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CASE STUDY

E-Business at Delta Air Lines: Extracting Value from a Multi-Faceted Approach

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Title: **E-Business at Delta Air Lines: Extracting Value from a Multi-Faceted Approach**

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Abstract: Delta Air Lines entered e-business with much aplomb when it agreed to provide Priceline.com with its excess inventory (seats on planes) in exchange for a 10% equity position. When Priceline stock soared, Delta sold part of its holding for \$750 million. Delta management recognized that e-business offered many different business opportunities and has identified ways to lower costs (e.g. selling tickets on line), increase revenues (e.g. selling excess inventory through Priceline), and experiment with new business concepts (developing MYOBTravel.com for small and medium-sized businesses). This case study describes Delta's e-business initiatives, noting the organizational structure used to aggressively pursue new opportunities. Of particular note is the role of the IT transformation that positioned Delta for the opportunities e-business created. Seeking to avert a Y2K crisis, Delta invested \$1 billion in its IT infrastructure and developed a publish-and-subscribe environment to support a cross-functional customer-orientation.

Key words: e-business, IT infrastructure, IT architecture, IT-business relationships



**Massachusetts Institute of Technology
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E-BUSINESS at DELTA AIR LINES:
Extracting Value from a Multi-Faceted Approach

In late 2000 Leo Mullin, CEO of Delta Air Lines, reflected on the importance of e-business to Delta:

E-business is in many respects the answer to our prayers with respect to success in the future. We are an older economy business, and we have a cost structure as a transportation company that isn't envied by very many people. We really have to think about entirely new ways of doing things. I think that the arrival of e-commerce at this time has been a godsend.

Over the years Delta had accumulated a number of what management referred to as “hidden assets”—assets that did not appear on the balance sheet—such as brand recognition, a large customer base, and purchasing power. Delta expected its e-business initiatives to support its core business by driving value from its hidden assets. In addition, Leo Mullin believed that information technology in general, and the Internet in particular, offered opportunities to lower distribution costs, increase employee productivity, and improve customer service.

Background

In 2000, Delta Air Lines was the United States' third largest airline in terms of revenues and passenger miles, and the largest U.S. airline in terms of number

of departures and passengers enplaned. Revenues in 2000 neared \$16 billion, and Delta reported net income of over \$1 billion for the second consecutive year. (See Exhibit 1 for Summary Financial Statements.) Based in Atlanta, Georgia, the firm had 84,000 employees, who each year flew 117 million customers to 45 states within the U.S. and 44 cities in 28 countries throughout the world. With its Sky Team¹ alliance partners, Delta's network covered 118 cities in 47 countries.

When Leo Mullin became CEO in 1997, Delta rated last on all three of the key customer metrics in the airline industry: on-time arrivals, customer complaints to the DOT, and baggage handling statistics. The organization was demoralized, and analysts regarded Delta as a laggard internationally. In addition, Delta's information technology, which had been outsourced several years earlier, was seriously outdated and facing a Y2K crisis. Three years later Delta was the only airline to score in the top three on all three customer metrics, employee surveys indicated that morale at Delta ranked in the top quartile among US companies, and Delta belonged to what was generally considered to be the second best international airline alliance. Delta had

¹ Sky Team members included Air France, Aeromexico, Korean Air, and CSA (Czech Airlines).

This case was prepared by Dr. Jeanne W. Ross of the Center for Information Systems Research at the MIT Sloan School of Management. This case is for the purpose of management education, rather than illustrating or endorsing any particular management practice. The case is part of a research project on e-business migration conducted jointly by Melbourne Business School and the MIT Sloan School. Support for the project from PricewaterhouseCoopers LLP is gratefully acknowledged. This case may be reproduced free of charge for educational purposes provided the copyright statement appears on the copy.

rebuilt its information technology infrastructure and was gaining recognition as a high-technology firm. Its information technology subsidiary, Delta Technology, won the Computerworld Smithsonian Award for Technology Innovation in 2000. In July 2000, Leo Mullin was named by *Forbes* magazine as a member of “The E-Gang,” twelve executives who were “forcing the web to grow up.”²

