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United Parcel Services: Business Transformation through Information Technology

Jeanne W. Ross, MIT Sloan School, and Will Draper, Paul Kang, Seth Schuler, Ozge Gozum, and Jessica Tolle, McKinsey & Co., Inc.

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Author: **Jeanne W. Ross, MIT Sloan School, and Will Draper, Paul Kang, Seth Schuler, Ozge Gozum, and Jessica Tolle, McKinsey & Co., Inc.**

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Abstract: Nearing its 100th anniversary, United Parcel Service was the world's largest package delivery company. Senior management had adopted a strategy of "enabling global commerce" and was growing through both extensions of its core business and expansion into adjacent businesses. In pursuing growth, UPS examined the fit between new business opportunities and its core competencies. UPS counted its highly standardized and scalable information processing capability among its core competencies, but many acquisition opportunities did not require the scale of UPS' core business. Thus, as UPS diversified, it pursued alternative organizational structures and considered new IT architectures to meet the needs of its new businesses.

This case examines the strategic, organizational, and technical issues UPS was addressing in early 2002. In particular, it describes the opportunities associated with two new business lines: logistics and capital. These new businesses were characteristic of both the opportunities and challenges UPS would encounter as it attempted to deliver on its "enabling global commerce" strategy.

36 Pages

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UNITED PARCEL SERVICE:
Business Transformation through Information Technology

During the 1990s, United Parcel Service (UPS) grew from a $14 billion package delivery company to a $30 billion global enterprise offering international shipping, logistics, financial, and related services. UPS management adopted a strategy of "enabling global commerce" which combined the physical movement of goods with the movement of information and capital. As it entered the 21st century, the firm planned to drive deeper into its customers' supply chains.

> *Out of every dollar spent on logistics, six cents is spent on moving small packages. The other 94 cents is the other part of the supply chain. It's fulfillment, it's warehousing and it's the cost of the goods. So we have been moving into the other 94 cents.*
>
> *—Mike Eskew, Vice Chairman and incoming CEO*

In 2000 UPS was named by *Fortune* magazine as both America's and the World's Most Admired mail, package and freight delivery company[1] and by *Forbes* magazine as Company of the Year.[2] UPS's information technology unit, which was the recipient of the *Computerworld* Smithsonian Award in 1991 and 1997, earned the firm a place among *Red Herring's* 100 Most Important Companies in 2000 and *PCWeek's* Fast-Track 100. MIT's Sloan School gave UPS a "Clicks-and-Mortar" award in April 2000, calling it the most advanced company in integrating physical and online business practices.

Increasingly UPS was reaping the benefits of IT capabilities that generated efficiencies in the firm's core operations and created opportunities for new adjacent lines of business. Eskew intended to further leverage the firm's

1 *Fortune*, "The world's most admired companies," 01 October 2000.

2 Barron, Kelly, "Logistics in Brown," *Forbes*, 10 January 2000. According to Barron, "UPS used to be a trucking company with technology. Now it's a technology company with trucks."

This case was prepared by Dr. Jeanne W. Ross of the Center for Information Systems Research at the MIT Sloan School of Management and Will Draper, Paul Kang, Seth Schuler, Ozge Gozum, and Jessica Tolle from McKinsey Business Technology Office. This case is for the purpose of management education, rather than illustrating or endorsing any particular management practice. The authors would like to gratefully acknowledge the cooperation of United Parcel Services in completing and publishing this case.

information technology capability to grow the company, as he prepared to take over the CEO role from James Kelly in January 2002 (Exhibit 1).

Background

Founded as American Messenger Company in 1907 by James E. Casey, the firm initially provided local messenger and delivery services in Seattle, Washington. By 2001, UPS grew to become the world's largest integrated package delivery company. The company's 359,000 employees delivered an average of 13.6 million packages a day sent by 1.8 million shippers to 7 million consignees. Approximately 200,000 delivery vehicle drivers and package handlers were unionized, and the company also employed significant temporary labor to respond to seasonal variability in package volume. The delivery network included 1,748 operating facilities, 152,500 delivery vehicles (package cars, vans, tractor-trailers) and 238 aircraft (Exhibit 2).

In fiscal year 2001, revenues reached $30.6 billion with operating income of $4 billion (Exhibit 3A and 3B). UPS was responsible for handling nearly 6% of the U.S. Gross Domestic Product. Although the U.S. was its dominant market, UPS delivered 1.2 million packages a day across more than 200 countries and territories. It was capable of reaching nearly 90% of the Earth's population. Throughout the 1990s, UPS diversified into related businesses, but small package delivery still represented 95% of revenues at the end of the decade.

UPS employed the world's largest staff of industrial engineers, who studied each step of the package delivery process to increase the efficiency of its operations. For example, they measured each driver's route, taking into account miles driven, traffic lights and walking distance from vehicle to delivery location to optimize routes. In the 1960s, engineers pioneered development of a "hub and spoke" system, in which regional sorting facilities (hubs) acted as package exchange points, expediting regional service and enabling redirection of packages. Many hubs were designed to sort tens of thousands of packages per hour for delivery to operating centers, where UPS's familiar brown vehicles were based. UPS Air Service operated under the same "hub-and-spoke" principle.

Growth Strategy at UPS

The UPS growth strategy incorporated both growth in its core small package delivery business and entry into new markets. Both efforts leveraged existing UPS competencies and external acquisitions and alliances.

In the core business, UPS expanded its existing product and customer service offerings. Extensions to the core included offering existing U.S.-based services to a new geography or the introduction of new services such as Guaranteed Ground. External extensions to the core included alliances with SAP and Oracle® to include UPS functionality in their software packages and the acquisitions of Mail Boxes Etc.® to provide 4,400 retail locations to sell UPS services.

> *Until the mid-1990s, UPS's additions to its product portfolio consisted largely of time-in-transit based extensions, customer service improvements and development of the Web channel. These additions were supported by our internal technology and information.*
>
> *—Joe Pyne, SVP of Corporate Development*

UPS moved into what management called "adjacent businesses" which led to the creation of subsidiaries. Through its strategy and corporate development organizations, UPS piloted small-scale initiatives. Those that proved successful were developed into subsidiary units. Jack Duffy, Senior Vice President of Strategy, summarized the approach to subsidiary businesses.

> *There are some very simple principles in strategy. Clearly we're thinking about opportunities and the first factor is the market size. If it is attractive, is it adjacent and complementary to our core business? And is it consistent with our strategy to enable global commerce? And to that degree, if an initiative doesn't meet all three criteria, it gets excluded from consideration quickly.*

The higher risk initiatives frequently involved investment in new technologies—either externally or through internal development—that had the potential for long-term impact on UPS.

Mike Eskew summarized UPS's approach to business growth through a four-part model (Exhibit 4). He distinguished between development requirements for growing the core and for building adjacent businesses.

> *Every extension to the core business has to work— it can't fail. If you are going to touch a driver with it, it's got to work. With new businesses, [new initiatives] do not have to work in every case. We like to think that we can try things and as we say, fail small fast.*
>
> *—Mike Eskew, Vice Chairman and incoming CEO*

Eskew distinguished between internal and external sourcing of the capabilities required to grow. The internally-developed core UPS services were the gravitational center of UPS. Growth initiatives in the other three areas would ultimately be subsumed in the core: standardized, large scale, highly efficient and reliable provision of service.

Growth in the Core

Until the mid-1980s, UPS offered a single package delivery service at a single price to all customers. Spurred by competition from Federal Express, Roadway Package System (RPS) and others, and by opportunities to exploit excess capacity in the delivery network, UPS began to broaden its product offerings and customer services. UPS expanded its set of products by introducing Time Definite Services, offering air and ground shipment with delivery times such as UPS Next Day Air®, UPS Next Day Early AM®, UPS 2nd Day Air® and UPS 3 Day Select®.

> *Early on, packages were delivered the way a driver would drive through the area. Now that driver has to get the "8:30s" off and the "10:30s" off. As a result, they are stopping and starting, and driving extra miles, which isn't the most efficient thing to do. But the revenue on those packages makes it worthwhile to think through not just how many locations can a driver deliver to every hour, but how to maximize the portfolio on each car.*
>
> *—Mike Eskew Vice Chairman and incoming CEO*

In non-U.S. markets, UPS accelerated its expansion by shifting from an organic growth model to an acquisitions and partnering strategy. This strategy was executed in two parts. First, UPS developed country-to-country delivery services by acquiring regional players and partnering with local companies. Then, UPS began to acquire local companies within target foreign countries to replicate its domestic package delivery business.

In addition to product extensions, UPS developed multiple channels for reaching its customers. Customers were able to schedule pickup and track package movement through call centers, the Web, and electronic connections to client shipping systems. Mobile devices, such as PDAs, could be used to track packages. UPS also began to integrate deeper into customer business processes by developing alliances with software companies such as SAP and Oracle to provide interfaces to UPS functionality within their enterprise systems.

Parallel with efforts to increase revenues, UPS realized operational efficiency gains. For example, the company optimized its ground and air transportation networks to deliver packages via the most cost-effective means. UPS automated manual operations in all areas of the business, such as driver reporting processes, package sorting, customer support and back-office functions (accounting, billing, payroll).

Growth through Adjacent Businesses

Management believed that appropriate "adjacent businesses" and important new technologies offered significant opportunities for long-term growth. By 2001, the company launched seven subsidiary businesses (Exhibit 5). UPS's entry

into logistics and financial services were illustrative of the opportunities and challenges that the firm encountered in new markets.

UPS Logistics

There were three reasons to get into the logistics business. First, it's a large and growing market. Second, we have a competitive advantage, given our expertise in package movement. Third, we began to see other companies offering supply chain management services getting between UPS and our customers.

—Joe Pyne, SVP, Corporate Development

UPS founded its logistics group in 1995, combining several small, homegrown operations and acquiring several companies that provided geographic coverage or specific capabilities. (See Appendix A for a description of the logistics industry and key competitors to UPS.) The logistics business grew rapidly, achieving over $1 billion in revenues in 2000.

To achieve high growth, Logistics was entrepreneurial in selling its services, capturing customers across multiple industries and performing a broad number of customer-focused services. For example, UPS reconfigured the outbound distribution of finished product of a major manufacturer from facilities to retail outlets, and implemented a customized tracking system to reduce delivery time. For Samsung Electronics, UPS had arranged to design and manage the entire global supply chain, including design and implementation of a global technology architecture. UPS also developed a service parts logistics business to rapidly deliver replacement parts to high-tech customers and, in some cases, perform minor repair functions.[3]

In each industry it served, Logistics would learn the specific requirements of the business through a core customer, investing significant resources to integrate into the customer's systems and connecting to its external suppliers and clients. UPS would then leverage its experience and existing systems in attracting additional customers within the industry. UPS Logistics identified three key logistics processes in customer firms: 1) *pre-manufacturing*—managing raw materials movement into manufacturing facilities; 2) *post-manufacturing*—managing finished goods from manufacturing facility to distribution centers to end-customers; and, 3) *reverse and spare parts logistics*—managing returned goods and spare parts inventories for post-sale service. Initially, UPS developed capabilities in the post-manufacturing and reverse logistics processes, as they were most adjacent to the core business.

UPS Capital

UPS Capital's supply chain related financial services form deep customer relationships and serve the UPS strategy to embed itself more deeply into a customer's business. We integrate our service with what UPS has to offer for small businesses to Fortune 50 companies. Leveraging the transparency into a business's supply chain via UPS Logistics, Capital supplements the logistics service with solutions that lower risk related to control of inventory levels, obsolescence, and shrinkage.

—Bob Bernabucci, President, UPS Capital

Founded in 1998, UPS Capital offered traditional commercial finance products, such as insurance on package deliveries and expedited C.O.D. payments. Capital offered asset-based lending and import/export finance solutions to strengthen the Logistics offering (Exhibit 6). (See Appendix B for a description of key competitors to UPS in financial services.) UPS Capital believed that bundling financial services with package delivery and logistics services would present a compelling customer offering that financial services firms could not match. In addition, leveraging aggregate data trends collected by the core and logistics businesses would provide a distinct informational advantage that would allow Capital to better manage risk and price products.

[3] Service parts logistics manages the delivery of post-sales equipment and services parts to customers for procurement, repair, and disposal by stocking inventory in strategic locations to minimize delivery time. UPS offers service parts logistics using their own set of warehouse facilities or manages a customer's warehouse network.

To quickly develop the skills to manage a financial services business, UPS Capital hired from the outside. More than 80% of Capital employees had non-UPS backgrounds. While Capital succeeded in bringing financial expertise in-house quickly, integration with the parent was a slower process, as new Capital employees needed to establish relationships within the core organization to jointly develop complementary products and customer relationships.

