

October, 1993

Dear Colleague:

Attached is the Information Services Market Analysis Program's latest report on the *Transportation Sector*. It provides a current assessment of the events and issues driving this marketplace, and offers INPUT's forecast of the market size for information services for the period, 1993-1998.

This report should be filed with INPUT's other U.S. Information Services Market Analysis Program reports, behind the tab marked *Transportation*. Your INPUT program binders, together with the delivery modes reports, provide a total assessment of the United States market for information services.

Market Analysis Program industry and cross-industry sector reports are prepared annually and may be in one of two forms. The expanded report such as this *Transportation Sector* report, contains a detailed industry analysis and supporting forecast data. It is typically 40 to 50 pages in length. The forecast update is a short report, providing a new forecast and summary data to support forecast assumptions. It is generally be 15 to 20 pages in length. Normally, for each industry and cross-industry market segment, full reports are produced every other year, with summary reports prepared in the intervening years. The intent of this new format is to recognize the value of our client's time, and provide concise statements of industry activity, supported by rigorous business, technical, and competitive analysis, and a five-year industry forecast.

I am certain that you will find the *Transportation* report to be both informative and useful, and welcome any comments that you have on this document, or any of INPUT's publications.

Sincerely,

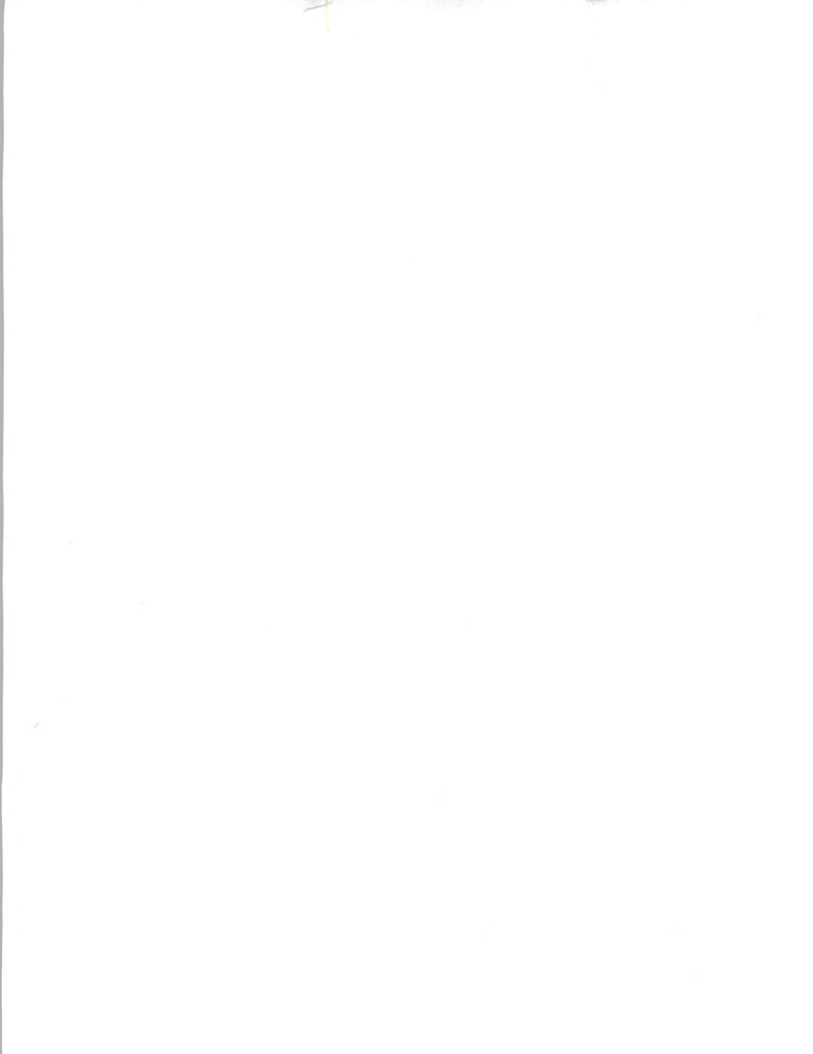


Robert L. Goodwin

Manager

Information Services Market Analysis Program

Enc.