Delta had actually been “lured” into e-business by Priceline, a dot-com start-up whose value proposition was that it would sell airlines’ excess inventory (seats on flights) at discounted prices to persons for whom price would determine whether or not they would fly (www.priceline.com). Delta marketing executives were initially skeptical of the idea of selling tickets through Priceline, but the chief financial officer supported the concept and Leo Mullin was persuaded of the inevitability of the Priceline model as a distribution channel. As the first major airline to agree to sell tickets through Priceline, Delta received a 10% equity stake. When Priceline stock later soared, Delta cashed in part of its equity holding and banked more than \$750 million:

What Priceline really represented was taking inventory that would not otherwise be sold and placing it in the hands of another supplier. It goes out there and you don't know exactly what happens to it, and what it's going to do to your business. You wonder if you have created a channel of discount sales of your product that could substantially cause your product to ultimately be priced lower. It's a classic question of disintermediation. I felt that there were a lot of safeguards that would keep that from happening, and oh, by the way, it was going to happen anyway. And, of course, that's what happened. Now there are a lot of companies out there with attributes that are similar to Priceline. So it was the right call. We had the right vision as to how this whole industry was going to change in this respect, but by being first, clearly we have gotten much more than anybody else has out of this.

—Leo Mullin, Chairman and CEO

² Corcoran, Elizabeth, “The E-Gang,” *Forbes*, July 24, 2000, pp 145-172.

The Priceline deal created a model for e-business initiatives at Delta. For example, when management was looking for a vendor to provide wireless services, it partnered with Softnet Zone and arranged for an equity stake in that firm. Delta also received equity in People PC as part of an arrangement to deliver personal computers to its employees. Management believed that partnering with start-ups was the best way to marry the speed and agility of dotcom companies with Delta’s reputation and customer reach:

We're not going to go out into the marketplace to do deals and partner with people just to get equity value. That is not what we're all about. What we're all about is partnering with thought leaders and with companies in the new economy that provide us with opportunities to improve the core of Delta Airlines. In doing so, we take advantage of the fact that we have these hidden assets, such as our brand, to drive some potential equity value. But the value to the core is paramount.

—Vince Caminiti, Senior Vice President,
E-Business

B2C Initiatives

Following the Priceline deal, Delta actively pursued three types of e-business initiatives that management believed would be important to the firm’s competitiveness: B2C, B2B, and B2E. For airlines, the most immediate impact of e-business was on the sale and distribution of airline tickets. Travel agents had long been the airlines’ dominant ticket distribution channel, and as recently as 1997 had been responsible for approximately 85% of Delta’s ticket sales. By 2000, almost a quarter of Delta’s ticket sales were completed online, while the travel agent’s share had shrunk to 60%. Travel agents would continue to provide an important sales channel, but Delta set a target of selling half of its seats online by 2003. The cost savings would be significant. Tickets sold by travel agents cost Delta approximately \$34 each, whereas a ticket sold online directly from Delta cost about \$2. In 2000, Delta realized savings in sales and distribution costs of approximately \$20 million from substituting online ticket sales for sales through travel agents.

Delta customers could choose from a variety of online channels. Delta.com offered seats exclusively on Delta flights, and Delta encouraged travelers to

use this channel, offering them bonus frequent flier miles. Sales on Delta.com had increased 250% from 1999 to 2000, but Delta.com was the preferred channel only for loyal Delta customers. Thus, Delta was actively seeking alliances that would meet the needs of occasional Delta customers.

The Priceline alliance (a reverse auction) sold tickets to customers for whom price was the major determinant guiding their travel choices. Delta sold \$250 million in tickets through Priceline in 2000. For customers who typically compared schedules and prices across airlines, Delta joined with four other airlines to create Orbitz,³ an online travel service intended to compete with Travelocity (www.travelocity.com) and Expedia (www.expedia.com)—two early, successful entrants into the online ticket sales industry. Orbitz promised to show customers all available flights on a given route. Its earliest version merely provided flight information, but in 2001 Orbitz would sell seats on any airline and also offer hotels, rental cars, and other travel services.