Technology Support of the Core Business

Technology played a critical role in UPS's growth. In 1986, CEO Oz Nelson pushed the firm to invest heavily in information technology and develop the capability not just to track packages but to offer a wider range of services. Nelson articulated the benefits of the company's technology investment.

> *We will lower our cost of operations. We will be able to provide information internally to ourselves and make adjustments to personnel and equipment without losing a step on service. Customers will have a better idea of when packages will arrive or when they aren't going to arrive and why.*[4]

Between 1986 and 1996, UPS invested more than $11 billion in information technology, building a massive infrastructure of telecommunications networks, data processing facilities, and application portfolios to support package tracking, airline management, and business operations (Exhibit 7). Convinced of the importance of moving aggressively on IT, senior management gave the IT organization the freedom to build infrastructure with a long-term view and prioritized IT projects in some instances without detailed business cases. While the initial impetus for the UPS technology investment was to develop a package tracking capability to compete with Federal Express and RPS, the technology infrastructure that UPS built led to process improvements and product extensions in the core business. A shipping label imaging system developed in the early 1990s represented the firm's initial foray into package tracking.[5] In parallel, the firm was investigating a tool to electronically collect package data that would make the imaging system obsolete within three years. UPS rolled out the Delivery Information Acquisition Device (DIAD) [6] in 1991. Drivers used DIAD primarily to collect delivery information, including collecting customer signatures on commercial deliveries, and records of delivery (e.g., back door, front door, garage) for residential delivery. Subsequent releases of DIAD provided functionality such as scanning bar codes to recognize pickup, tallying C.O.D. (credit on delivery), and referencing programmed route information.

Capturing and Leveraging Package Data

In August of 1994, Chairman Oz Nelson sponsored the Package Level Detail (PLD) Program. Under the leadership of the CIO, 16 senior executives from functions throughout UPS worked to identify package data elements and initiatives which would maximize business value to both the customer and UPS, while minimizing costs, implementation time, and risk. PLD initially focused on tracking for UPS's premium services, thus affecting a limited number of packages. Over the next five years, PLD evolved to encompass end-to-end, full life-cycle information of *all* packages entering the UPS system—domestic and international. This capability became dubbed "full visibility tracking."

PLD contained all of a package's shipping information, such as sender and consignee data, product data, package contents and data required for international shipping, including information about its value and purpose. PLD enabled end to end (i.e., pickup, sortations, feeds, delivery)

4 *Chief Executive*, "The Wizard is Oz," March 1994.

5 The initial system converted paper shipping labels to images to provide tracking information with a one-day lag.

6 An early version of the DIAD was introduced as early as 1991 but it had minimal capabilities and was not fully rolled out. The DIAD 3, introduced in 1999 had a 32-bit PowerPC RISC processor, 6.5 megabytes of memory, and three communication methods: internal packet radio, an adapter to communicate via a cellular telephone, and an internal acoustic modem with automatic dialer.

real-time tracking and tracing information, which UPS made available to its customers via multiple peripheral devices (telephone, web, PDAs and shipping systems).

Over time UPS realized many benefits from PLD, including service line extensions such as guaranteed delivery, new products such as expedited C.O.D. payment, and automated processes that saved drivers as much as 30 minutes per day.

> *Before PLD and the DIAD, the driver had to pick up a physical piece of paper from the customers, obtain the signature and validate the number of packages. Now he just scans the packages and uploads the delivery information with the DIAD, which gets matched with the PLD information from the shipping systems. Our billing is much more accurate and many driver tasks are automatic. There's a whole driver process that has been eliminated based on the DIAD and PLD technology.*
>
> *—Phil Nardomarino, VP of IS, Operations Portfolio*

In 1999, UPS initiated development of Production Flow System (PFS), providing the next generation of PLD, and allowing UPS to continue to improve the efficiency of operations. PFS enabled UPS to use pre-loaded PLD to configure expected flow and tracking information. PFS could then generate intelligent package loading instructions and optimize driver route scheduling.

> *The natural outgrowth [of PLD] is to make a package smart—to know everything about a package, including the delivery path it should follow, before it comes down the line. For example, the pre-loader can just look at the package and know, it goes in car number one, third shelf, third position. Boom, done. So he doesn't have to have that vast knowledge of driver routes anymore.*
>
> *—Jerry Skaggs, VP of IS, Shared Services Portfolio*

By simplifying the sorting process, UPS could reduce error rates during the pre-load process and improve worker productivity. Further cost improvement could be gained by reducing training requirements, which was especially significant given the high turnover rates for sorting staff.

Centralization and Standardization of IT

As technology became an integral part of the UPS business, ensuring highly reliable and scalable systems for running its high transaction volumes became a priority for the IT organization. Toward this objective UPS emphasized centralization and standardization of IT in the organization.

> *The scale, the size, the integration with all the other systems, and the maintenance all beg for centralization and standardization.*
>
> *—Mike Eskew, Vice Chairman and incoming CEO*

When UPS started to build its IT infrastructure in the late 80s, John Nallin, manager in charge of delivery information and package tracking, was given responsibility for deploying a centralized IT architecture. He noted that the popular trend toward distributed computing led management to challenge the centralization concept.

> *The architectural strategy was contrary to the feelings of the time. Everybody wanted to decentralize processing. My concern was that if we decided to decentralize, we wouldn't be able to do [package tracking 24/7] and the reliability would go south.*
>
> *Look at the Web. If we didn't have a centralized, tightly controlled environment, we wouldn't have been able to process six million packages a day through Web tracking. We were doing 50,000 in 1992–93. Now we are doing 4.5 million on the Web alone. We couldn't have done this if we were spread across 60 locations.*
>
> *—John Nallin, VP of IS, Corporate Repositories and Architecture*

Centralization of the infrastructure facilitated standardization of hardware, operating systems and databases, and processes such as development methodologies and release cycles. IT and business executives endorsed standards to lower operations costs and enable easier integration and development of enterprise applications.

> *We have 330,000 PCs out there. If we weren't standardized, it would be impossible for us to roll out applications in the field and make all the changes. Standardization is really one of the major contributors to our success… It also saves a lot of money.*
>
> *—Jerry Skaggs, VP of IS, Shared Services Portfolio*

John Nallin chaired a standards committee that enforced rigorous adherence to technology standards and the enterprise architecture. While the standards and architecture were continually updated to absorb new technologies, the committee worked to ensure that reliability would not be compromised for incremental functionality.

> *Keeping standards is a painful science. Sometimes I'm the only guy carrying the standards manual. You look at any magazine, any brochure and everybody's got something smarter, faster, quicker… For example, DB2 is our mainframe database. How about UDB?[7] There is not much difference from DB2 but it is different. Do we allow UDB to come in? NO!*
>
> *—John Nallin, VP of IS, Corporate Repositories and Architecture*

If necessary functionality was missing from the existing set of applications, UPS would tend to build in new functionality rather than replace stable legacy applications. For example, instead of buying and integrating a new enterprise CRM[8] solution, the CRM technology group extracted data from existing applications to populate a user interface for customer service representatives to view consolidated customer histories. While this solution had limited functionality compared with a full-scale CRM implementation, it satisfied a specific business need while not compromising the reliability of the architecture.

> *We have very stable legacy systems that work perfectly for what they are designed for and are already integrated with all our systems. Instead of getting rid of that to purchase and integrate the universal CRM solution, we took the approach of understanding what our systems lacked and spent money to find the best way to share data.*
>
> *—Geoff Light, VP of CRM Technology*

Although compliance with standards was strictly enforced, UPS encountered situations in which technology and process standards had to be compromised for a clear business purpose. For instance, in 2000, the team responsible for billing applications had to upgrade the billing system to support a fuel surcharge due to unexpected gas price increases. A delay in implementing the surcharge would have cost implications, so adherence to architecture were postponed for a year while the business needs were addressed.

> *We quickly implemented a short-term solution by leveraging an unused field in an existing database that was originally intended for a different purpose. With senior management approval, we compromised the application architecture but in the following enterprise release we spent the time to engineer a long-term solution that enabled fuel surcharge activation via parameter changes.*
>
> *—Jim Medeiros, IS Customer Service Manager*

The architecture also had to accommodate non-standard technologies as UPS acquired companies to build the international business. Through these acquisitions, UPS inherited applications developed outside of the core architecture. While UPS developed new core systems such as ISPS (International Shipment Processing System) and modified existing core

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7 UDB stands for Universal Database. It is an IBM product that allows for a wide range of data types, such as images, and allows users to define data types.

8 Customer relationship management

applications to support non-U.S. markets, UPS maintained and operated the acquired systems. Over time, non-standard technologies were replaced and the acquired ones were integrated into the core architecture.

Technology Support of Subsidiaries

Unlike the core's centralized approach to IT, the subsidiaries managed IT in a highly decentralized manner. Each subsidiary business unit had its own CIO, who led an IT organization composed mostly of application development staff. Subsidiary managers felt decentralization was necessary to be responsive and flexible in support of their entrepreneurial initiatives.

UPS Logistics

Logistics IT purchased and integrated third party supply chain applications to develop its offering. Despite limiting its scope by focusing on serving a select set of industries, customization requirements within each industry for each client led to a proliferation of solutions. In the course of creating customer-specific solutions, Logistics' managers found that systems built for one purpose often did not translate well to the needs of another.

Mike Eskew came and said why do you have to build your own tracking system? We did requirements for what we needed and spent two months working with [central IT] on how we could leverage the UPS tracking application to meet our business needs. It came back with a 30% fit with what we needed. We needed multiple tracking numbers, different size fields, integration with third parties, and multiple shipping modes.

—Jay Walsh,
CIO of UPS Mail Innovations,
former CIO of UPS Logistics

Over time, Logistics found itself supporting multiple software packages for each supply chain component, such as warehouse management systems, that catered to specific industry requirements or individual customer needs. Minimizing the number of supported technologies would allow UPS to take advantage of scale and increase profits.

Rather than having 20 different solutions, we need to have two warehouse solutions, a transportation solution so that there are fewer permutations. We still need to offer solutions for each line of business but we don't need to have as much variability in each line of business. If we can put the whole thing together and put that together with a supply chain visibility and execution capability, then you really do own the supply chain.

—Dave Currence,
UPS Logistics SVP & CIO

UPS Capital

To get products to market quickly, Capital's IT group initially partnered with other financial institutions or technology companies to gain access to financial product applications and back end processing capabilities. Over time, Capital's business needs and strategy became more defined and IT began to buy packaged financial software to develop a technology capability in key product areas, focusing on financial products that would enhance the service offerings of the core and logistics businesses.

Capital believed that workflow automation would increase operational efficiencies and provide a customer service advantage. Capital initiated a program to develop the capability to provide full transparency in an application going through the approval process, allowing UPS to provide application status to customers on a real-time basis. The challenge would be in tying siloed, product- or process-specific applications together to provide visibility for every product type and across all functions.

The risk of funding inventory is understanding where the inventory is, and how to control shrinkage and obsolescence. Using UPS package data, and obtaining customer approval, we can determine the level of risk on a global scale.

—Bob Bernabucci
CEO of UPS Capital

Leveraging the Core Across Subsidiaries

Subsidiaries operated as autonomous business units responsible for their individual profit and loss results. Yet, senior management promoted a single identity for all UPS companies. Most of the senior managers in the subsidiaries had a long history with UPS, and a single bonus plan that compensated managers based on corporate rather than business unit results reinforced corporate loyalty.[9] Thus, subsidiary managers were predisposed to leverage core assets where it made sense to do so.

> *[UPS Capital IT] has a small IS team of 20 people and we are able to keep it small because we leverage the core infrastructure. They do a terrific job in the data centers running our systems, so that we don't need to be there or spend time worrying.*
>
> *—Stephanie Hill, CIO of UPS Capital*

Logistics and Capital leveraged the telecommunications infrastructure and applications hosting services of the central IT unit. Subsidiary management viewed the robustness, redundancy and cost-efficiency of its operations as sources of competitive advantage for the businesses, especially as they experienced rapid growth.

The efforts of central IT to accommodate the unique needs of subsidiaries were bounded by principles and a standards-based architecture that stressed reliability, performance, and efficiency.

