

BUILDING A SUCCESSFUL E-BUSINESS: The

The company famous for transporting goods from anywhere to anywhere around the globe has used its impressive information infrastructure to expand into a channel logistics business.

ALI F. FARHOOMAND,
PAULINE S.P. NG, AND
WILLIAM L. CONLEY

FedEx Story

Building a successful e-business essentially involves a shift in the concept of the firm, in which organizational boundaries become less demarcated. In the new business order, market participants become an extension of an integrated business Web, and forge alliances to compete collectively. The transition from a conventional to an e-business is a daunting task requiring multiparty coordination and inter- and intraorganizational integration of business processes and systems.

To achieve such seamless integration, companies must set up the necessary information infrastructure, which entails building databases to feed the applications used by e-business participants. Such infrastructure should enable the integration of front- and back-end processes of a firm and its customers, suppliers, distributors, and business partners. Companies must also redesign their business processes to encompass the whole business Web, since the Internet facilitates outsourcing of non-core business processes. Integration also requires aligning organizational structure with systems and processes that cut across all functions in and outside of the firm. The overriding objective of such alignment is to discern how market participants can collectively utilize the knowledge base of the business Web to better understand market requirements and satisfy customer needs. Such collaborative generation, usage, and management of knowledge becomes the centerpiece of a company's brand equity.

In this article we discuss FedEx Corporation—the largest express transportation company in the world, with about 30% of the market share and annual revenue in excess of \$19 billion—to illustrate how a company can successfully align its information systems with its business processes and organization structure to leverage the full potential of doing business on the Internet.

FedEx has strategically positioned itself to provide global physical transportation, coupled with information intelligence. It has established a sound information infrastructure that handles more than 100 million transactions per day. This scalable e-business infrastructure supports FedEx's core business in two ways: it allows for continual improvement of internal operations, and it anticipates and satisfies customer needs for integrated supply chain services.

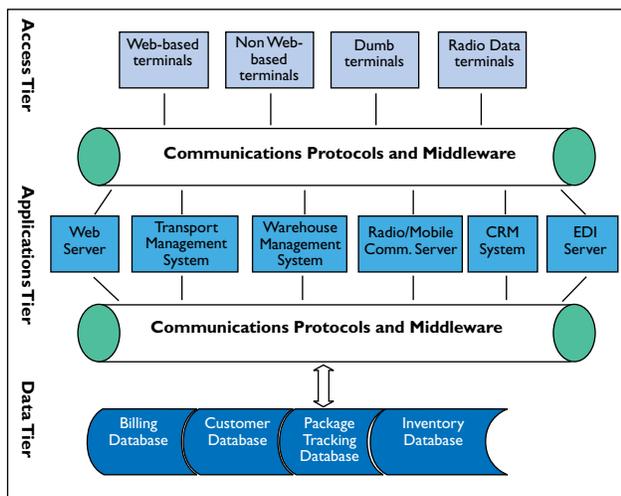


Figure 1.
FedEx's three-tier architecture.

Like most companies, FedEx's information systems and networks were initially developed to improve internal operational efficiencies. FedEx pioneered the hub-and-spokes concept later adopted by other carriers, and the combination of centralized information systems and the hub-based distribution model gave FedEx a competitive advantage. The transportation logistics information system, called the Customer, Operations, Service, Master Online System (COSMOS) was the first centralized computer system in the industry used to track packages. This system works in concert with the Global Operations Control Center (GOC), which houses huge wall-screens that track weather patterns and the real-time movement of FedEx trucks and aircraft.

Through various front-end applications, package data is fed to the back-end COSMOS system and retrieved by customers in the same way. The linking of back- and front-end processes has been made pos-

sible through a three-tier IT architecture illustrated in Figure 1. The database tier, located in Memphis, enables any company department to access and compile data and reports needed to run operations. It consists of various databases residing in a mainframe, and a data warehouse program made up of systems applications, such as billing, customer records, and package tracking.