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VERTICAL MARKET ANALYSIS

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TRANSPORTATION  
1993-1998

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**U.S. Information Services  
Market Analysis Program**



O C T O B E R      1 9 9 3

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# TRANSPORTATION

## INFORMATION SERVICES OPPORTUNITIES & TRENDS

1993-1998

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**Transportation**

***Information Services Opportunities & Trends***  
***1993-1998***

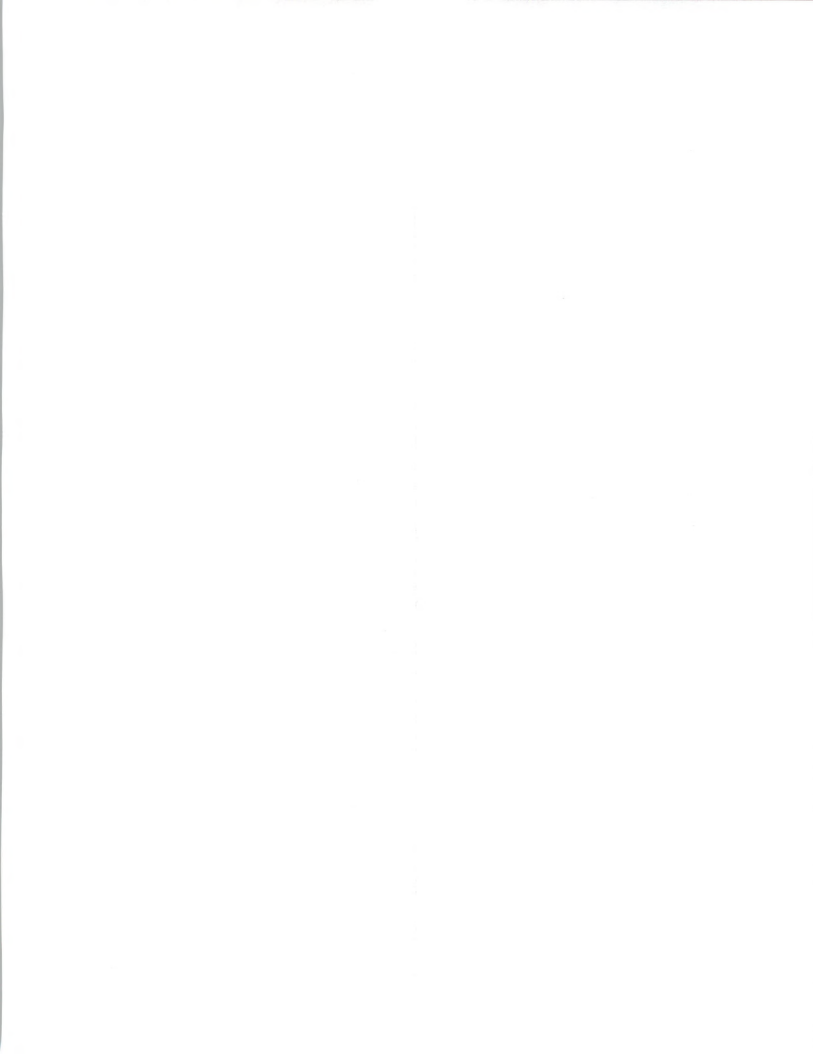
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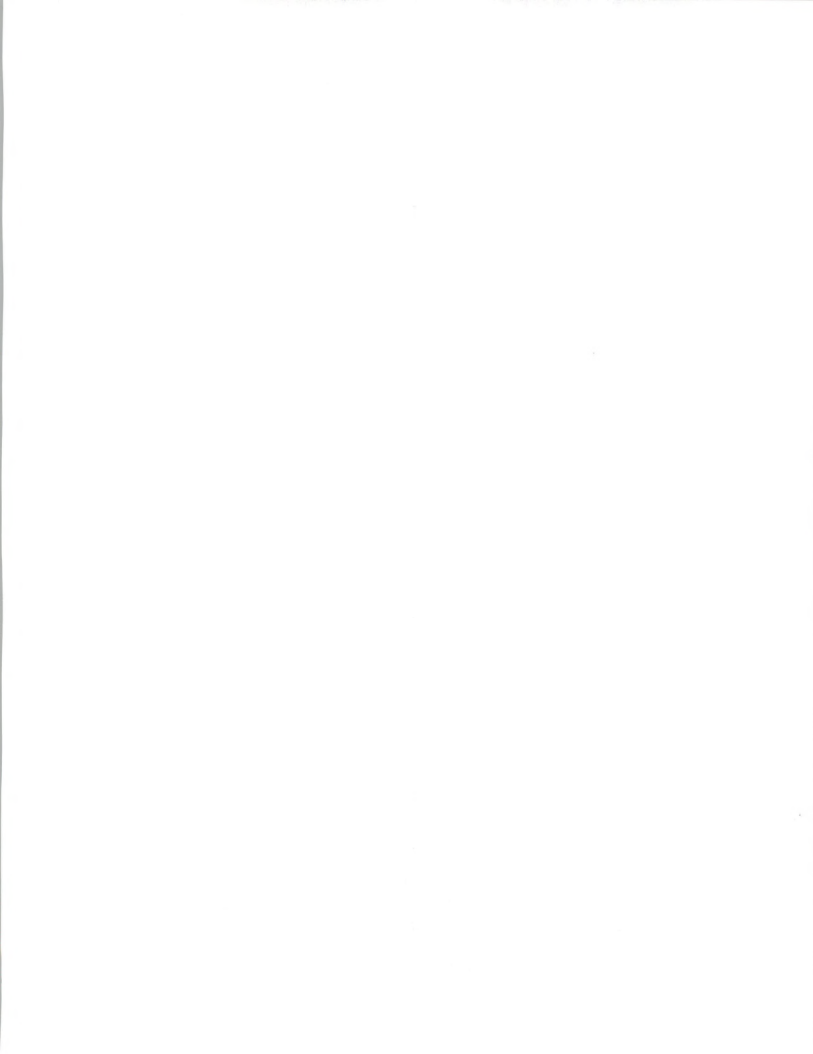
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## Overview