> *[Central IT] set some conditions in place stating if you use the core systems, you need to conform to my standards and if you don't use these systems, you don't have to go by my standards. If you have to touch me, because I'm your data center, I'm your 24/7 support, and I'm your telecommunications, then we have standards that you need to comply with. If you can't build on our standards because it's one-off, then we go through an architectural process to decide whether or not we can support it in-house.*
>
> *—Ken Lacy, SVP and CIO*

UPS's emphasis on reliable and scalable systems for the high volume core business created a barrier to subsidiary use of central infrastructure. Technology purchased by central IT tended to be "high-end," "high cost" installations designed to meet the UPS performance requirements and expanding functionality in package delivery. Subsidiary requirements were much less demanding, necessitating negotiations with the core to accept a lower end, less expensive solution into the architecture.

> *UPS [core] had a standard network configuration for routers, T1 connections and such that cost $5,000 per month. I said my revenue isn't $5,000 per month. I wanted to take advantage of the service but they've got to offer me a solution that I can afford. I've had to prod UPS on multiple occasions for services that are customer focused, not provider focused. UPS core has Cadillac type services and they need to have that in their business. But these new business units don't need it and can't afford it.*
>
> *—Jay Walsh,*
> *CIO of UPS Mail Innovations,*
> *former CIO of UPS Logistics*

Responsiveness was also a factor that limited integration between core and subsidiary systems. The complexity of applications and interfaces between applications, and the processes to prioritize, approve and plan projects resulted in 6-month release cycles.

> *Subsidiaries need more than two releases a year, especially when piloting new business products that require quick implementations. Outside of the enterprise architecture, smaller scale technical environments are used to experiment with solutions. When ready to commit to a long-term high volume solution, the system is then engineered into the enterprise architecture.*
>
> *—Jim Medeiros,*
> *IS Customer Service Manager*

[9] UPS Capital was the only exception to this compensation structure. Capital managers were compensated based on the ability to meet business plans for their respective product portfolios.

The central IT organization worked to accommodate the needs of the subsidiaries, while maintaining control of the architecture. It expanded the set of standards to encompass subsidiary requirements, for example, supporting NT-based platforms for Capital since there were no other options for their specialized financial applications. Core IT also created a single point of contact for subsidiaries to procure central IT services and became more flexible for small-scale projects. Dave Barnes, an IT vice president responsible for customer automation applications, noted the shift within the core IT organization.

> *From a business perspective, we were used to building everything for the masses. We are now learning to build for smaller groups, knowing we might scale it up quickly if we need to.*

Looking Forward

In 2001, UPS continued to defend its market leadership in package delivery and was rapidly expanding into adjacent businesses. Looking to the future, management intended to deliver on its vision of enabling global commerce by driving deeper into customer supply chains, and offering its customers an integrated product set across core and subsidiary businesses.

These strategic objectives would require significant changes to sales and technology functions within the core and subsidiaries. To sell a bundled solution and take advantage of cross-selling opportunities, the sales organization would need to manage relationships with all relevant decision makers in the customer supply chain, coordinate internally to manage the overall relationship, and bring specific expertise and knowledge as needed.

The subsidiaries were already undertaking changes as the company looked to consolidate administrative (HR, legal, finance), sales and marketing, and IT functions into a shared services organization. The new IT organization would have two main objectives. First, it would consolidate all applications development, internal and customer-facing IT support, and governance staff under a single CIO. The new IT organization would also define the enterprise architecture to support the integrated product strategy through consolidation and integration of the current set of applications. Back-office applications such as accounting and operational technologies such as brokerage systems would be included in the consolidation effort. Laurie Johnson, the incoming CIO of shared services IT, as VP of Technology, Corporate Development, outlined her key challenges as she began to form the new IT function.

> *I'd love to leverage what's good about the core, but the subsidiaries still need a different sense of urgency, the ability to take higher risks with products, technologies and customer relationships, flexibility that allows us to serve the customer faster, better, cheaper—and rules that are made to be broken.*
>
> *—Laurie Johnson*

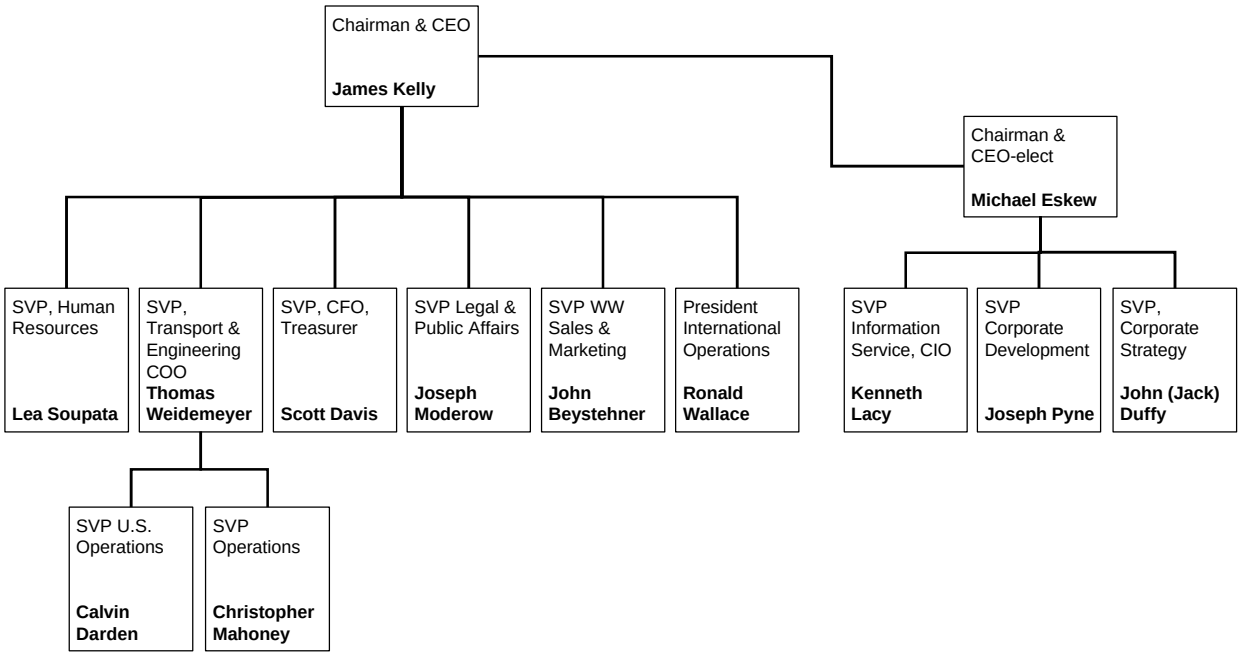
Developing and leveraging an IT capability to support greater integration of the core and subsidiary businesses would be difficult given the size, scale and breadth of UPS operations. Senior management believed, however, that an integrated product portfolio would allow UPS to differentiate itself from its competitors and achieve new levels of growth.

> *We were thinking how do you approach a customer with a bundle of products and solutions that appear seamless to the customer? If we can do this—and it's going to take time and hard work—it will be difficult for others to replicate.*
>
> *—Jack Duffy, SVP Corporate of Strategy*

Towards this end, UPS created Supply Chain Solutions, a streamlined organization that combined the sales, marketing, finance, and technology resources for its supply chain subsidiaries. Supply Chain Solutions was intended to make it easier for customers to access UPS's expanding range of logistics, freight, financial, and consulting services.

UPS ORGANIZATION IN 2001

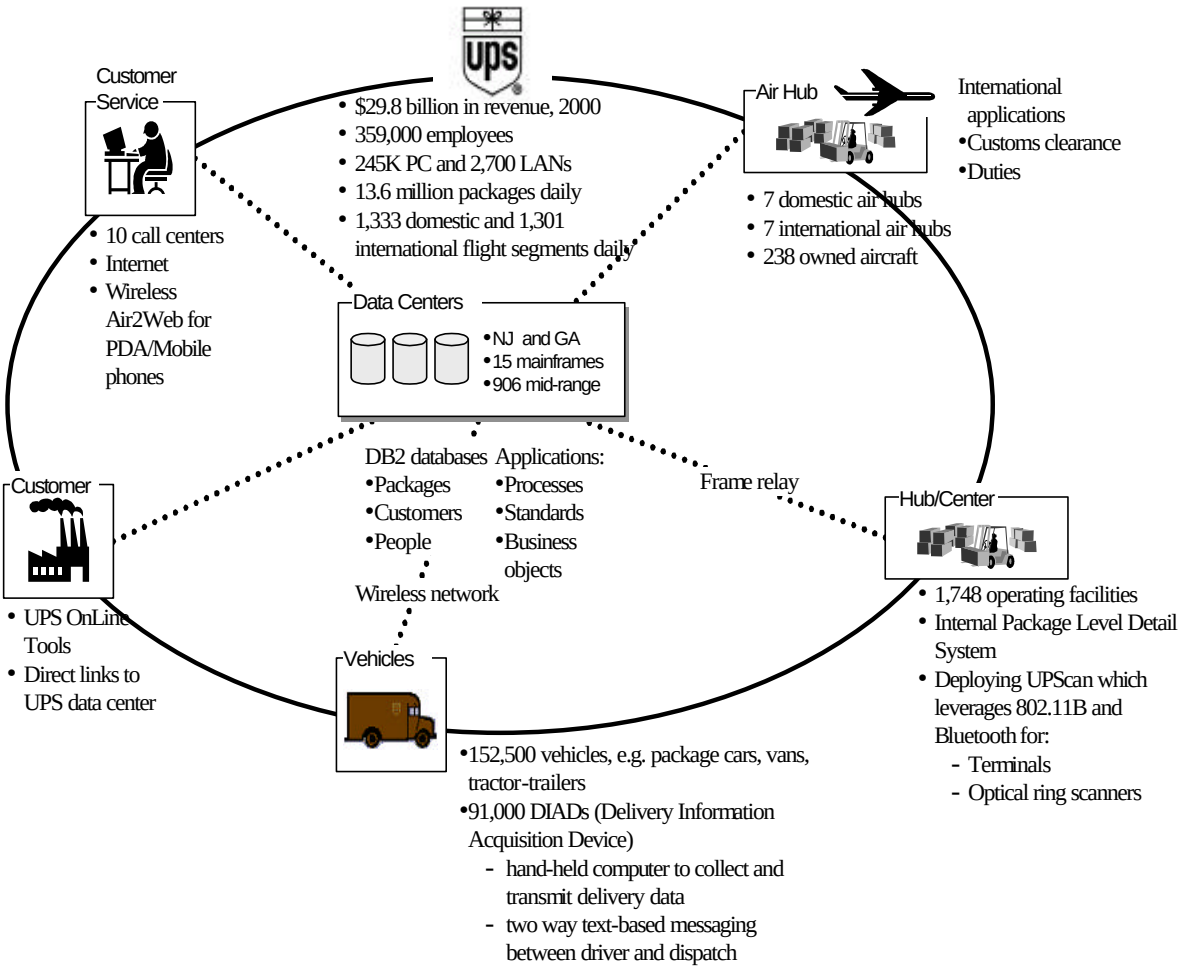
EXHIBIT 1



Source: UPS

EXHIBIT 2

UPS OPERATIONAL AND TECHNOLOGY INFRASTRUCTURE IN 2001



Source: UPS, Computerworld, Internet Week, VARBusiness, McKinsey

UPS Revenue From Operation

EXHIBIT 3A

	Year Ended December 31,					
	1995	1996	1997	1998	1999	2000
	(financial data in millions, except per share amounts)					
Statement of Income Data:						
Revenue:						
U.S. domestic package	$ 17,773	$ 18,881	$ 18,868	$ 20,650	$ 22,313	$ 24,002
International package	2,958	3,074	3,067	3,399	3,730	4,166
Non-package	314	413	523	739	1,009	1,603
Total revenue	21,045	22,368	22,458	24,788	27,052	29,771
Operating expenses:						
Compensation and benefits	12,401	13,326	13,289	14,346	15,285	16,546
Other	6,545	7,092	7,526	7,439	7,862	8,713
Restructuring charge	372	-	-	-	-	-
Total operating expenses	19,318	20,418	20,815	21,785	23,147	25,259
Operating profit (loss):						
U.S. domestic package	1,906	2,150	1,623	2,815	3,506	3,929
International package	(274)	(302)	(106)	29	232	274
Non-package	95	102	126	159	167	309
Total operating profit	1,727	1,950	1,643	3,003	3,905	4,512
Other income (expense):						
Investment income	58	55	97	126	197	527
Interest expense	(77)	(95)	(187)	(227)	(228)	(205)
Tax assessment	-	-	-	-	(1,786)	-
Total other income (expense)	(19)	(40)	(90)	(101)	(1,817)	322
Income before income taxes	1,708	1,910	1,553	2,902	2,088	4,834
Income taxes	665	764	644	1,161	1,205	1,900
Net income	$ 1,043	$ 1,146	$ 909	$ 1,741	$ 883	$ 2,934
Per share amounts						
Basic earnings per share	$ 0.93	$ 1.03	$ 0.82	$ 1.59	$ 0.79	$ 2.54
Diluted earnings per share	$ 0.92	$ 1.01	$ 0.81	$ 1.57	$ 0.77	$ 2.50
Dividends declared per share	$ 0.32	$ 0.34	$ 0.35	$ 0.43	$ 0.58	$ 0.68
Weighted Average Shares Outstanding						
Basic	1,118	1,114	1,103	1,093	1,121	1,153
Diluted	1,131	1,129	1,116	1,108	1,141	1,175
As Adjusted Net Income Data:						
Net income before impact of non-recurring items (1), (2)	$ 1,043	$ 1,146	$ 909	$ 1,741	$ 2,325	$ 2,795
As a percentage of revenue	5.0%	5.1%	4.0%	7.0%	8.6%	9.4%

(1) 2000 net income excludes $139 million related primarily to investment gains.
(2) 1999 net income excludes a $1.442 billion tax assessment charge.