In early 2001, Delta planned a roll-out of MYOBtravel.com (mind your own business travel) for companies with five to fifty travelers, a constituency that Delta management believed was under-served. MYOBtravel.com provided expense monitoring and measuring in addition to acting as a portal for airline ticket sales, hotels, and rental cars. Delta would benefit from MYOBtravel.com in a number of ways: commissions on sales of other firms' products, reduced costs on the sale of Delta flights, marketing fees paid by participating firms, and, conceivably, additional sales on Delta flights.

Delta.com, Priceline, Orbitz, and MYOBtravel.com reached out to very different customer segments. Management believed that e-business offered many more opportunities to segment customers and design channels to meet their individual needs:

We need to be sensitive to the travel public out there and provide them with channels to accommodate their needs. To the degree that a customer wants to go to an online travel agent, to a traditional travel agent, or to come to the supplier directly, that is his or

³ The five founding partners of Orbitz (www.Orbitz.com) were Delta, United, American, Continental, and Northwest.

her choice. The message here is we're going to have our aperture open to accept travelers any way they want to deal with us.

*—Vince Caminiti, Senior Vice President,
E-Business*

Management noted that whether customers bought their tickets through a Delta site, a travel agent, Priceline, or another online ticket agency, the seats that they bought were clearly branded. Passengers would fly on Delta planes staffed by Delta employees. Leo Mullin wanted to “under-promise and over-deliver” so that every customer was potentially a repeat customer, loyal to the Delta brand.

B2B and B2E Initiatives

Delta's B2C efforts pre-dated those of either B2B or B2E, but the firm felt that significant benefits could accrue from all three initiatives. In the B2B space, Delta was particularly focused on leveraging its spending power and had joined a consortium of 30 airlines working to establish a B2B exchange. Although airlines had formed a variety of code-sharing partnerships, and they cooperated on ventures such as Orbitz, the B2B exchange was difficult to negotiate:

In the case of the B2B space, where you have all of these competitive airlines working together to try to get savings on their spend, that's going to represent a real challenge and we're not really there yet. I think that that model in a lot of industries has yet to be proven.

—Leo Mullin, Chairman and CEO

Despite these challenges, Delta management felt that an effective market exchange could significantly reduce its \$7 billion annual procurement costs, so Delta was interested in helping to establish a successful B2B exchange for airlines.

B2E initiatives focused on enhancing the productivity and job satisfaction of Delta employees. The Delta intranet enabled Delta's mobile workforce to access human resource listings and would eventually be used to communicate assignments and schedules to Delta's 9,000 pilots and 18,000 flight attendants. Leo Mullin had promised free personal computers to all of Delta's employees to encourage them to use the technology and to give them access to the firm's IT infrastructure from their homes. At

the end of 2000, over 50,000 computers had been distributed to Delta employees. Leo Mullin felt that the company was already seeing the benefits of employees' increased familiarity with computing technology:

We have a philosophy of top pay for top performance, so if you compared flight attendant to flight attendant, or mechanic to mechanic, reservation clerk to reservation clerk, or pilot to pilot, we're number one in all those categories. Yet, we have an 8% unit cost advantage over the other hub and spoke airlines in the country. Now how, in fact, can that be? Well, the crucial ingredient is that we are, obviously, far more productive. And I feel strongly that one of the major reasons is because we are so much in advance of the other airlines in this country with respect to the utilization of computers throughout the entire spectrum of applications. You get that benefit every day from every individual using it effectively. So the provision of these computers to the employees on a widespread basis and their gains in familiarity that result, all of that just enhances the orientation of our company to use these resources in a very effective way, and it's paying off.

Management believed that Delta had just started to capitalize on B2E opportunities:

We are in the process of framing this mural that we want to paint, because it takes this wired work force to levels that we haven't even dreamed of yet. It's a pretty exciting proposition. I don't believe we have begun to formulate our total intranet strategy. We have a lot of functional areas providing intranet access to their employees but what is the ultimate mural that we want to paint? How do we drive productivity? How do we drive e-learning and communication? We're in the process of carving and crafting that right now.