### A

#### Purpose, Organization and Methodology

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This section identifies the purpose and scope of this report, identifies key issues affecting information services expenditures in the transportation services industry market sector, notes how the document is organized and explains INPUT's research methodology and the techniques used in the preparation of the forecast data.

##### 1. Purpose

The purpose of this forecast report is to describe the evolving transportation service industry, identify the key factors in these markets, and provide the 1993 INPUT forecast for information services in major segments of this industry.

*Industry Definition* - The transportation industry encompasses all service businesses that are primarily involved in the movement of goods and people. According to those who work in these businesses, it is not a single industry, rather a group of competing industries based on their mode of transport, i.e., railroad, trucking, etc. Because these industries are quite different in vision, economic forecast and use of technology, this report will consider each of these "transport mode" entities as segments within the overall sector.

*Sector Definition* - The transportation service industry sectors, as defined by INPUT, include:

- Railroads, SIC code 40, including passenger, general freight and the rapidly growing intermodal traffic
- Trucking, SIC code 42, for-hire motor freight



- U.S. Postal Service, SIC code 43's only entity
- Water freight, SIC code 44, both domestic and international
- Air transport, SIC code 45, covering passenger and freight, domestic and international
- Pipelines, SIC code 46, which covers petroleum lines, and excludes natural gas carriers that are part of the energy industry
- Services, SIC code 47, covering the specialized businesses that include travel agents, freight forwarders, etc.
- Package delivery firms are classed in both SIC codes 44 and 45, dependent upon their parentage, i.e., Roadway Express is classed as trucking, Federal Express as air cargo, etc.

*Key Issues* - INPUT feels that an understanding of the issues confronted by the industry and its underlying sectors is necessary for comprehension of their information services direction. With this understanding, market strategies for the focused information services vendor become clearer.

- Because transportation is generally a business service industry, its fortunes are tied to the economy. Will the domestic and international economy recover sufficiently for the industry to continue the pace of technology implementation?
- In 1993 several federal government initiatives will have an impact on the economy and, more directly, on the various transportation sectors.
- A knowledge of several concepts and technologies like global positioning, logistics, and the pervasive EDI is fundamental to understanding the directions of transportation service providers.
- Smaller transportation companies without the financial resources or the perceived need for these expensive technologies have more fundamental needs.

## 2. Organization

In addition to this introductory chapter, the report contains analyses of the industry, information services market and competitive environment as described below:

- Chapter II, *History, Events, Trends and Issues*, discusses changes, market issues and activities and competitive factors in the transportation industry and segments that can have an impact on the current and future use of information services.



- Chapter III, *Information Systems*, presents an analysis of the expenditures for information services, by delivery mode and submode, for the U.S. transportation services market. The chapter also discusses various recent and in-progress technology activities within the segments of the transportation industry.
- Chapter IV, is INPUT's *Information Services Market Forecast*.
- Chapter V, *Vendor Competition*, includes data on vendor activities, addressing the transportation industry and segments by application area, delivery mode, and size. In addition, positioning of the vendors is discussed, including the increasing importance of transportation companies as technology vendors. A selection of vendor profiles is included.
- Chapter VI contains INPUT's *Summary and Conclusions* for the transportation technology market.
- Appendix A contains the *Forecast Data Base*, presenting a detailed forecast by information service delivery mode and submode for the transportation industry vertical market. A reconciliation to the previous forecast is also provided.
- Appendix B contains descriptions of four federal government activities that are expected to alter the short- and long-term expectations of transportation industry segments.
- Appendix C contains industry-specific definitions.

### 3. Methodology

Much of the data on which this report is based was gathered during 1992 and the first half of 1993, as part of INPUT's ongoing market analysis program. Trends, market sizes, and growth rates are based upon INPUT research and in-depth interviews with users in the transportation services industries and the IS vendors serving the industry. INPUT maintains ongoing relationships with, and a data base of, all users and vendors that it interviews. Interviewees for the research portion of this report were selected from this data base of contacts.