UPS Operating Data

EXHIBIT 3B

	Year Ended December 31,					
	1995	1996	1997	1998	1999	2000
	(financial data in millions)					
Operating Data:						
Delivery volume (in millions of packages)	3,094	3,153	3,038	3,137	3,282	3,461
Average daily package volume (in thousands)						
U.S. domestic:						
Next day air	668	760	822	938	1,039	1,122
Deferred	716	763	771	783	852	914
Ground	9,949	10,015	9,521	9,645	10,016	10,434
Total U.S. domestic	11,333	11,538	11,114	11,366	11,907	12,470
International						
Domestic	722	683	678	730	711	786
Export	175	194	217	256	303	368
Total International	897	877	895	986	1,014	1,154
Total average daily package volume	12,230	12,415	12,009	12,352	12,921	13,624
Average revenue per piece:						
U.S. domestic:						
Next day air	$ 19.34	$ 19.34	$ 19.49	$ 19.69	$ 19.86	$ 19.87
Deferred	11.27	11.39	11.86	12.39	12.45	12.53
Ground	4.95	5.09	5.19	5.51	5.65	5.82
Total U.S. domestic	6.20	6.44	6.71	7.15	7.38	7.58
International						
Domestic	6.22	6.10	5.36	5.14	5.12	4.53
Export	37.18	37.32	35.01	33.46	32.21	30.35
Total International	12.26	13.01	12.55	12.49	13.21	12.76
Total average revenue per piece	$ 6.64	$ 6.91	$ 7.15	$ 7.58	$ 7.84	$ 8.02
Revenue:						
U.S. Domestic						
Next Day Air	$ 3,269	$ 3,734	$ 4,054	$ 4,690	$ 5,240	$ 5,664
Deferred	2,041	2,207	2,314	2,464	2,694	2,910
Ground	12,463	12,940	12,500	13,496	14,379	15,428
Total U.S. Domestic	17,773	18,881	18,868	20,650	22,313	24,002
International						
Domestic	1,136	1,058	919	953	924	904
Export	1,646	1,839	1,922	2,176	2,479	2,837
Cargo	176	177	226	270	327	425
Total International	2,958	3,074	3,067	3,399	3,730	4,166
Non-package	314	413	523	739	1,009	1,603
Total Revenue	$ 21,045	$ 22,368	$ 22,458	$ 24,788	$ 27,052	$ 29,771
Operating weekdays	253	254	253	254	254	254
Capital expenditures (in millions)	$ 2,096	$ 2,333	$ 1,984	$ 1,645	$ 1,476	$ 2,147

EXHIBIT 4

UPS GROWTH MATRIX

Services	Internal	External
Existing	• International expansion • Product extensions (e.g., 3 day select, 150lb package weight)	• M&A activity (25 acquisitions since mid 90s) • Strategic Alliances (e.g., SAP, Oracle, PeopleSoft)
New	• UPS Capital • Service Parts Logistics • UPS Consulting • UPS Logistics Group • Freight Services	• Strategic Enterprise Fund investments, e.g.: - Savi Technology - Air2Web

Development Approach

Source UPS

EXHIBIT 5

UPS SUBSIDIARY BUSINESSES

UPS Subsidiaries

	Launch	Services	Acquisitions
Logistics	1995	• Supply chain and transportation management solutions • Spare part logistics • e-Logistics solutions and logistics technologies	• Uni DATA, Polysys, Livingston -- 2001 • CLS, Burnham --2000 • Finon, Rollins --1999
Capital	1998	• Financial services such as asset-backed lending, factoring, funding for restructuring, leasing • Trade services such as letters of credit • Insurance services for shipments • Commercial tools such as electronic invoice payment, card processing solutions	• First Bank International -- 2001
Consulting	2001	• Supply chain strategy and planning • Procurement, production and fulfillment consulting • Product design and customer management strategy • Cash management consulting	
Freight Forwarding/ Brokerage	2001	• Freight Transportation services (air, ocean, road) • Trade Management services (financing, brokerage) • Material Management services (JIT support, fulfillment)	• Fritz, 7 North American border brokerages – 2001 • Unistar USA, Atlas Air UK, UPS Italia
Mail Boxes Etc.	2001	• Retail service from providing shipping supplies geared towards small-medium enterprises	• MBE -- 2001
Mail Innovations	2001	• Expedited flat mail delivery service via pre-sort before injection into USPS priority mail service	• RMX, Mail2000 -- 2001
iShip	2001	• Web-based shipping solutions enabling management and monitoring of multi-carrier, multi-destination shipments	• iShip -- 2001

Source:UPS

EXHIBIT 6

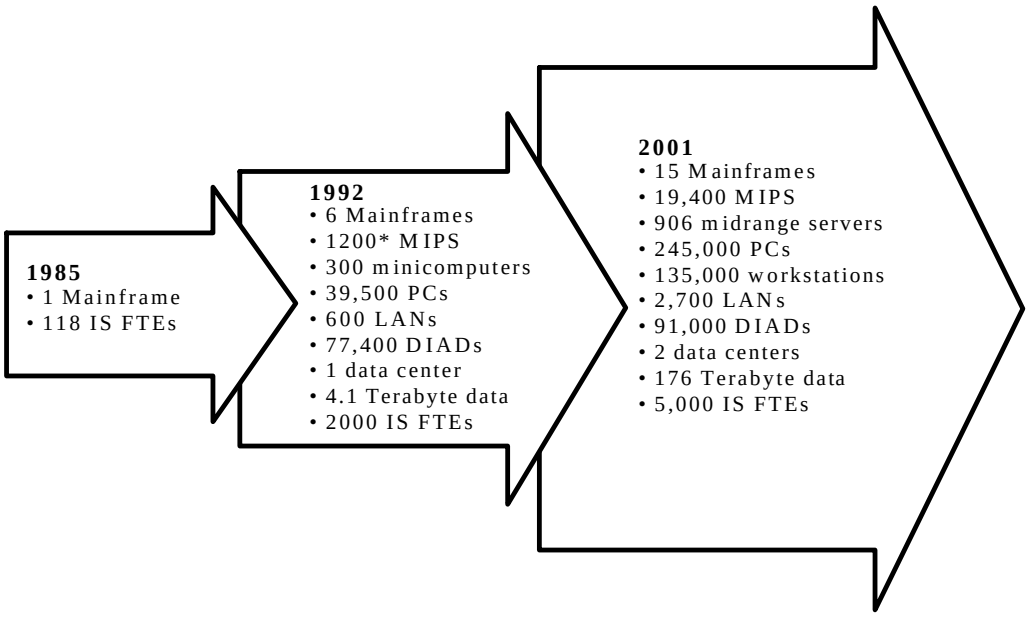
UPS CAPITAL SERVICE OFFERINGS

Offering	Services	Description
Distribution Finance – asset based lending programs	• Asset Based Lending • Corporate Finance • Inventory Purchase	• Provides working capital based inventory financing and receivables management for a variety of business opportunities
First International Bank funding for smaller businesses	• Domestic financing • Export financing • Import financing	• Government guaranteed lending through SBA, USDA, and EX-IM Bank lending programs
Glenlake Insurance provides insurance solutions related to business operations and shipments	• Credit Insurance • Flexible Parcel Insurance • Excess Value Insurance • COD Secure	• Loss protection, reduce risk from receivables • Customized loss and damage coverage with UPS • Additional protection on UPS shipments • Reduced risk related top COD collections for customer
Global Trade Finance financing for companies wanting to grow globally with minimum risk	• Export Receivables Service • Import and Export Letters of Credit	• Helps protect customers doing business internationally • Online automated L/Cs that reduce the tedious process of protecting international transactions
Card Transaction Solutions	• Business credit cards, including: T&E, Fleet, Procurement, etc.	• Better way to manage cash flow, secure accurate business reports and control business expenses
Equipment Leasing for securing equipment	• Different types of leasing options available	• Leasing of telecom systems, warehouse machinery, and other business equipment
COD Enhancement expedites remittances from shipments	• COD Automatic	• Expedites payment of COD funds, which are deposited directly into the customer bank account

Source:UPS Capital, McKinsey

EXHIBIT 7

IT INFRASTRUCTURE EVOLUTION



* Approximated from IBM ES9021 Model 860 at 200 MIPS

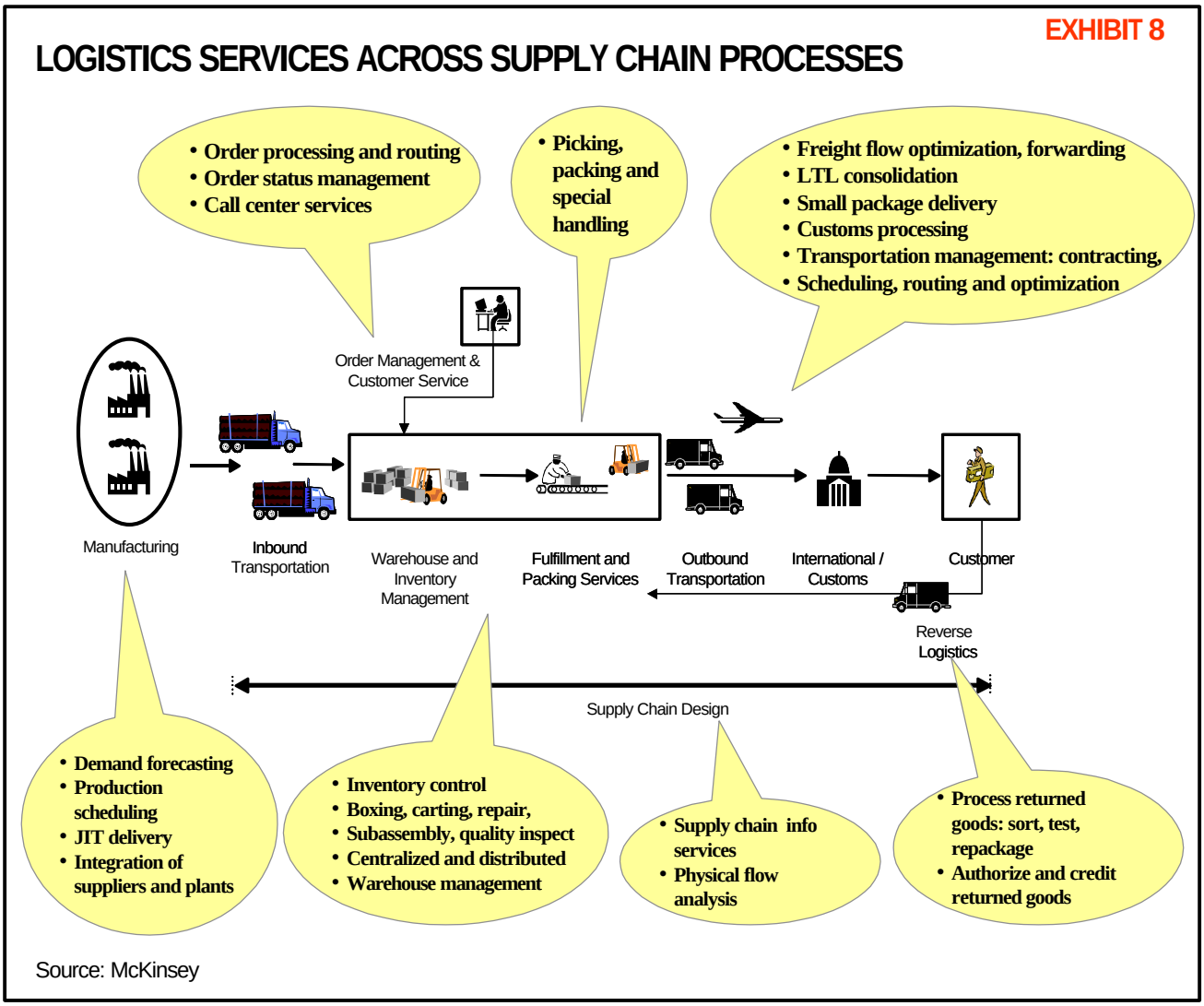
Source:UPS, Dow Jones Interactive

Appendix A

The Logistics Industry

Market Overview

Traditionally, most companies would take on the task of storing and moving goods, building warehouses and distribution centers and perhaps managing their own transportation fleet. As a result, the market for third party logistics (3PL) services had been primarily for transportation and warehouse management. Providers were either transportation carriers or service providers like customs brokers and freight forwarders that helped customers optimize distribution networks, manage storage and distribution facilities, and navigate the complexities of international customs. By late 2001, the market for logistics had moved far beyond transportation and materials handling into helping companies manage their entire supply chain. These supply chain management services extended across the many logistics disciplines; from the traditional services of inventory and warehouse management to shipping and transportation to demand planning and order management (Exhibit 8).