—Vince Caminiti, Senior Vice President,
E-Business

E-Business Organization

Delta had originally intended to make functional leaders responsible for e-business initiatives related to their areas. They found, however, that the

functions had little time to devote to e-business, so they were not able to move very aggressively with that model. As a result, Delta created an e-business team under Vince Caminiti, former head of sales and distribution. This team took responsibility for identifying e-business opportunities and bringing them to life:

One of the clear reasons that we broke Vince and a small team off, and let them focus all of their attention on what's happening on the Internet and e-commerce side of the business is because it changes every minute, really every hour, every day. To maintain operations in a core business and do e-business—we tried that initially, but it just didn't allow people to focus on either side. So we broke off the e-business team but linked them back to the mother company to keep us connected. And they are, for the most part, a kind of think tank, living in the e-commerce world.

—Vicki Escarra, Executive Vice President,
Customer Service

The team consisted of fifty full-time, collocated team members, who had solid line reporting relationships to their functional heads to ensure that existing business realities guided their efforts. Three disciplinary leaders reported directly to Caminiti: B2C, B2B, and B2E. Team members did not “belong” to one of the disciplines. Rather they were pulled onto project teams as needed. Delta management chose this approach in order to integrate e-business into core business operations. Caminiti noted that the team was expected to be temporary:

We want this business unit—which is a separate business unit within Delta—to go away. We want it to go away because we believe that over time—and we're talking about a couple years—the whole e-business phenomenon should be part of the very DNA of Delta Airlines. This organization today is focused on driving traction, driving focus, driving attention, and making things happen.

Caminiti felt that the organizational structure of e-business at Delta recognized that e-business was a cross-functional phenomenon. The e-business team, by representing and involving key functions in every

initiative, could identify, in advance, the potential impacts of an initiative on all parties that might be affected:

I never want anybody to tell me something like, I wish I would have known more about that. This allows these functional areas, from the beginning, to understand what we're doing, why we're doing it, and how it impacts them. That saves a lot of the challenges at the end when you're ready to launch.

—Vince Caminiti, Senior Vice President,
E-Business

The e-business team was focused on changing internal processes to enable the firm to respond faster to e-business opportunities. In particular, the team noted that it was important to adopt some of the characteristics of dotcom organizations, such as speed, traction, and risk-taking. The team found that partnerships with start-ups could help to infuse these values into some of their e-business projects. They also found value in selectively using consultants or contractors to offset resource limitations. For example, the MYOBtravel.com initiative was developed with Boston Consulting Group. BCG did the initial work to identify the opportunities for small business travel. Delta then brought in its own internal experts on pricing and revenue management, customer branding, and customer experience—some ad hoc and some dedicated to the initiative—to work with BCG to actually design and build the travel hub.

The e-business team had primary responsibility for launching e-business initiatives, but the expectation was that responsibility for managing and operating ongoing e-business initiatives would be located in appropriate functional areas. Programs like Orbitz and MYOBtravel.com, for example, might remain in the e-business unit for a year or so, but they would eventually be moved into the sales and distribution area. How quickly these programs could be moved into existing functional units would partly determine how quickly the e-business team would disband.

The IT Infrastructure

E-business initiatives at Delta leveraged the firm's recently renewed IT infrastructure. Responding to a Y2K crisis and the desire to greatly enhance the "customer experience," the firm had spent hundreds of millions of dollars in 1998–99 to tear out many of

its old legacy systems and rebuild its IT infrastructure. The new infrastructure, referred to as the Digital Nervous System, was built around the firm's core processes. The information required for the firm's core processes was captured in nine central databases (location, schedule, flight, maintenance, equipment, employee, aircraft, customer, and ticket) and TIBCO middleware was built around the databases so that new applications could access and, if appropriate, update relevant data. (The Digital Nervous System is depicted in Exhibit 2.)