*INPUT Library* - In addition, extensive use was made of INPUT's corporate library located in Mountain View, California. The resources in this library include on-line periodical data bases, subscriptions to a broad range of computer and general business periodicals, continually updated files on over 3,000 information services vendors, and the most up-to-date U.S. Department of Commerce publications on industry statistics.

*Financial Data* - It must be noted that vendors may be unwilling to provide detailed revenue breakouts by delivery mode or industry. Also, vendors often use different categories of industries and industry segments, or view their services as falling into delivery modes that differ from those used by INPUT. Thus, INPUT must estimate revenues for these categories on a best-effort basis. For this reason, the delivery mode and individual segment forecasts should be viewed as indicators of general patterns and trends rather than specific, detailed estimates for individual years.

## B

### General Business Trends

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As noted in the economic assumptions section of the Department of Commerce's 1993 U.S. Industrial Outlook, U.S. economic growth in 1992 was somewhat less than forecast in the prior year. The very slow recovery seen at the end of 1991 continued into 1992 with unemployment remaining at undesirably high levels—a condition fueled primarily by corporate restructuring and defense industry cutbacks. Even though retail sales were encouragingly high during the 1992 Christmas season, business expenditures continued to remain low, due to both an ongoing desire to reduce costs and improve profits and uncertainty as to the precise nature of any economic (primarily tax) reforms that would be proposed by the new Clinton administration to support its various programs. In 1992, the major burden of implementing economic policy fell on the Federal Reserve System, a strategy that caused it to steadily reduce the federal funds rate from 8% in June of 1990 to 3% in September of 1992, forcing a general reduction in all interest rates to the lowest levels in years.

The outlook for 1993 is cautiously optimistic, with many of the uncertainties tied to the new administration's attempts to both reduce the budget deficit and stimulate a sluggish economy. At this time, messages remain mixed, with proposed corporate taxes favoring small businesses and those who make capital investments and penalizing larger corporations, especially services firms, through a 2% increase in the top corporate tax rate from 34% in 1992 to 36% in 1993. Personal income will be reduced by a proposed average increase in income taxes of 3% for middle income families and 5% for those in the highest income categories. All taxpayers, both business and individual, will experience higher energy costs due to





newly proposed energy taxes. Many critics of the administration's proposals fear that new taxes risk slowing the economy just when it has started to show some healthy growth—and there is a general wait-and-see attitude to determine how successfully the proposals survive the conflicting agendas of the congressional process.

INPUT uses the Blue Chip Consensus (economic) report and various other sources (Federal Reserve, IMF) to identify anticipated economic growth trends and incorporate GDP assumptions in both industry and delivery mode financial forecasts. Economic growth in 1992 had a very slight upwards movement, but the 3% growth in GDP anticipated for that year is now forecast for 1993. This modest 3% growth is the logical result of the pressures placed upon the defense industry, tax uncertainties, a weak commercial real estate market, high federal debt, slow growth in the labor force, cautious financial institution lending policies, and the growing economic interdependence of the industrialized nations, causing one country's economic problems to affect all. Balancing these growth inhibitors are the healthy gains in corporate profits noted in 1992 and a pattern of increased consumer spending.

In summary, U.S. economic fundamentals, strengthened in 1992, established a foundation for the modest but steady 3% growth predicted for 1993.



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## History, Events, Trends and Issues

In the main, there is no transportation industry, nor has there ever been. Instead it should be viewed, as it has always been by its insiders and administrations, as a group of competing industries based on their mode of transport, i.e., airlines, railroads, trucking and water transport. Each was created by the birth of a transport technology and struggled to survive and grow against the competition of the day. The first railroad, the Baltimore and Ohio (B & O), was built to connect Baltimore, Maryland and the Atlantic Ocean with the Ohio River, and shared the same general route as the Chesapeake and Ohio (C & O) Canal. Both were quicker and easier modes of travel than their predecessor, animal-powered wagons. Since that time, the C & O Canal has become a bike path, the B & O routes were consumed by CSX Transportation, and animal-powered wagons evolved into multitrailer trucks sharing crowded roads with private automobiles, as airplanes crisscross the skies.

By viewing the mode-based industries, initially separated by the basic distinction of people and goods, a better picture of recent history can be formed. It is on this basis that more accurate projections may be drawn.

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### A

#### History

Exhibit II-1 is derived from U.S. Department of Commerce figures, which show that the vast majority of people continue to travel by private automobile. Some projections indicate that the number of automobiles in the U.S. will grow to one for each person between the ages of 20 and 64 by the year 2000. Although this does not necessarily imply massive increases in driven miles, it does not provide much hope for the already congested highways.