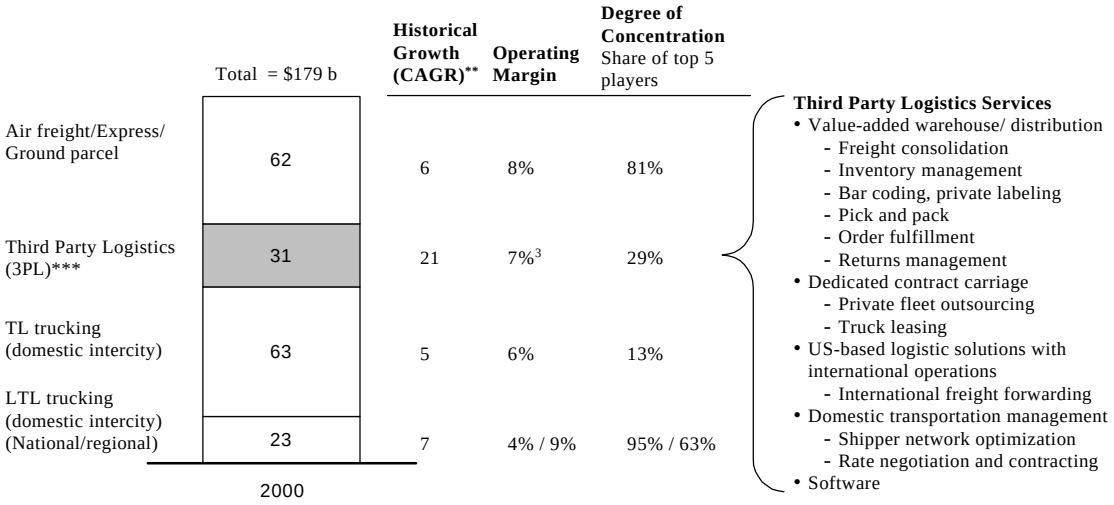
Armstrong & Associates, a supply chain solutions consultancy and information services provider, stated that in the United States logistics was a $179 billion market in 2000, with 17% ($31 billion net of transportation) spent on 3PL services. The remaining 83% was spent on trucking, airfreight and expressed as actual expenditures on transportation. Armstrong observed a 21% annual growth in 3PL spending over the last five years, compared to 67% in transportation itself (Exhibit 9).

EXHIBIT 9

U.S. LOGISTICS MARKETPLACE BY SEGMENT*

USD billion, net revenue

ESTIMATE



* Excluding rail, private trucking, local for-hire trucking, specialized trucking, water, & pipeline transportation
** CAGR dates vary by segment, representing the past 3-5 years.
***Net revenue is net of purchased transportation
Source:Colography, Armstrong & Associates, S&P, McKinsey T&LS Practice Analysis

Supply Chain Business Requirements

Companies look to outsource the management of their supply chain to external vendors to obtain cost efficiencies, rapidly gain a global footprint, reduce business complexity in managing supplier networks and improve supply chain performance. By outsourcing their supply chain management, companies demand value creation in three areas:

- **Efficient movement of goods:** Optimization of product flow within a supply chain to minimize inventories, stock outs and obsolescence

- **Improved design of supply chain:** Optimization of overall supply chain configuration, including third party transportation contracts, to minimize cost and maximize quality and performance

- **Increased asset productivity:** Improved management of assets (e.g., warehouses, transportation fleet) for productivity and utilization improvements

Such efficiencies require new capabilities including end-to-end visibility of the supply chain, from raw materials to their customer's inventory. With such visibility, firms accelerate delivery of goods to intermediate and final markets by providing new capabilities like available-to-promise, cross-docking,

and merge-in-transit. To provide end-to-end visibility, supply chain solutions require tight integration to customer legacy systems and supplier systems.

These new capabilities allow organizations to optimize product, information, and capital flows, thus reducing numerous logistics costs, e.g., transportation, obsolescence, and inventory holding costs.

Competitors in Logistics Services

The market for logistics services began to transform from one focused on transportation to one focused on information in the early 1990s. Both asset-intensive and asset-light companies were attempting to break up the existing value chain and commoditize basic services. Three categories of competitors emerged in this rapidly growing market: transportation companies, logistics management firms, and system integrators.

Transportation companies built or acquired capabilities to extend their asset-intensive transportation operations.

- ***FedEx*** offered logistics services beginning in 1989 with its spare-parts logistics unit. The company made a significant investment in the logistics business in 1998 by acquiring and integrating Caliber Systems' order management, customer service, fulfillment, and part-sequencing solutions with FedEx's transportation capabilities.

- ***Deutsche Post*** (DP) entered the logistics market in 1998 by acquiring leading logistics providers Danzas and AEI. In conjunction with DP's global air, sea, rail, and freight networks, Danzas provided end-to-end, supply chain solutions including order processing, physical-flow analysis and financial services. For example, Danzas designed and managed the material flow for 350 European suppliers for GM Opel in Thailand to reduce inventory and consolidate shipping.

Logistics management firms entered the market with information-based third-party logistics services such as supply chain design and management, order management, warehousing services, and customer service. 3PL companies arranged for integration of multiple asset intensive transportation and warehousing service providers.

- ***Exel*** provided end-to-end supply chain services but owned few assets. The company targeted specific industries, e.g. retail, consumer goods, and chemicals with customized solutions. For example, Exel provided inbound services, warehouse management, pick-and-pack, and transportation services for Smith & Nephew, a leading European healthcare provider, improving fill rates and reducing shipping costs.

- ***Li & Fung*** focused on managing the supply chain for high-volume, time-sensitive consumer goods, especially garments. Company services included product development, raw material sourcing, production planning and management, quality assurance, export documentation, and shipping consolidation.

System integrators in conjunction with leading software companies provided the logistics value chain applications and the integration platform to enable information flow between trade partners along the chain.

- ***Accenture*** brought together business-process solutions, system integration, and supply chain expertise for its clients. Accenture integrated its skills in procurement/sourcing, transportation, inventory management, distribution and supply chain planning with its knowledge of supply chain software (e.g., SAP, i2, Ariba) to deliver customer-specific solutions. In addition,

Accenture developed an outsourcing business focused on providing supply chain solutions to companies such as Alcatel, DuPont, Sara Lee, Dell, and Nortel.

- ***IBM Global Services*** offered collaborative supply chain process and system solutions including demand planning, order management and customer services, and warehouse and transportation management for global companies in automotive, retail, electronics, and consumer packaged goods industries. The company bundled consulting solutions, operating platforms, and hardware for single source, end-to-end logistic design.

Appendix B

Commercial Financial Services

Market Overview

While logistics services aid the movement of goods along the supply chain, commercial financial services facilitate the flow of funds. In 1999, U.S. commercial banking transaction volume totaled $3.8 trillion, with commercial lending and asset finance accounting for $1.6 trillion of the total.[10] Commercial lending and asset finance products span all segments of the order-to-cash process, as well as offer strategic financing during business expansion or downturns. Two large product categories include:

- **Global trade finance**, including letters of credit and escrow services, facilitates international business by allowing a financial institution to act as an intermediary, promising to pay a seller on behalf of a buyer. Global trade finance products mitigate transaction risk for buyers and sellers, as well as protect against country risks for both buyer and seller.
- **Distribution finance**, including asset-backed lending and factoring, provides working-capital financing and receivables-management services. These products enable more efficient use of cash flow by freeing up cash from inventory or accounts receivables.

Competitors

While many large banks provide commercial lending and asset-finance products, there are non-banking financial institutions that specialize in this area, applying industry expertise to offer customized solutions. In 2001, CIT Group and Heller Financial, two of the largest non-bank financial institutions, were acquired, thus consolidating the industry:

- ***CIT Group***, a subsidiary of Tyco International and renamed Tyco Capital after the 2001 acquisition, offered finance solutions to capital-intensive business such as airlines, transportation and media companies. Their clients included British Airways, Delta, Avaya, Agilent, and Dell. Tyco Capital offered financing for business restructuring and expansion such as leasing and mortgages, in addition to asset based lending and factoring.
- ***Heller Financial***, a 2,500-person firm acquired by GE Capital, offered financial services to SMEs, leasing services to large customers, and industry-focused solutions to real estate and healthcare businesses. Heller worked with a large network of other financial institutions internationally for coverage for global customers. Its clients included Amazon, Iomega, Echelon, Singapore Airlines and Continental Airlines.

[10] Syndicated loans ($1 trillion) and deposit accounts ($1.2 trillion) are the other two components.

UNITED PARCEL SERVICE:

Business Transformation through Information Technology

Organizational Addendum

Introduction

Between 1986 and 1996 UPS developed IT organization structures and processes to complement its robust technology infrastructure. These highly centralized structures and processes were designed to achieve strategic value from IT. Through the mid 1990s firm resources were focused on supporting UPS's high-transaction, small package delivery business. But UPS's entry into adjacent businesses introduced a more distributed organization and more difficult choices about the design of IT structures and processes.

This addendum examines the organization structures, governance and IT processes in use in the UPS core business and addresses opportunities to extend them into adjacent subsidiary businesses.

IT Organizational Structure in the Core

In 1997, Ken Lacy became CIO of UPS. Like many senior UPS IT professionals, Lacy spent much of his career in accounting and finance functions. He started as a clerk in the Florida district rising quickly to corporate controller. As corporate controller, Lacy developed his IT management skills by filling the role of business interface for the accounting application portfolio.

As UPS developed its technology capabilities in the late 1980s, it created a large centralized IT organization. IT grew rapidly from 118 people in 1985 to 5,000 in 2001. Lacy's IT unit was responsible for the UPS core package delivery business; another broader set of IT leaders, often brought into UPS from outside the company, oversaw subsidiary businesses. The core IT organization consisted of three functions: Applications, infrastructure, and planning and architecture:

- Applications groups supported four portfolios:
  - Customer automation portfolio: shipping clients, package tracking, and Web applications
  - General and administrative applications: global accounting, HR, finance, global billing, and eProcurement systems
  - Business development portfolio: global sales force automation and call center applications
  - Operations systems portfolio: DIAD, airline management, brokerage, and applications for sorting facilities
- Infrastructure groups comprised of data center operations and shared services (HR, Finance, and Accounting)
- Planning and architecture groups for standards development, advanced technology, long-term strategy development, and telecommunications.

All group managers had more than 10 years of tenure within IT as well as backgrounds in diverse business areas like finance or accounting. UPS offered broad career opportunities, regularly transferring key IT managers among the applications, infrastructure and planning groups, as well as across UPS businesses units. For example, Jay Walsh's IT management assignments included leading IT in the airline business, the Logistics subsidiary, and at the Mail Innovations subsidiary. Jim Medeiros had been responsible for infrastructure support of UPS subsidiary businesses, billing, and other

systems in the core, and customer relationships between core and subsidiary IT groups.

In addition to opportunities for dynamic career paths, UPS offered attractive compensation packages (including stock ownership and profit sharing) and many opportunities to work with new technologies. As a result, the entire IT organization had a 5% turnover rate, far below industry averages.

To support core operations, Lacy's organization had four key responsibilities: 1) enhance existing core applications; 2) implement new systems; 3) operate centralized infrastructure services reliably and cost-effectively and 4) provide governance mechanisms to manage applications and infrastructure development.

