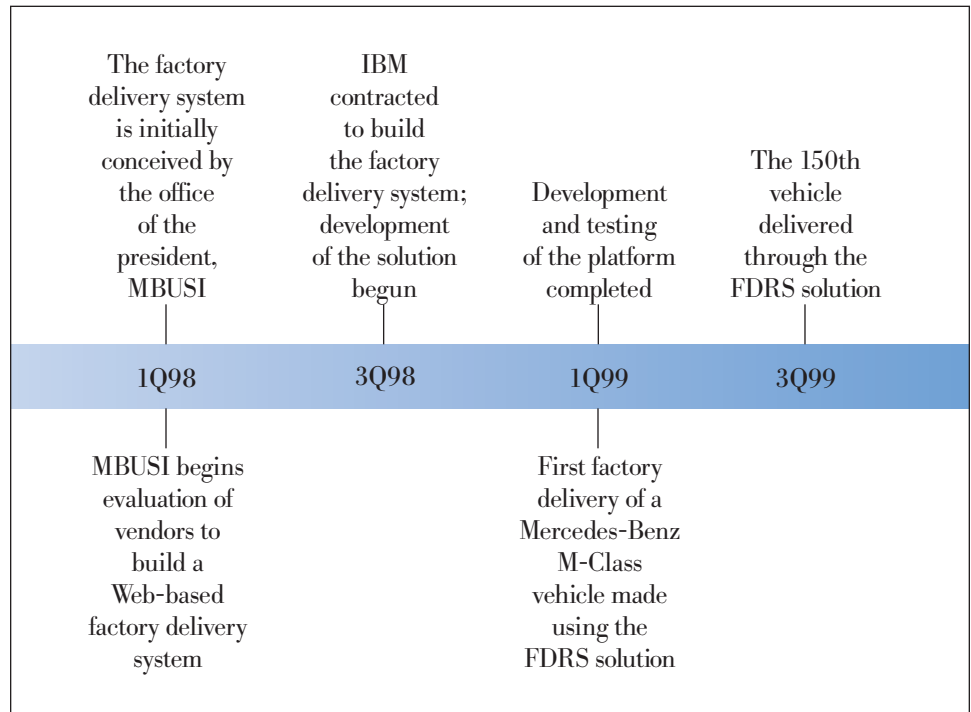
Implementation Timetable and Strategy

The origins of the FDRS solution can be traced to the first quarter of 1998, when Mercedes-Benz leadership proposed the concept. Andreas Renschler, then president of MBUSI, strongly supported and encouraged the idea. MBUSI contracted with IBM in the third quarter of 1998, and began implementing the solution soon after. After approximately five months of intensive development and testing, the FDRS solution became operational in the first quarter of 1999. The development team consisted of IBM Global Service specialists and IBM e-commerce developers working in close collaboration with MBUSI.

As mentioned, Engelke and his team approached the project with a fairly clear set of specifications, but relied heavily on IBM to transform the concept into a working e-business solution. Indeed, MBUSI wrote the functional specifications of the FDRS platform, while the IBM team was responsible for writing the detailed specifications and the code itself. As Engelke points out, one of the most challenging aspects of the MBUSI implementation was the complexity of the Lotus and Domino scripts required to bring together all the information from disparate systems. "There was a substantial amount of very complex coding involved in the FDRS solution," says Engelke. "This application involves a lot more than having our dealers fill out a form and submitting it. There are many things the servers have to do for the system to function properly, such as looking at calendars and production schedules. We built a solution with some very advanced communication linkages."

> *"IBM's expertise and experience were invaluable in helping us to circumvent potential speed-bumps like this."*
>
> *— William Engelke*

As the IBM team moved deeper into the implementation stage, a number of technical issues — related to the solution's complexity — became apparent. According to Engelke, the synchronization of data between the Notes databases and the back-end databases proved much more difficult than expected. "Because of issues related to the different timing schemes of the two systems, we were getting some discrepancies in the data," says Engelke. "The fundamental problem was that our back-end activities employ both real-time and batch processing, while the Domino replication is near-real-time. Also, to get the highest possible performance, the Domino database is an optimized subset of the enormous ERP table set. When you have that kind of a scenario, it becomes very tricky to get all of the rules associated with replication right." Ultimately, the team achieved calibration of the two "sides" of the solution by focusing on issues of timing, error detection schemes, and alerts. "IBM's expertise and experience were invaluable in helping us to circumvent potential speedbumps like this," notes Engelke.