The applications tier consists of the distributed application servers of wide-area networks, which have a total capacity of 16 billion bits per second. The application servers, which perform functions such as transportation and warehouse management based on customer requests, either retrieve data from or write to the data repositories residing in the mainframe. They are distributed among countries within a region to serve regional business operations such as Europe and Asia Pacific, and are accessed through intercountry connections via international leased lines (IPLC).

The access tier encompasses the media through which customers and remote FedEx employees can access the FedEx infrastructure to use server applications and retrieve real-time information from various databases. Access is made possible through four access media: Web-based, non-Web-based, dumb terminals, and radio data terminals.

The communication protocols between each layer allow for message exchanges between systems. The Microsoft Message Queuing Services, for example, enable applications running at different times to communicate across heterogeneous networks and systems, and allow multiple ways of sending and receiving messages. The overall architecture also relies on a set of middleware that glues together various interenterprise applications.

FedEx's information infrastructure has enabled it to redesign its business processes and those of its customers. It permits FedEx to look beyond sequential and linear operational modes to discover innovative business relationships and processes that create competitive advantages for FedEx and its customers. However, integration is fundamental to establishing such relationships.

Integrating Business Processes

Over the years, FedEx has established a corporate culture based on delivering quality customer service, cultivating a "whatever it takes" attitude that filters down from the top. The proliferation of the Internet gave FedEx the opportunity to build one-to-one customer relationships, essentially taking service levels to new heights. FedEx's information infrastructure allows it to extend its services beyond pure transportation to address other supply chain service

needs of customers. It has allowed FedEx to extend beyond giving customer access to real-time data, to become more involved in customers' internal processes.

Today, FedEx markets its front-end services under the banner of FedEx eShipping Tools. These stand alone shipping and hardware-based tools connect FedEx with over two million customers. Web- and

returns management system).

Through its sophisticated information infrastructure, FedEx is pulling in, and in many cases locking in, customers with an unprecedented level of technological integration. By backtracking along the supply chain to raw materials, FedEx has identified points where it can provide management services, and has developed expertise in applying technology to shorten

the order-to-delivery cycle. Its services include transportation, order processing and distribution center operations, fulfillment, inventory control, purchasing, production, and customer and sales services. The ability to interconnect and distribute information to all supply chain players has become the focus of FedEx's strategy. Through its information infrastructure, FedEx can now add value to other companies by providing better logistics management services (see sidebar).

Tighter supply chain management is no longer viewed as a strategic advantage but a competitive imperative, with businesses interested in any process, such as proof of delivery and payment, that can be integrated and automatically triggered, rather than being separately invoked. By integrating its services within the selling and supply chains of its customers, FedEx has increased