Systems Enhancement and Implementation

UPS developed a variety of large complex applications in-house including CAReS[11] for call center support and PLD within tracking operations and billing systems. These systems interfaced with other applications and middle-ware. Requests for enhancements to these systems were constant, especially as the business began to understand the importance of technology to support product and service initiatives. But every enhancement demanded thorough testing to ensure that new features did not adversely affect the many interrelated applications.

To control this process, some enterprise systems were managed through semi-annual releases.

> *It's a year cycle that's broken down into three phases: design, development and testing. There are teams working on the design phase, other teams working on the development phase, and other people working on the testing phase of one of the two releases. As soon as the design team turns over the design to the development team, then they're starting to work on the design requirements for the next release. So it's a continuous cycle.*
>
> *—Ken Lacy, SVP and CIO*

11 CAReS was a GUI-based, customer service application, integrated with the interactive voice response and computer telephony integration applications

In addition to system enhancements, development teams charged out their services to implement new applications and translate business needs into a development work plan. They worked with business owners to define requirements, identify existing packages (if appropriate), develop business cases, and implement systems. They worked closely with John Nallin's architecture team and Jerry Skaggs' operations staff in order to identify platforms for building systems in accordance with UPS standards and to minimize costs.

The development staff was located in four sites: New Jersey, Kentucky, Maryland, and Georgia. The Innoplex facility in Atlanta, Georgia was constructed during the dot-com boom and was designed to encourage innovation in IT development, especially Web applications. The Innoplex facility was a former warehouse and was managed very differently from other locations. For example, walls were reconfigurable to allow teams to co-locate and staff dressed casually.

IT Operations

IT operations were based in Mahwah, New Jersey, with UPS's primary data center. Jerry Skaggs was responsible for data center operations and regularly benchmarked UPS's efforts to ensure world-class performance. To ensure efficient operations, data center managers were constantly evaluated against external benchmarks. For example, UPS averaged one analyst per 1,400 gigabytes of data; the external benchmark was one analyst per 800 gigabytes.

IT operations also sought to improve the reliability of IT to provide 24/7 operations support. CIO Lacy emphasized to senior management the importance of IT-driven projects that did not have traditional business cases but were critical to improving reliability. Disaster recovery plans and investments in redundant operations were important examples.

> *Business Continuity Planning is a major undertaking. The name was changed from Disaster Recovery to focus it on keeping the business consistently running in any situation. It's not one of the more exciting*

things…quite honestly, some people don't even know it exists. The CIO is certainly involved, and [some management committee members] are aware of it, but certainly they don't get into the details. It's hard to explain why it's not as simple as package delivery. But that doesn't mean you don't need to do it.

—John Nallin, VP of IS, Corporate Repositories and Architecture

For budget allocation, Lacy and his staff undertook detailed analysis to forecast and plan infrastructure refresh and maintenance requirements. Aging technologies and increasing use of software packages meant UPS needed to periodically update systems in order to retain vendor support and reliability.

For new system implementations, Lacy and his staff ensured that project budgets not only accounted for one-time development costs, but also for the ongoing infrastructure costs over a five-year time period as they drove increasing use of processing and network capacity. (See Exhibit 1 for breakdown of UPS's IT budget.)

When you fund a project, you fund the infrastructure. So if you're going to build a new system, we lay out the numbers for the next five years. Here's what this system will cost, for MIPS, data storage, telecom, and all the things that go along with it.

—Ken Lacy, SVP and CIO

Governance Processes

As UPS built a large IT infrastructure, application portfolio and organization, processes to manage these assets became critical. A senior management committee, consisting of four senior executives,[12] set IT's strategic direction, and established priorities and funding levels. This team met regularly during the late 1980s and early 1990s, while the IT capability was built. By 2001, the committee transitioned to an overseer role, providing input on the company's long-term technology strategy.

As the executive steering committee became less active in IT governance, it was replaced with an Information and Technology Strategy Committee (I&TSC) composed of approximately 15 senior managers from all functional areas. I&TSC was chartered with studying the impacts and application of new technologies and setting near-term technology direction. The Internet was one of the technologies the group investigated and as a result, applications such as customer service on the Web were developed.

The governance process was rooted in UPS's cross-functional core process team approach. By the late 1990s, management found that most systems requests had cross-functional implications.

Everything we're doing today is interrelated. There's very little from a technology perspective that doesn't impact someplace else in the organization. Years ago, we had silos and did work for the users we directly worked with. We built the same systems two or three times. We are now trying to integrate and leverage the technology we have to our benefit.

—Phil Nardomarino, VP of IS, Operations Portfolio

Management also worked to leverage U.S.-based systems internationally. The International business had traditionally been independent from the domestic business, leading to redundant efforts. Management relied on four core processes to align IT projects with strategic objectives to eliminate duplicative efforts and support cross-functionality:

- Customer information management—systems that interfaced directly with the customer (e.g., tracking, shipping systems, Web-based systems, EDI)
- Package management—pickup, delivery, sort and transport of packages (i.e., core operations such as PFS)

[12] The Steering Committee consisted of Mike Eskew, Vice Chairman and Executive Vice President; Joe Pyne, Senior Vice President, Corporate Development and Marketing; Jack Duffy, Senior Vice President, Corporate Strategy; and Ken Lacy, Senior Vice President and CIO.

- Product management—identification, design and development, and marketing of new cross-functional services
- Customer relationship management—systems supporting internal units for servicing customers and supporting the sales of new services (e.g., sales force automation, call centers)

A cross-functional team managed each of the core processes. A senior executive headed them, and an IT owner helped prioritize needs and resource requirements across functions.

> *We go through a structured prioritization process of hundreds of ideas, where the idea is defined, a business case is built around it and the value proposition is determined. We score each idea along various dimensions within a process and across processes. Among hundreds, we choose 50-70 projects and rank them in terms of priority from high to low. The highest priority projects undergo final approval by the management committee.*
>
> *—Dave Barnes, VP of IS, Customer Automation Portfolio*

Projects were prioritized based on the strength of their business cases and financial metrics (e.g., return on investment, net present value), but prioritization also occurred on non-financial metrics such that non-core projects would be given adequate resources. For example, the CRM process team emphasized the importance of international projects by giving them higher priority, even if domestic projects were more financially attractive.

As the owner of the customer information management (CIM) process, Ken Lacy and his CIM team played an important role in project prioritization. CIM and other process teams were responsible for rationalizing proposals to a common set of projects across all IT systems by: 1) understanding business requirements for proposed initiatives, and 2) estimating required budget, staff resources, and time to complete.

The IT unit provided another layer of governance. In addition to formalizing the project prioritization and budgeting processes, IT established standards and designed the architecture. Lacy established an IT governance committee to oversee day-to-day IT operations. Composed of Lacy and senior IT managers, it aligned IT more closely to the business, establishing rigorous management processes and enforcing technology standards and processes. The governance committee had oversight over all key IT decisions, from project approval to standards enforcement and technology direction setting, as well as providing a forum to raise critical issues.

> *I set up the IT governance committee to drive decision-making on all projects. The committee consists of such managers as John Nallin, who really understands the critical nature of all the standards, and requirements for standards enforcement. I give people an opportunity to bring issues to the governance committee so that if they don't agree with the standards, they can state their case. And if there's a good case to make a change, then we'll seriously consider it.*
>
> *—Ken Lacy, SVP and CIO*

As Lacy worked to hone processes associated with these responsibilities, Joe Pyne, Senior Vice President of Corporate Development and head of the subsidiary businesses, began to create a shared services unit that incorporated sales, marketing, customer service, HR, finance, and IT (Exhibit 2). The shared services IT unit would work with core IT to solicit infrastructure services and create subsidiary-specific infrastructure as needed.

Subsidiary Shared Services Business Unit

By 2001, subsidiaries represented only 8% of UPS's revenues, but were expected to play an important role in the firm's long-term growth. As the subsidiaries progressed from start-up to developed businesses, management recognized the need to reorganize supporting services, including IT. Joe Pyne asked Laurie Johnson, a 26-year UPS veteran, to lead the formation of the new IT shared services organization.

Johnson was originally from the finance department. She took her first IT role in the

early 1990s as a functional representative to IT, developing business requirements for IT projects. She moved to long-range planning, where she gained experience in outsourcing non-critical functions, such as billing data capture. From 1996 to 1998, Johnson was the portfolio planning manager for G&A applications in the core business responsible for project planning for HR, general ledger, payroll, and billing systems.

During her years in the core business, she developed many relationships, which she leveraged in her next role as CIO of UPS Capital. At Capital, she helped build the set of applications to support the start-up business. Not having the resources to internally develop applications, she leveraged third-party providers and packaged software. She used the existing data center to host applications. Immediately prior to accepting the role of CIO for subsidiary shared services, Johnson played a coordination role between subsidiary businesses, monitoring IT expenditures through project approval and finding ways to fully leverage core IT infrastructure.

Transitioning into her new role, Johnson knew there would be two main challenges to implementing a shared services IT function within the subsidiaries. First, she would be inheriting a group of independent businesses each with its own CIO-led IT organization and application portfolios. Second, she would have to gain maximum value from leveraging the core, but not compromise the speed and flexibility required of the subsidiaries. At the same time, however, successfully developing and enforcing more rigorous governance mechanisms, standards and processes would streamline the applications portfolio and enable subsidiaries to integrate various offerings into a seamless product offering. In taking on her new role, Johnson worked with an implementation team consisting of all subsidiary CIOs.

Proposed Shared Services IT Organization

In contrast to the core, subsidiaries were managed like start-ups, with rapidly changing business strategies and an entrepreneurial mindset. However, as subsidiary businesses matured from startups to large-scale enterprises, expenses began to increase at a faster pace than revenues. Subsidiary managers started to value the performance, efficiency, and reliability of the core infrastructure. Although responsive, business-specific development remained important, senior management believed the organization would be better served by bundling the set of previously disparate, silo businesses into an integrated supply chain services offering.

As CIO of the new IT organization, Laurie Johnson would report directly to Dan Brutto, head of all subsidiary shared services. Johnson laid out an initial proposal for the organizational structure:

- Three distinct applications portfolio teams, **Supply Chain Solutions, Finance/Mail Messaging and General and Administrative**, who would perform all applications development and maintenance functions for their respective portfolios
- An external facing **Solutions** unit with three groups: customer field support, technical solutions implementation support and relationship management between shared services and external groups (e.g., core and subsidiary businesses, core IT, customers)
- An internally focused **Investment Management** unit, performing governance functions and coordinating organizational processes (e.g., budgeting, project initiation and prioritization)

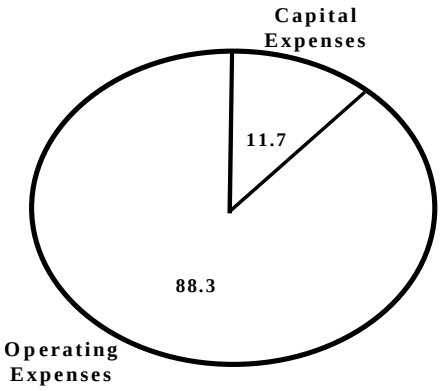
As she began to refine her proposed organizational model, Johnson knew that the successful model would have to balance the reliability-focused, process driven approach in the core with the adaptable, entrepreneurial style of the subsidiaries.