The factory delivery system is initially conceived by the office of the president, MBUSI	IBM contracted to build the factory delivery system; development of the solution begun	Development and testing of the platform completed	The 150th vehicle delivered through the FDRS solution
1Q98	3Q98	1Q99	3Q99
MBUSI begins evaluation of vendors to build a Web-based factory delivery system		First factory delivery of a Mercedes-Benz M-Class vehicle made using the FDRS solution	

Source: Mercedes-Benz U.S. International, Inc.

Figure 2. Implementation Timetable for the Mercedes-Benz e-business Solution

Return on Investment

MBUSI views its return on investment for the FDRS system almost exclusively in terms of increased customer satisfaction. "We believe that the marketing and customer satisfaction aspects of the program probably outweigh the significance of more traditional cost-based benefits," notes Engelke. "That's really what we're focusing on." Engelke believes that for customers, the primary benefit is the ability to receive a factory delivery experience — which includes a factory tour and a ride on the off-road course — at a very low cost. He further points out that the consumer's cost of a factory delivery solution that did not employ Web technology such as Lotus Domino would be "significantly" higher than its present cost of $600. The reason: "Running a more paper-based factory delivery system would compel MBUSI to create an organization to support administration of the service," Engelke says. "The annual cost of such an operation could easily reach a quarter million dollars. By building a low-cost, flexible solution on the Domino platform, we've been able to get around this entirely."

Engelke also sees the strategic marketing benefits of the FDRS system as highly significant, since the program reinforces the image of Mercedes-Benz as a premium brand. "Any positive effect that the FDRS system has on the Mercedes-Benz brand will be hard to detect using traditional metrics," says Engelke. "However, we believe that for something like brand equity, measures like that don't really apply. We see our decision to introduce the first factory delivery program in the United States as evidence that we consider our customers' satisfaction — and the richness of their overall experience — to be of utmost importance."

"Running a more paper-based factory delivery system would compel MBUSI to create an organization to support administration of the service. The annual cost of such an operation could easily reach a quarter million dollars. By building a low-cost, flexible solution on the Domino platform, we've been able to get around this entirely."

— William Engelke

Engelke sees a general improvement in the image of Alabama (where the factory is located) as another – albeit broader – intangible benefit. Indeed, MBUSI actively promotes the ability to view various tourist sites in Alabama after picking up their M-Class vehicle at the factory as one of the key benefits of the program for consumers. "We market the program as a complete package of the Alabama experience, including the Space and Rocket Center, the Gulf Shore beaches, the Robert Trent Jones Golf Trail, and other attractions," notes Engelke. "We believe that the factory delivery program says something very positive about the State of Alabama," he adds.