## EXHIBIT II-1

## Transportation

### Passenger Transportation Miles Ten-Year Comparison

	Passenger Miles (Billions)		Percent Change	Market Share (Percent)	
	1980	1990	1980- 1990	1980	1990
Private Automobile	1,557	1,660	6.6	83.5	80.8
Domestic Airline	219	358	63.5	14.1	17.4
Bus	27	23	-14.8	1.7	1.1
Rail	11	13	18.2	0.7	0.6
Total	1,814	2,054	13.2		

Source: U.S. Department of Commerce

The ten-year period 1980-1990 was one of significant growth for passenger transportation. Airline miles traveled increased at an incredible 63.5%; the only mode to improve its share. Bus travel was the only loser in total miles for the 1980s. A possible surprise is the slower growth in private automobile miles, compared with the others during the period.

A similar numerical vision of domestic intercity freight from the same source is shown in Exhibit II-2.





## EXHIBIT II-2

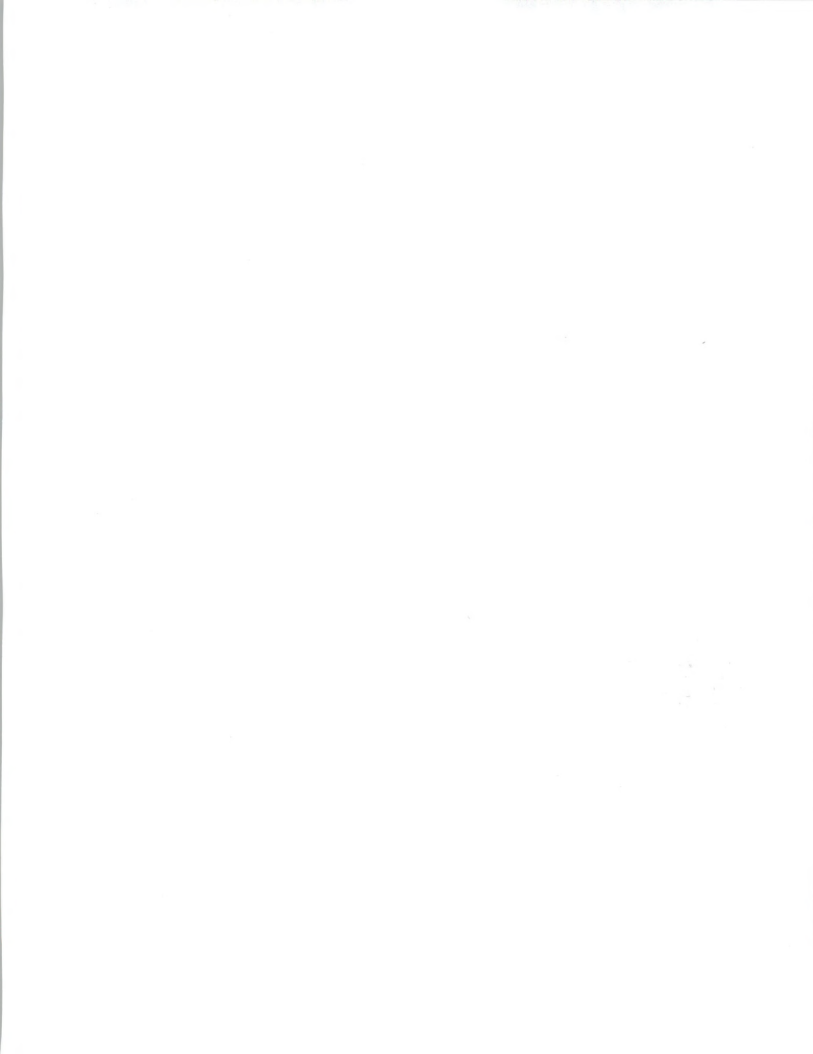
## Transportation

### Freight Transportation Ten-Year Comparison

	Ton-Miles (Billions)		Percent Change	Market Share (Percent)	
	1980	1990	1980- 1990	1980	1990
Railroads	932	1,071	14.9	37.5	37.5
Trucking	555	735	32.4	22.3	25.8
Oil Pipelines	588	577	-1.9	23.8	0.2
Waterborne	407	462	13.5	16.2	16.2
Domestic Airways	5	11	120.0	0.2	0.4
Total	2,487	2,856	1,789		

Source: U.S. Department of Commerce

The table shows a ten-year trend upward in total cargo volume for all sectors except oil pipelines, which had a modest drop. Rails exceeded industry growth slightly, and water was slightly below. The biggest gainers were trucking, also successful in increasing market share, and air cargo, with astounding growth based on the fast growing small package businesses of the 1980s. Combined, transportation is a service industry involved in the movement of goods, i.e., raw materials, parts, finished products, and people; for getting them to work, supporting business activities and vacation. Beyond automobile travel, transportation companies are primarily business support entities. The keys for selection among the various modes are: price, service, and timeliness. Collectively, our transportation system is an economic enabler, but has been one of the victims of the sluggish economy of the past several years.