This structure gave Delta a "publish and subscribe" environment which management felt was critical to ensure that real-time information was made available to everyone with a need to know. As an application updated one of the central databases (i.e., published an event), the information would be shared with any application that had subscribed for that information.⁴ Bob DeRodes, the CIO who had inherited the infrastructure when he took his position on January 1, 2000, noted that it offered a powerful engine for delivering information to both employees and customers:

Feld Associates (the firm that led Delta's infrastructure development) was able to create this layer of middleware that says: given all these transactions, can I interpret them and create events? Can I then figure out that these three transactions back to back create an event? Things like a gate change, or a flight change, a crew situation, a delay, all the events, thousands of events that occur. Can we define events, and can we figure out what these transactions are saying to us and create an event? Then if you had the event, how about if we publish the event, so anybody who needs to know about it, or thinks they need to know about it, can subscribe to it.

The Digital Nervous System was not fully implemented at the end of 2000, but executives considered it to be a key asset facilitating customer service and related e-business initiatives:

⁴ A "publish and subscribe" infrastructure offers an alternative approach to integrating data from enterprise resource planning systems. In an ERP, data flows automatically among integrated applications. In a publish and subscribe infrastructure, middleware links independent applications.

The whole notion around the Digital Nervous System is if we were to have a change in our operations control center—let's say a cancelled flight—with one or two entries, that information would be pushed into all of the operating and customer groups without an individual or 25 individuals having to actually access or send that information. The information would come to the reservations call centers; it would go to the airports; it would go to the Crown Room Clubs. It would actually go to customer PDAs, cell phones, beepers; even customers' laptops, giving them the information around the fact that Flight 222 from Washington to Atlanta has cancelled, and we've rebooked you on Flight 223 that leaves two hours from now. So, the real power behind the Digital Nervous System is having the ability to push the technology out into ways that would make it easier for customers who do business with us.

*—Vicki Escarra, Executive Vice President,
Customer Service*

DeRodes noted that the Digital Nervous System greatly reduced application development time. The prototype of the application that would send notification to customer pagers and computers was prepared in a couple weeks. Typically, he would have expected eight to nine months of development time. To become fully subscribed, the Digital Nervous System required complete renewal of the computing technology at each of Delta's airports. Delta's 26 busiest airports had been fully equipped with new hardware and networks by the end of 1999; another 26 would be completed by the end of 2000. The remaining 35 airports handled a total of only 7% of Delta's customers, but the publish and subscribe concept could not be fully deployed until those airports were also updated. DeRodes noted that Delta was already spending more money on technology than any other airline but that the spending was unlikely to diminish as he attempted to upgrade the last of the airports, finish building out the Digital Nervous System, and add new customer service and e-business applications:

But the fact of the matter is that we also want to spend more capital on planes and on ground equipment and buildings. And all of a sudden it would be easy to think that

maybe IT doesn't need this much. But we've gotten great support from Leo Mullin and the executive council. There's just no wavering on the support for technology at this point. And as long as we deliver, I think that will be there.

—Bob DeRodes, CIO

Bob DeRodes received far more requests for IT services than he could deliver. He worked with an IT Board, consisting of the chief financial officer, the executive vice president for customer service, the controller, and the heads of flight operations, customer commitment, and distribution planning to determine IT priorities. The e-business team relied on Delta Technology to do the IT development work for e-business initiatives. This ensured that e-business initiatives were tied back into the core business and that e-business priorities were established in light of their contribution to the core, but it also meant that e-business initiatives were accessing the same resources that were requested by the functional units for IT support. Thus, as they established IT priorities, the IT Board was assessing the resources that could be made available for e-business.

Establishing and Funding e-Business Priorities

To ensure that the e-business team focused on the initiatives believed to have the most significant impact on Delta's profitability and competitiveness, Vince Caminiti applied for funding through the traditional capital budgeting process. He estimated the ROI of projects that appeared most likely to significantly reduce costs, increase revenues, or offer valuable equity positions. He then sent his recommendations to the Information Technology Board, where they would be evaluated relative to other IT projects. Because e-business opportunities arose unexpectedly, Caminiti had 90-day reviews with the IT Board. Delta management felt that the highly dynamic nature of e-business required a more flexible funding process. Thus, an opportunity with a high ROI might be funded mid-year.