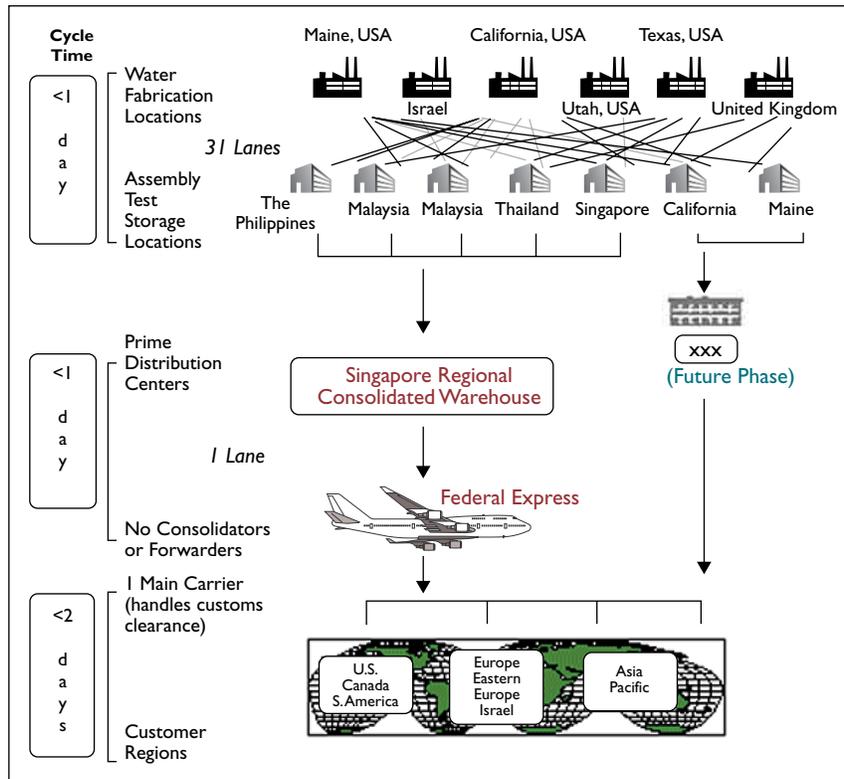


Figure 2. The Direct Shipping Program for National Semiconductor.

customer loyalty, raised customer switching costs, and raised the competitor barriers to entry. No longer viewed as simply a transportation business, FedEx has used its information infrastructure to transform itself into a recognized channel logistics business.

DOS-based shipping systems allow customers to interact with FedEx's extranet, download software and shipping information, track packages, manage invoicing data, and integrate their accounts payable application program with FedEx shipping transaction reporting.

In addition to e-Shipping Tools, FedEx also provides integrated solutions to address the entire customer selling and supply chains. Its eCommerce Solutions allow businesses to integrate FedEx's transportation and information systems seamlessly into their own back-end operations. These solutions include FedEx PowerShip MC (a multicarrier electronic shipping system), FedEx PowerShip (a hardware/software system providing fully synchronized functions and high reliability performance, while allowing an average of eight transactions per second), FedEx ShipAPI (an Internet-based application that allows customization, eliminating redundant programming), and FedEx NetReturn (an Internet-based

Aligning Structure with Systems and Processes

Recognizing that customers want to deal with one company to meet their transportation and logistics needs, FedEx renamed itself the FedEx Corporation in early 2000, and extended the FedEx brand to four of its five subsidiary companies, to provide customers with an integrated set of business solutions. This branding strategy allowed the company to capitalize on one of its greatest assets, the well-known FedEx brand name.

Additional reorganizations provided a single point

National Semiconductor

In 1992, National Semiconductor (NatSemi) formed an alliance with FedEx whereby FedEx acted as NatSemi's logistics department. NatSemi wanted to reduce its order cycle time from an average of 16 days to three, its distribution costs from 3% to less than 2% of sales, and its 800-plus staff to 180 people. In addition to these challenges, the company faced several operational problems. Its airlift capacity could not keep pace with demand; its warehouse operations and supplier deliverables suffered from inconsistent quality; and its shipping coordination and tracking, involving numerous consolidators and forwarders, was complex and inefficient.

With the alliance that secured FedEx as the main carrier handling all shipping and customs clearance tasks, FedEx consolidated NatSemi's three prime distribution centers outside of the U.S.—in the U.K., Japan, and Hong Kong—into one Singapore-based global distribution center, which ships to all locations outside the U.S. (see Figure 2).