In April 1993, *Fortune* reported 1992 results as follows:

"In the doghouse for the second straight year, transportation subtracted from the list's (the Fortune Service 500) luster, losing just over \$1 billion as a group."

Beyond transportation companies, the Service 500 list is broken into eight subgroups: 100 diversified companies (like AT&T and EDS); 100 commercial banks; and 50 each for diversified financial, savings institutions, life insurers, retailers, and utilities. Because the Service 500 had a total profit improvement of 9% over 1991 (to \$73 billion), the transportation sublist stands out as the only group with a cumulative loss for 1992.

The list of "The 50 Largest Transportation Companies" in the United States, with total revenues of \$153 billion during 1992, includes:

- 13 railroads, 10 profitable, with a total of \$2 billion positive
- 12 airlines, only 3 with profits, with losses of \$4.7 billion
- 11 trucking firms, 7 showing profits
- 6 shipping companies, 4 profitable
- 4 pipelines that were all profitable
- 3 package specialists, with 2 showing positive results
- 1 bus line making a modest profit

The 1992 losses were primarily in airlines. Without losing nine airlines, the remaining 41 firms would have shown a profit of \$3.6 billion. Hence transportation, as a whole, is not an unhealthy industry.

Finally, of the entire Fortune Service 500 companies, transportation service companies uniquely positioned themselves at both ends: two railroads (Southern Pacific and Norfolk Southern) were among the top five for "Biggest Increases in Profits" over the prior year, and three airlines (USAir, United, and American) were among the top five from "The Money Losers" list.

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## B

### Events

Beyond the recessive economy, what caused these formerly high flyers to turn negative? It certainly was not high fuel cost—that was part of the 1991 transportation story. In fact, the 25% cheaper jet fuel saved airlines more than \$2 billion in 1992. Imagine if fuel costs had not moderated.



One issue was accounting rule SFAS 106, requiring recognition of retiree health benefit liabilities. Thirteen transportation companies took this write-off, causing at least a 10% profit loss during 1992. In some cases, this was the difference between profit and loss. Because companies can wait until next year to take the charge, this rule change may hit others in 1993.

The continued fallout from industry deregulation—which deregulators expected would take between five and seven years—has now lasted three presidential terms and continues to plague some areas. Three airlines (Continental, TWA and America West) spent 1992 in Chapter 11 bankruptcy, and trucking firms continued to fall to the intense price competition fostered by over 47,000 companies.

### **1. Passenger—1992**

U.S. airlines struggled through their fourth straight year of operating losses. The International Air Transport Association's (IATA) 215 members have posted losses for the period 1990-1992 of \$11.5 billion. The association blames its financial situation on: overcapacity—many aircraft added during the 1980s; the Gulf War, which caused a decrease in demand; the ongoing recession; and the impact of liberalized regulations, all of which fostered fare wars. Though the mid-1992 fare wars were the most obvious cause of losses that year, fare cutting continues to be the airlines' quick answer to raise money, especially for those that are bankrupt. U.S. carriers are not alone, as major European airlines posted their third year of operating losses, with 1992 revenue estimated at \$1.4 billion.

The bankrupt and near-bankrupt airlines of 1992, often blamed by the big three for a propensity to cut fares and initiate wars, will probably all return from insolvency by mid-1993. Continental was rescued by a financial infusion (\$450 million for 60% of the common stock) from a North American pair, Air Canada and a group of Texas investors calling themselves Air Partners. TWA, with former owner Carl Icahn reaching agreement with the federal government to retire his pension fund debt for \$200 million, passed the last hurdle out of bankruptcy and is now owned by its employees (45%) and creditors (55%). The third and final passenger carrier under court protection, America West, is still working on reorganization but will probably succeed. Two other financially troubled U.S. carriers, Northwest and USAir, both received expected partial ownership deals with large foreign carriers, KLM and British Air, respectively.



Railroads, primarily the 21-year-old Amtrak, moved 40 million passengers in 1992. Amtrak succeeded in covering 79% of its operating costs, which is better than most of the world's subsidized passenger trains. However, that still left the taxpayer to cover some \$500 million. Amtrak's goal is self-sufficiency, and it continues to move toward it, now projecting to reach it by the year 2000. Forty-five percent of its passengers were metropolitan-area commuters, where Amtrak operates the lines under government contracts. Other railroads are moving back into the long-abandoned area of passenger service under similar arrangements, on both the East and West coasts.