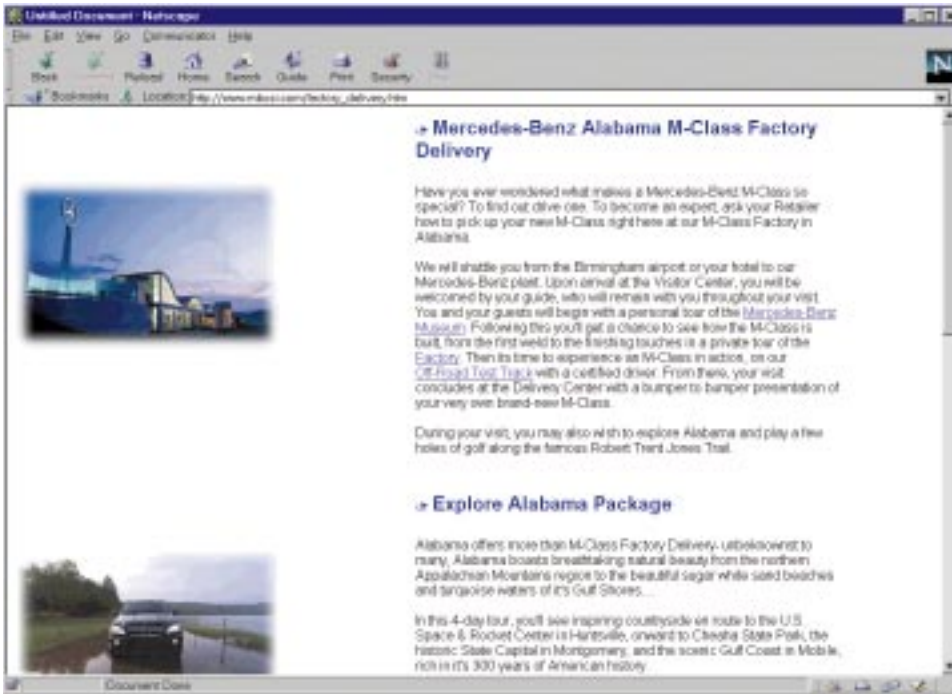| Overall Benefits	
Area	**Benefit**
Strategic Marketing Benefits	Customer satisfaction and brand loyalty are expected to be enhanced by the FDRS program, by virtue of the fact that it enriches the Mercedes customers' experience The FDRS program strengthens the Mercedes-Benz brand image (*e.g.,* premium) in the United States
Cost Savings	Development of a Web-based solution will enable MBUSI to offer the factory delivery program at a substantially lower cost, due to its low reliance on administrative personnel
Regional Economic Development	"Package marketing" of the FDRS program, along with tourist sites, enhances the image of Alabama as a tourism destination.
DaimlerChrysler AG Organizational	The creation of a similar – albeit smaller – factory delivery system to the European Customer Delivery Center in Sindelfingen, Germany reflects favorably on the MBUSI business unit.

Source: Mercedes-Benz U.S. International, Inc.

Figure 3. Benefits of the Mercedes-Benz e-business Solution

Implementation Issues/Lessons Learned

Since rolling out the FDRS platform in early 1999, one of the key implementation issues faced by MBUSI has been synchronization of FDRS Domino databases with back-end (*i.e.*, ERP and associated) systems. "You need to make sure that the information on the Web-based system is correct, and that updates on one side of the system flow appropriately to the other," Engelke says. "Proper planning of update sequences is important."

Engelke also points to the importance of change control. Specifically, once a Web-based system is real-time linked to a back-end system, software changes on either side may affect the other. MBUSI worked closely with IBM Global Services in this area. "You must achieve a balance between the fast reaction times typical of Web-based software development and maintenance which occurs in 'Internet time,' with the necessity of maintaining system stability," notes Engelke. "IBM provided a disciplined approach which lets us enhance our Web site quickly, while avoiding the possibility of inadvertently creating problems with site functionality or data."

Future Plans

MBUSI's most immediate plan for the FDRS solution is to further leverage its platform by expanding the range of services offered over it. "We've already built a very advanced platform with which we can communicate with our dealers," notes Engelke. "We have also started to use the core of the FDRS system to create communication links to our suppliers, through which we deliver feedback on the quality of the supplies that they have been sending to Mercedes." The system recognizes dealers and suppliers based on their user-ID and password to route them into the appropriate portions of the system.

Moreover, MBUSI has also discussed the possibility of extending the FDRS platform to include transactional applications, such as the ability to order materials and to check order status via the Web. "Using our Web-based platform to conduct transactions with some of our major suppliers would be much more cost-effective than the EDI system we are using now," says Engelke. "We could really optimize costs by shifting to a Web-based platform for these types of activities."

As Engelke looks forward to the next stage of the FDRS evolution, he also looks back favorably on his choice of IBM Global Services as a solutions partner. "We're very confident that our choice of IBM allowed us to develop an optimal solution to fit our needs," Engelke concludes. "IBM has been very active working with the auto industry to develop e-commerce, and to develop state-of-the-art approaches toward automotive business problems. In fact, the team that built our solution has just completed a very large dealer network for another transplant automobile manufacturer that connects all their dealers together. The fact that IBM has a lot of experience in the auto industry means we don't have to teach them about the importance of timely delivery of information. They already know."

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