EXHIBIT 1

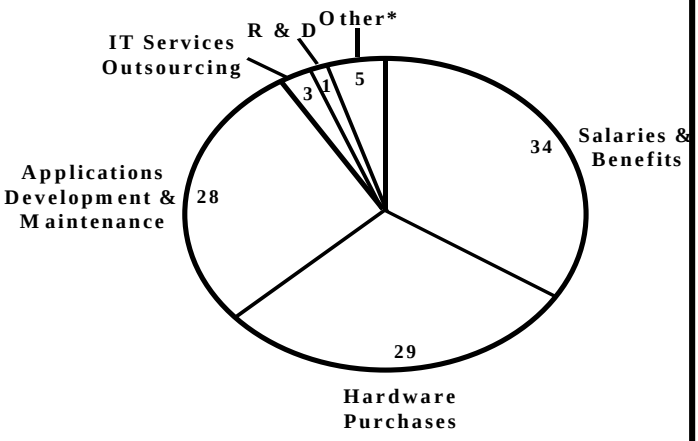
IT BUDGET

Percent, 100% ~ $1 Billion

Breakdown of IT Expenses



IT Budget Cost Components

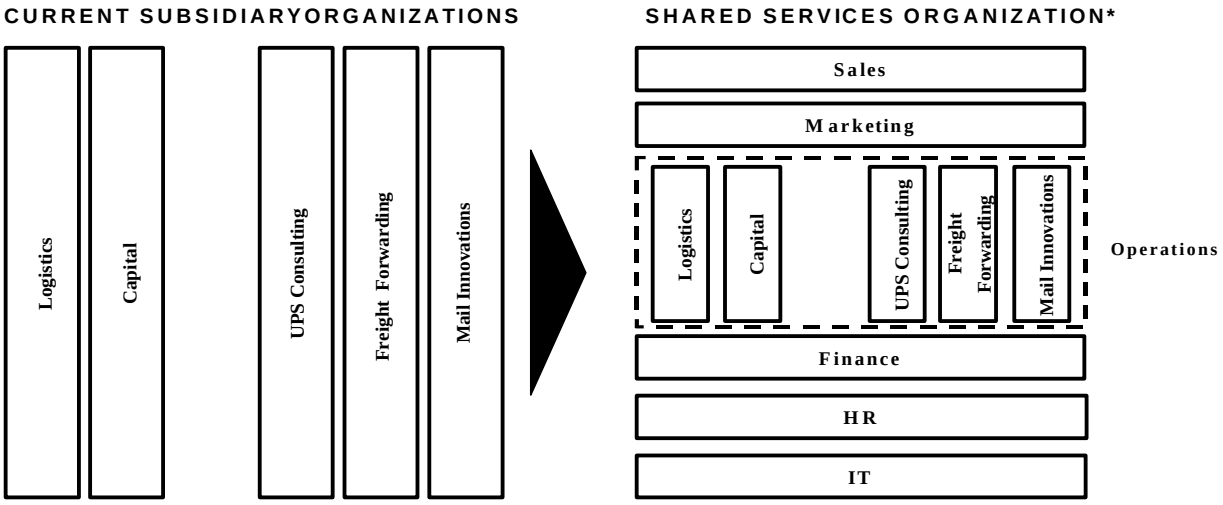


* Maintenance and administrative

Source:UPS Public Relations

EXHIBIT 2

DEVELOPMENT OF SHARED SERVICES UNIT IN SUBSIDIARIES



* Shared services do not include MBE and iShip subsidiaries

Source: UPS

UNITED PARCEL SERVICE:

Business Transformation through Information Technology

Technology Addendum

Introduction

UPS's information technology infrastructure provided a highly standardized and centralized foundation for the package delivery business. In building the infrastructure, the IT unit focused on delivering efficiency and reliability in the processing of millions of transactions each day. Starting in the late 1980s UPS had been introducing continuous improvements to operations and customer services through information technology infrastructure and systems that automated core processes. Management believed that IT had become a significant source of competitive advantage.

> *If we were going to be able to compete, we were going to have to become a technology company.*
>
> *—Ken Lacy, SVP and CIO*

In the late 1990s, as UPS attempted to grow through adjacent businesses, management wanted to leverage its IT capability. The extent to which new subsidiaries could apply existing technologies, however, was not clear.

This addendum describes the technologies in use at both UPS package delivery and UPS subsidiaries in late 2001.

Technology in the Core Business

At the heart of UPS's technology capability was its robust physical infrastructure that supported enterprise applications and housed centralized databases.

Data Processing Facilities

UPS opened a large, centralized data operations center in Mahwah, New Jersey, in 1991 and built a second data center in 1995 in Windward, Georgia to provide redundancy. By 2001, the two centers held 15 mainframe computers with 19,650 MIPS of processing capacity and 183 terabytes of mainframe and Unix storage capacity. The data center processed 92 million online transactions and 460 million batch transactions daily, with 35% of the processing capacity devoted to tracking systems. In addition, the data centers housed 57 mid-range servers hosting UPS Web applications and online tools. The UPS website generated more than 6 million tracking requests daily.

UPS designed the mainframe processing environment and the Internet infrastructure to scale quickly and reliably.

> *We purposely architected to the point where we could expand horizontally as well as vertically very quickly. So we didn't put all our eggs in one box. You'll find a lot of our Internet activities are stretched over many small servers so that if you lose a few of them you don't have to worry about it. And then we duplicate that with two data centers so that if we lose one data center, the other data center takes it over. And we did the same thing for telecommunications.*
>
> *—Ken Lacy, SVP and CIO*

UPS ran 24/7 operations and exchanged data daily between their two data centers. This arrangement ensured business continuity for unforeseen events such as inclement weather and power outages. The data centers had contracts with two separate utilities to ensure a

source of electricity. In addition, diesel generators and fuel battery cells provided backup power.

Telecommunications Network

The UPS network began as a group of networks built to accommodate various internal information service applications that the company was building in the mid-to-late 1980s. In the early 1990s, UPS constructed a private network using x.25 packet switch technology to support its global expansion and package tracking services. As UPS delivered more information-based services (e.g., online services and package flow monitoring), the network had to undergo another evolution to keep pace with increasing demands for higher information transfer rates, reliability, scalability, and cost effectiveness. In 1995, UPS migrated from x.25 leased lines to a public frame relay network to meet these needs.

A cellular network that allowed the package data to be uploaded directly from the delivery vehicle to UPS databases enabled real-time package tracking. Although there were no nationwide cellular networks at the time of implementation, UPS chose not to build a private wireless network and instead signed contracts with over 100 cellular carriers to provide coverage over 97% of the U.S. In 2001, UPS was the largest user of cellular technology in the world, making over one million calls daily.

Applications

UPS developed an extensive suite of applications centered around package delivery information and customer databases. UPS divided its applications into four portfolios:

- Customer automation portfolio: applications that pass information to and from the customer; including Web applications, shipping clients (e.g., WorldShip), and on-line package tracking
- Operations portfolio: internal applications that facilitate package movement from driver pickup to delivery; including package shipping systems, DIAD,[13] air systems (scheduling, maintenance), and international (brokerage, customs)
- Business development portfolio: sales force automation, and call center applications
- General and administrative portfolio: back-office applications; including HR, finance, accounting, and industrial engineering applications, eProcurement

Information flow at UPS paralleled business processes. DIADs and shipping clients would send package information to the data center. UPS's data center was designed to accept incoming package data via multiple channels—through Web browsers, telephones, shipping clients, DIAD cellular/radio/modem transmissions and manual key entry of shipping book records. As the package moved through various sort points in the UPS network, package-tracking systems scanned bar codes and uploaded package status to UPS's mainframes. When the package was delivered to the consignee, the DIAD again transmitted successful delivery of a package, triggering additional services such as delivery confirmation, as well as billing and accounting processes. Via the Web, IVR's or the call centers, customers could inquire about the status of their delivery. (See Exhibit 1 for package delivery process detail.)

UPS continually enhanced both infrastructure and applications to incorporate the capabilities of new technologies and to improve standard processes (Exhibit 2). For example, the first DIAD technology was deployed in 1990, updated in 1993, and again in 1999. With each version of DIAD, UPS strove to increase the communications capability to deliver more near-real-time tracking data required by the package tracking applications. The first DIAD needed to be docked in a delivery vehicle in order to transmit package information. New capabilities enabled by improvements in wireless technology allowed next generation DIADs to transmit data as soon as packages were delivered.

[13] Delivery Information Acquisition Device: the handheld computers used by UPS drivers to collect and upload delivery information

Similarly, customer service applications also evolved to integrate various customer contact channels. UPS built the Customer Access Resource System (CAReS) in 1994 to enable interactive voice response (IVR[14]). CAReS was designed to be a messaging system between the customer database and existing and future customer service applications. CAReS proved important in developing CTI[15] and Web-based applications. Not only did CAReS simplify the management of multiple access points to the database, but it also ensured a common data communication interface among the many applications such as back-office, sales, customer service and package tracking for the core business. In 2001, UPS planned to enhance the seven-year-old CAReS system to provide additional CRM capabilities.

In late 2001, two major IT initiatives were underway: (1) development of next generation package delivery applications and (2) integration of international systems into the UPS core architecture.

Production flow system (PFS) was the name given to the next generation package delivery applications. PFS was a set of applications that would enable increased efficiencies in sorting and delivery.

Systems supporting the International business were largely independent of the core in the late 1990s. The International business largely grew via acquisitions. As a result, UPS IT was gradually migrating International onto the core platform.

> *In the core business, we are in an integration mindset. We have automated hubs in Europe and Asia; we have DIAD deployed in other countries, and international customers use the same APIs. And now we are bringing it all together by integrating the back-end systems.*
>
> *—Dave Barnes, VP of IS, Customer Automation Portfolio*

To maintain the stability of complex applications such as tracking and billing, UPS put in place a rigorous change process with set six-month release dates to prioritize and manage business demand while maintaining high reliability. A typical business initiative would take up to one year from concept to implementation. However, the applications development staff was able to respond to critical business needs by implementing necessary changes with the next scheduled release.

Package and Customer Data

UPS focused on centralization while planning the infrastructure and the application portfolios, but major connectivity in the system was provided by a common data architecture: package level detail (PLD). PLD was the file format that contained all data regarding the package.

Besides containing package information for billing, PLD data collected from scans allowed sorting of packages within the UPS physical network. For example, PLD files had hierarchical tags that allowed consolidation of individual packages into a bag, consolidation of bags into an igloo[16] and consolidation of igloos into a plane.

PLD data was uploaded to a hierarchical IMS Fastpath database in the UPS data center, which in near real time, extracted, transformed, and populated the data into a relational DB2 database. However, incoming data had to be loaded into the IMS database rather than DB2 due to the high transaction processing requirements. The hierarchical database could not perform track and trace or other analytical functions, which were possible in a relational database. To meet both performance requirements as well as package tracking functionality, UPS worked with IBM to develop the capability for near real time sort from IMS to DB2.

The customer database stored customer information and historical billing data in a data warehouse. In 2001, a new initiative was undertaken to consolidate all customer-related

14 IVR (interactive voice response) is an application that enables automated telephone transactions

15 CTI (computer telephony integration) allows customer service representatives to view customer related information while responding to a service inquiry

16 An igloo is a package container shaped to maximize space usage inside an aircraft.

data from various transactional databases into a real-time, operational data store. This database would use a master customer identifier (and appropriate sub-identifiers for business units or geographies) to consolidate all transactional data and give a customer the ability to monitor all inbound and outbound deliveries.

Technology in the Subsidiaries

Due to the differences between subsidiary needs and the core that UPS offered, UPS subsidiaries usually developed their own IT environments or partnered with external providers.

> *If I had to use one word to describe how Logistics started, it would be entrepreneurial. The worst thing Logistics could have done was use everything at UPS and try to leverage off that. If you think of UPS's technology, it's very production oriented—millions of packages, multi-millions of transactions. We really couldn't just leverage off that and, in addition, many of our acquisitions had reasonable stand-alone systems.*
>
> *—Dan DiMaggio, President, UPS Supply Chain Solutions*

Similarly, UPS Capital initially relied on external partners such as other financial service providers for its product offerings and gradually migrated to in-house capabilities as its product portfolio developed. UPS Capital believed there was significant future potential in leveraging the core's research about customers and shipments to gain market understanding and assess risk management, while ensuring protection of customers' privacy.

> *Information from the core business will be integral to UPS Capital growth and development. It will help focus our marketing and sales efforts and reduce our exposure to risk. It will help us achieve the controlled and disciplined growth that is required in financial services.*
>
> *—Stephanie Hill, VP of Marketing, UPS Capital*

Over time subsidiary management preferred to contract with the core to host applications and procure network services. For example, UPS Logistics acquired Sonic Air in 1995 and migrated their service parts logistics applications from Data General NT-based servers to UPS core's high-end Unix servers. Running applications on the core infrastructure allowed the technology to meet needs of the growing service parts business.

> *As [the subsidiary businesses] scaled up, they couldn't withstand the growth and migrated onto a common UPS backbone. That system is now on the UPS backbone, which provides us 24/7/365 availability and gives our customers global visibility.*
>
> *—Dan DiMaggio, President, UPS Supply Chain Solutions*

As the most mature subsidiary, UPS Logistics provided an example of how IT support for subsidiaries evolved. It was comprised of two main business units, Service Parts Logistics (SPL) and Supply Chain Management (SCM), each with their own set of applications.

Service Parts Logistics (SPL)

SPL's application platform has four components: a set of planning and optimization tools, a CRM application, warehouse management software, and a database. The planning and optimization tools use algorithms to provide initial inventory stocking policies for new customers and regular updates based on analysis of historical inventory levels. The CRM and warehouse management applications were integrated to support the full set of processes that made up Service Parts Logistics, such as fielding customer requests for replacement parts, packing and shipping parts from one of 450 warehouse facilities, and ensuring on-time service completion. The database stores customer as well as inventory data.