Though there are hundreds of bus systems in the U.S., both public and private, the largest and most ubiquitous is Greyhound. After its consolidation with Trailways in 1989, Greyhound struggled with a strike of union drivers, bankruptcy, air and rail competitors, and the recession. However, it showed a profit in 1992. Greyhound expects its upcoming computerized reservation system to take it up a notch in competition with other passenger carriers by providing better customer service and control.

Water passenger travel is almost exclusively for vacation and business conference cruises, and though part of transportation, is not significant in raw miles. The year 1992 was not an exciting one for water passenger carriers as they, too, suffered from the protracted economic weakness. Its growth is dependent upon a more stable economic environment.

## **2. Freight—1992**

Railroad had a great year in 1992, even though their primary commodity goal was off 3% (normally 40% of volume). The railroad's long-term effort to reduce train crews, automate for better equipment utilization, and reduce operating costs has paid off. The hot growth area is intermodal transportation, including the use of double-stack containers, with an increase of 7.4% over 1991 to a record 6.7 million units. In light of the permanent nature of these changes, the rail outlook is very bright.

Trucking continued its lead in total cargo volume, where the numbers double when intracity is included and includes freight hauled by nonpublic trucks (fully half of the intracity truck cargo volume is by shippers' own fleets).

Oil pipelines are a major factor in the movement of goods, though they deal in just one commodity. Most are owned by the oil companies and are very profitable because of the few employees required for operation. Consolidation and affiliations abound because new construction is expensive and the owners must fight ecology interests for permission to build.





For the waterborne freight segment, 1992 saw some moderation in profits following the Gulf War. The war's buildup during much of 1991 was the primary cause of the segment's extraordinary positive shift in fortunes, from losses in 1990 of some \$25 million to profits of \$111 million in 1991.

Based on ton miles, air cargo is hardly even a factor in the overall freight picture, with only a 0.4% share. However, in growth terms it was the star of the 1980s, doubling its total volume during the decade. Within the air cargo segment is the subsegment air express, which led the growth with a tenfold increase in volume. Federal Express, which made "overnight package express" a reality by innovations in operations and the central hub shipment process, led the growth and attracted competitors. Federal Express's attempt to recreate its business miracle in Europe was not a success, and its 1992 write-off brought it a losing year.

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## C

### Trends

The U.S. Industrial Outlook for 1993, prepared by the U.S. Department of Commerce, predicts an improved economy and cautiously projects a better year for the four primary "transportation industries" —airlines, trucking, railroads and water transport, though slightly different by group.

"In the *airline* industry, more carriers could merge or face bankruptcy, depending upon the economy and on whether destructive fare wars persist; long-term prospects, however, particularly international services, are for moderate-to-strong growth. *Trucking* company rates will remain under intense competitive pressure; major carriers will continue a trend toward seeking profits from expedited deliveries in short haul markets. *Rail* freight traffic is expected to increase about 3% in 1993, and Amtrak passenger miles to rise 7%. U.S. flag *ships* in international commerce face stiff competition from foreign vessels, but U.S. domestic and inland shipping could benefit from recoveries in steel, construction, automotive, and other basic industries."

The U.S. Department of Commerce projects the transportation industry, as a whole, to grow dramatically in some segments.

INPUT believes that the transportation industry will continue to concentrate the number of entities through various mechanisms (merger, purchase, bankruptcy and affiliation) driven by attempts to reach the appropriate size, to counter the pressure of industry globalization and provide the capital resources to compete, e.g., advanced equipment and technology. Though all segments will see the creation of global megacarriers, the most obvious changes will be in the fragmented trucking segment, where



the cost of entry was small. The new costs of competition will be too great for most existing firms. Also, the weaker business entities in all segments will fail to keep up and will extinguish themselves, and the stronger, more nimble competitors will grow faster than the industry.

Specific trends for the most active segments can be informative:

## **1. Passenger Carriers**

### **a. Air**

Though industry sources and government agencies differ in their expectation for this segment's capability to show 1993 profits, they do agree on the long-term prospect for growth. The next 10 years is bright—even using the conservative estimate of the U.S. Department of Commerce, at 4.1% domestic and 5.7% international annually. However, there are concerns about whether U.S. carriers can turn this growth into profits because of faltering steps in the recent past and a highly leveraged financial position as U.S. carriers confront big capital requirements for aircraft purchase.

The hottest growth area for airlines is in Asia. Pacific Rim growth is 20% to 25% annually; China leads with growth projected in excess of 30%. China had 28 airlines in late 1992 and by mid-1993 there were 40 companies, with reservation-waiting lists two weeks long.