Caminiti found that it was not unusual for e-business opportunities to have very high potential ROIs. He indicated that Delta looked to e-business to have a significant impact on the bottom line:

If we spend X millions of dollars on a project, we're going to get twenty times that in return from our core operations. Our

productivity game plan is that e-business will, over time, get us off of a six P/E (price-earnings ratio) into a seven, eight, nine or ten P/E. I think that's where we sense the excitement around utilizing new economy technology and utilizing the e-business strategy to kind of differentiate ourselves from the rest of the airline business.

*—Vince Caminiti, Senior Vice President,
E-Business*

A key challenge for Delta management was deciding how many e-business opportunities they should pursue. The number of opportunities could be overwhelming:

I remember one day, when I actually had calls within a two-hour period from four Fortune 200 CEOs who wanted to talk about what they might do in collaboration with Delta. So, these kinds of offerings come off the wall. You meet people at social events;

you meet people in various industry associations, and it is way, way more than most people can handle. So, you have to be very, very judgmental about the expertise that is brought to the table, or you can waste a lot of time going down blind alleys.

—Leo Mullin, Chairman and CEO

As Delta continued to examine and implement e-business initiatives, management was focused on delivering strategic value from all of its information technology investments. The wisdom of its investments might very well determine its long-term competitiveness:

We have to continue to invest innovatively. We're spending on the order of \$700 million annually on information technology, and that money has to be very, very well-spent. This is a technology-driven business.

—Leo Mullin

EXHIBIT ONE
Consolidated Financial and Operating Highlights

DELTA AIR LINES, INC.
Consolidated Financial Highlights
Excludes nonrecurring items
Dollar amounts in millions, except per share data.

Fiscal Year Ended June 30	2000	1999	Change
Operating Revenues	\$15,922	\$14,597	9%
Operating Expenses	\$14,045	\$12,727	10%
Operating Income	\$1,877	\$1,870	—
Operating Margin	11.8%	12.8%	(1.0) pts.
Net Income	\$1,019	\$1,085	(6%)
Diluted Earnings Per Share	\$7.36	\$7.09	4%
Dividends Declared on Common Stock	\$13	\$14	(7%)
Dividends Per Common Share	\$0.10	\$0.10	—
Common Shares Issued and Outstanding at Year End (000's)	122,640	138,554	(11%)
Passenger Mile Yield	13.51¢	13.09¢	3%
Operating Revenue Per Available Seat Mile	10.48¢	10.14¢	3%
Operating Cost Per Available Seat Mile	9.25¢	8.84¢	5%

DELTA AIR LINES, INC.
Consolidated Operating Highlights

Fiscal Year Ended June 30	2000	1999	Change
Revenue Passengers Enplaned (Thousands)	116,595	106,902	9%
Revenue Passenger Miles (Millions)	110,347	104,575	6%
Available Seat Miles (Millions)	151,913	144,003	5%
Passenger Load Factor	72.6%	72.6%	- pt.s
Breakeven Passenger Load Factor	63.5%	62.5%	1.0 pts.
Cargo Ton Miles (Millions)	1,814	1,690	7%
Cargo Ton Mile Yield	31.94¢	32.97¢	(3%)
Fuel Gallons Consumed (Millions)	2,876	2,730	5%
Average Aircraft Fuel Price Per Gallon	57.23¢	49.83¢	15%
Number of Aircraft in Fleet at Year End	809	676	20%
Average Age of Aircraft at Year End (Years)	10.1	11.6	(13%)
Average Aircraft Utilization (Hours per Day)	8.2	8.7	(6%)
Average Full-time Equivalent Employees	77,860	74,000	5%

1. *The Consolidated Financial and Operating Highlights include the results of operations of ASA Holdings, Inc. and Comair Holdings, Inc. since April 1, 1999 and November 22, 1999, respectively.*
2. *Nonrecurring items include gains from the sale of investments, asset writedowns and other special charges, the effects of a change in accounting principle and a charge for the voluntary prepayment of debt.*

EXHIBIT TWO

DELTA WIRED