Supply Chain Management

UPS's supply chain management capability provided customers with full network design services, including the ability to completely reengineer, map, and model the customers'

supply chain solutions. While SPL had standardized its applications architecture, SCM's logistics technology was customized around the unique needs of each client. The processes used to manage a supply chain of high value, high turn semiconductor inventory, for example, were very different from those used by a warehouse for automotive spare parts. As a result, SCM focused on developing platforms for just five specific industries.

Logistics IT combined packaged software, legacy systems from its acquisitions, and new internal development to create these industry platforms. They then constructed appropriate solutions for each customer, mixing and matching from five major categories of applications (Exhibit 3):

- **Demand planning** applications that forecast supply and demand to enable efficient production scheduling and minimize inventory. These applications often interfaced with external point of sale systems.
- **Manufacturing planning systems** that model the production capacity of manufacturing facilities in conjunction with demand planning inputs to optimize production schedules and materials requirements.
- **Order management systems** (OMS) that record order data, determine physical fulfillment and financial settlement processes, and communicate information to applications. OMS was a customer-facing application that supported product configuration.
- **Inventory and warehouse management systems** (WMS), which translate order information into execution steps, controlling the movement of goods within the warehouse or distribution center up to final delivery.
- **Shipping and transportation management systems** (TMS) that automate the shipping process, including route and schedule optimization, mode and carrier selection, fleet management, and freight payments. TMS communicated delivery information to third parties.

Even with industry-specific platforms, SCM solutions were customized to integrate UPS supply chain technology with their customers' and other parties' (e.g., suppliers and end-customers) applications.

> *The set of standards for suppliers, standards for the customer, and integration with legacy systems make integration very complex. [A large semiconductor manufacturer] took 18 months of integration work, integrating our package to their suppliers as well as their legacy systems.*
>
> *—Dan DiMaggio, President, UPS Supply Chain Solutions*

Due to customer and industry differences, Logistics supported several different vendor platforms performing similar functions. This increased support costs and diminished operating margins. Going forward, Logistics hoped to create a flexible application architecture that would support both a standard supply chain solution and allow customization via standardized interfaces.

> *We have been trying to migrate to an enterprise architecture and a standard solution for small and medium customers, but if I'm running a million square foot warehouse for a Fortune 500 customer, I can justify one-off, customized solutions. At [a major semiconductor manufacturer], the software is customized to track racks of chips, so the warehouse management system had to be specific for the semiconductor industry. But within the enterprise architecture, we'd like to have standard interfaces, even for our larger customers that plug in and out various software modules. The technology implication is that we will be the middleware capital of the world.*
>
> *—Dan DiMaggio, President, UPS Supply Chain Solutions*

Subsidiary Enterprise Architecture

As Laurie Johnson and her team began planning the enterprise architecture for the subsidiaries, there were opposing viewpoints regarding the relationship between core and subsidiary

technologies. Some were not optimistic that core technologies could be leveraged in the subsidiaries.

> *UPS applications are built for UPS and they're very finely tuned and package-specific so when you start getting into other businesses, they just don't work. The infrastructure is so finely tuned and complicated that if you want to tweak it, it's extremely complex, expensive, and time consuming.*
>
> *—Jay Walsh,*
> *CIO of UPS Mail Innovations,*
> *former CIO of UPS Logistics*

Others viewed tighter integration with the core as a key component of the architecture.

> *Whatever applications, whatever infrastructure we have in the parent that is leveragable, we absolutely want to do that. It doesn't make sense for us to build our own data center. We have two perfectly wonderful ones that are state of the art and as long as they have space, that's the direction we want to go.*
>
> *—Laurie Johnson,*
> *VP of Technology,*
> *Corporate Development*

Beyond leveraging the UPS data centers, redundancy, and disaster recovery capabilities, the subsidiaries also benefited from UPS's central procurement process and financial strength.

Beyond the sharing of physical infrastructure and financial clout, some managers in the core believed that the core technology could be leveraged in terms of applications as well. Existing package tracking infrastructure and data could be modified to meet some supply chain needs in the logistics business. For example, the PLD and package scanning technology was converted into an inventory tracking system.

> *Essentially, I could take our bar codes and put them on shelf positions in a warehouse and put other bar codes on packages and be able to tell you where inventory is. And I could do it with the technology we have today. But while the systems we have can physicalize the warehouse, we don't have a lot of functions that you would normally put into a warehouse management system.*
>
> *—Phil Nardomarino, VP of IS,*
> *Operations Portfolio*

While the package tracking data structure could be leveraged for some supply chain functions, significant application logic (e.g., inventory stocking and replenishment rules) would have to be written or acquired to develop a comprehensive supply chain solution. In addition, mainframe based core applications would either have to be converted to server platforms and hosted locally, or connected to supply chain facilities via data networks back to the UPS data center.

Laurie Johnson's enterprise architecture team would begin the design process by developing a technology landscape across all subsidiaries, inventorying all applications, platforms, and investment costs. The landscape would allow her and her team to begin the process of rationalizing and standardizing the set of subsidiary technologies and how to leverage the core technologies.

EXHIBIT 1

PACKAGE DELIVERY PROCESS

Pick-up initiation
- Customer channels: Call center, VRU, Web, Shipping clients, retail location, or 3rd parties

Information capture
- Customer data queried
- Package PLD assigned
- Dispatch schedule updated
- Package data preloaded to center

Pick-up scheduling
- Same-day or next-day pickup schedule updated
- Driver map updated
- Same-day info uploaded to DIAD

Package pick-up
- Some packages scanned

Origination center process
- Package scanned
- Packages to hubs loaded to feeders
- Customs clearance initiated

Origination hub sort
- PLD updated via dimensional weighting
- Package scanned
- Package sorted on average 2.2 times in a consolidated hub

Hub consolidation
- Packages consolidated into trucks, igloos, airplanes
- External tag of consolidated unit scanned
- Packages transported to destination hub

Destination hub sort
- Consolidated unit scanned
- Customs processes completed
- Package data preloaded to distribution centers

Destination center process
- Package scanned
- Dispatch schedule updated as needed
- Package loaded to vehicles as determined by pre-load

Destination delivery
- Package delivered to final destination
- Delivery re-scheduled in case of absent recipient

Delivery information capture
- Package scanned
- Customer signature recorded
- DIAD info uploaded
- Value added services processes, e.g., C.O.D
- PLD updated with destination info, e.g., residential vs. commercial

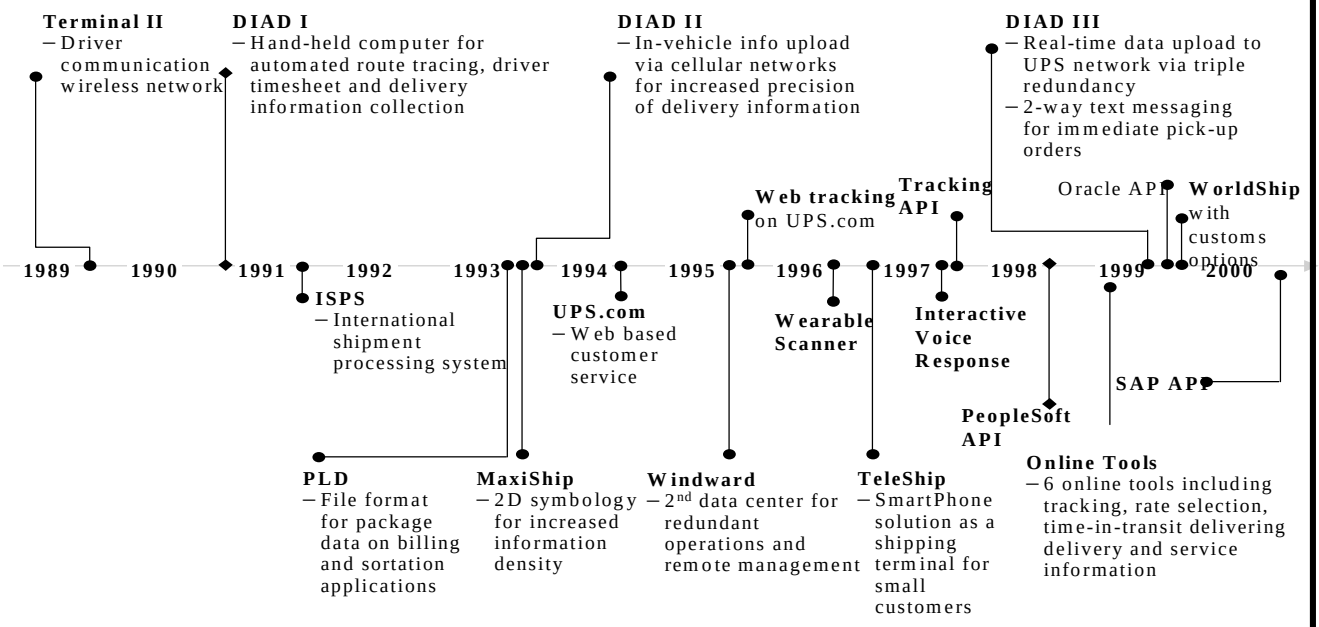
Transaction process
- Data updated
- Billing initiated
- Customer accounting/order systems updated
- Customer alerts sent

Tracking
- Packages are tracked via IVR, call center, VRU, Web, shipping clients

Source: UPS

EXHIBIT 2

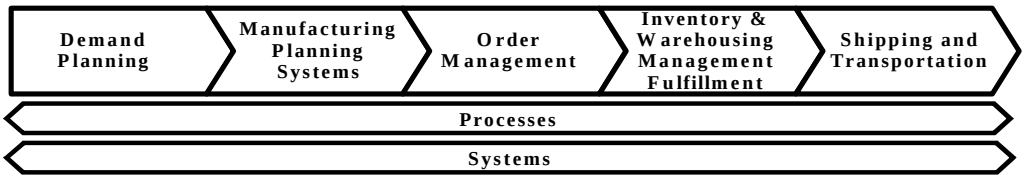
TECHNOLOGY INNOVATIONS TIMELINE



Source:UPS, McKinsey

EXHIBIT 3

SUPPLY CHAIN COMPONENTS



Business objectives	• Create accurate forecasts • Delay WIP to finished goods conversion	• Optimize manufacturing production schedules • Minimize WIP and raw material inventory	• Provide customers accurate info • Reduce lead times • Bypass warehouses	• Reduce inventory • Minimize obsolescence • Manage seasonality • Provide vendor managed inventory	• Reduce cost • On-time, correct quantity delivery • Increase delivery frequency • Minimize damage
Supply-chain activities	• Integration with customers and suppliers • Sourcing & procurement • Production scheduling	• Pre-scheduling of manufacturing cycle • Measurement of capacity, production quality and compliance to design • Enable Just-in-time (JIT) manufacturing	• Accepting orders, via multiple channels • Product configuration • Backorders • Customer service	• Inventory management • Material handling • Labeling and packaging • Pick & pack • Kitting • Cross docking • Returns	• Route and mode optimization • Inbound/outbound full/less than truck load service • Brokerage & freight forwarding • Merge-in-transit • Customs clearance
Information requirements	• Factory communication • Customer data, e.g. POS, sell through, forecast, inventory • Replenishment triggers	• Integration to enterprise resource planning (ERP) systems and demand planning applications • Integration to suppliers	• Available-to-promise (ATP) • Integration to customer's order management system (OMS)	• End-to-end inventory visibility • Integration to customer's OMS and ERP system	• End-to-end visibility • Integration to multiple shippers: - pricing - reservation - tracking - other

Source: McKinsey

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- IT-Enabled Change
- IT Innovation
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- The IT Engagement Models

In July of 2008, Jeanne W. Ross succeeded Peter Weill as the director of CISR. Peter Weill became chairman of CISR, with a focus on globalizing MIT CISR research and delivery. Drs. George Westerman, Stephanie L. Woerner, and Anne Quaadgras are full time CISR research scientists. MIT CISR is co-located with MIT Sloan's Center for Digital Business and Center for Collective Intelligence to facilitate collaboration between faculty and researchers.

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CONTACT INFORMATION

Center for Information Systems Research
MIT Sloan School of Management
5 Cambridge Center, NE25, 7th Floor
Cambridge, MA 02142
Telephone: 617-253-2348
Facsimile: 617-253-4424
Email: cisr@mit.edu
http://mitsloan.mit.edu/cisr

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