Although the number of wafer fabrication locations and assembly test storage locations remained unchanged, NatSemi's order cycle time was reduced to approximately three days, with corresponding savings in staffing and distribution costs. FedEx's direct shipping program established tight IT links between FedEx's distribution warehouse in Singapore and NatSemi's information infrastructure. NatSemi's order processing application, which ran on an IBM mainframe in Santa Clara, Calif., sent daily order batches through a dedicated line to FedEx's Tandem Computers mainframe in Memphis. Once FedEx received an order, it took over the order management-to-delivery process. The FedEx system sent the order via IPLC to Singapore where FedEx picked, packed, and shipped direct to the customer, and sent NatSemi an execution record. Throughout the supply chain process, NatSemi and its customers had immediate access to order status information, through the NatSemi and FedEx Web sites. By integrating information systems and processes, NatSemi eliminated seven regional warehouses in Asia, Europe, and the U.S. **C**

of access to sales, customer services, billing and automation systems through the formation of another subsidiary called FedEx Corporate Services. Previously, these services were performed separately by the five subsidiary companies. Knowledge genera-

tion and use is at the heart of this subsidiary, which pools together the marketing, sales, customer services, information technology, and e-commerce resources of the group.

Each operating company acts independently to meet customers' specific logistics needs, but collectively provides a range of business solutions. This collective synergy of solutions, built on an integrated knowledge base, gives FedEx its distinct competitive advantage. The organization aims to use its rich knowledge base, made possible through its integrated information infrastructure, as the major pillar of its brand equity, to help businesses of all sizes achieve their shipping, logistics, supply chain, and e-business objectives.

The reorganization opens up the opportunity for knowledge integration between business units within the group and allows FedEx to exploit its brand equity as well as its customer equity. This bundling strategy makes FedEx more convenient and accessible to customers, in that regardless of the choice of FedEx services, customers benefit from an integrated information platform. Whether customers contact FedEx in person, by phone, or online, they are routed to one "touch point." Front line staff has access to all previous records kept in the company's central databases on each existing customer. By accessing this information, staff members can customize customer service. They can also suggest integrated supply chain and e-commerce solutions that cross-sell services and choreograph customer solutions. Customers can access up-to-the-minute information on package/consignment delivery status regardless of the mode of transportation, the type of service chosen, and the geographic location.

Conclusion

FedEx's experience highlights the importance of a shared information infrastructure in bringing together interenterprise processes that characterize any successful e-business. Such infrastructure enables the flow of information within and across corporate boundaries in ways unimaginable prior to the emergence of the Web. Traditionally, each company along the supply or demand chain performed a certain function sequentially, thus curtailing synchronization of information flow across the network of market participants. In the new business order, however, companies must design their information infrastructure so all market players can participate, cooperate, and collaborate simultaneously in the business Web.

The hub-based infrastructure that allows synchronous and non-linear information flow draws its

strength from the unified database of information and knowledge on all parties connected to the business Web [1]. Each node in the Web that connects a participant can be viewed as a window for accessing database information. At the same time, the level of access and the interactions with the repository can be pre-defined according to the role of each participant.

For companies such as FedEx, integrating applications entails combining legacy and newer standalone applications developed in-house or by business partners. For most companies, however, integration will be a long and difficult challenge, particularly if legacy systems and newer applications have not been designed to work together. Companies must realign their organizational structure to take advantage of the shared information infrastructure. Such realignment should entail the sharing of the knowledge base generated by the whole business Web, within and across a company's business units and departments. Business units should no longer operate as standalone silos.

The emerging hub of information generated by the business Web empowers employees. Having full knowledge of market needs and possible solutions that the business Web can provide puts the company in an advantageous position to serve customers proactively. Companies such as FedEx are making themselves an increasingly indispensable part of their customers' businesses. By offering integrated solutions that draw upon business Web resources, companies can leverage and build upon their brand equity. No longer are brands simply associated with the value of a product or a service that a company can provide. Rather, as is the case with FedEx, brands are shaped and governed by the richness of the shared knowledge base generated in the business Web. ■

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ALI F. FARHOOMAND (ali@business.hku.hk) is an associate professor in the School of Business at the University of Hong Kong.
PAULINE S.P. NG (pspng@business.hku.hk) is a research officer in the School of Business at the University of Hong Kong.
WILLIAM L. CONLEY (wlconley@hotmail.com) is vice president of Supply Chain Services at FedEx Corporation, Inc.

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