Observers will not see a return to general profitability for airlines globally in 1993, but there is expected to be a positive turnaround in losses because economic improvement will not be noticeable until late in the year. Real growth and profits will begin in 1994 and continue through 1998, fueled primarily by increases in international travel. The big three U.S. carriers are poised to take advantage of this growth and will be successful in their global expansion. They have learned their lesson with much pain and red ink.

Also, airlines will release their control of their CRS businesses either by outright sale or through significant buying, probably by technology companies. The infusion of cash from these profitable transactions can then be used to help offset the segment's future capital needs for expansion and replacement aircraft.



## **b. Rail**

Predictions by the U.S. Department of Commerce for Amtrak passenger rail include a 7% increase in passenger miles in 1993 and 2%-3% growth through the end of the decade. Much of this growth is due to Amtrak's contract commuter service, encouraged by increasing highway congestion. Based on their proposals for service, mainly in the Western states, other rail companies are expected to re-enter the commuter sector of the rail passenger business, introducing competition for Amtrak.

Higher speed rail will enhance this segment's growth in the long term, as airport and road congestion increases. This is particularly true on the Boston-Washington corridor. Shorter travel time and downtown terminals have made the Washington-New York Metroliner the favored travel mode. In addition, Massachusetts is viewing rail as a possible alternative to expansion of the crowded Boston airport. Higher speed capability would increase the potential of rail picking up travelers from air carriers and road.

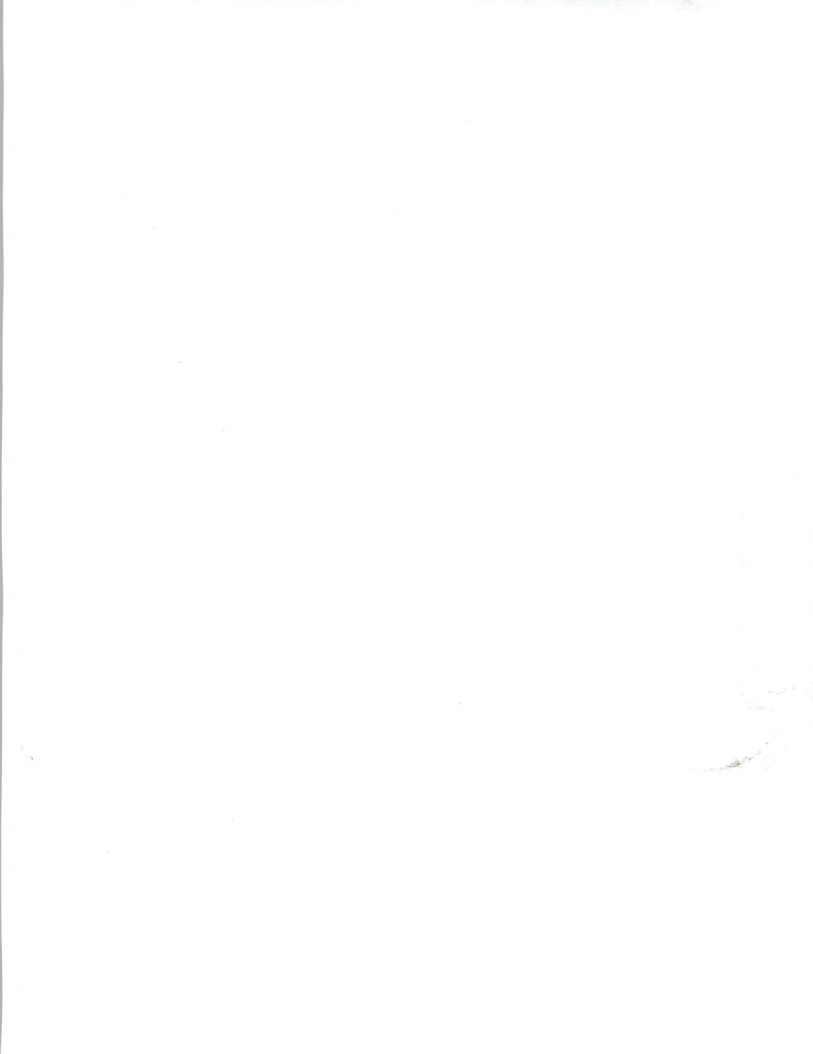
Recent favorable results from Amtrak tests of the improved "Roadrailer" units (see Appendix C) may expand Amtrak's share of contract Postal Service shipping beyond current levels. Other transportation firms could lose to Amtrak on parallel routes.

## **c. Bus**

Greyhound's return to profitability and entry onto the Fortune Transportation 50 list for the first time bodes well for this premiere busline. The creation of a CRS for its customers and the resulting management information will enable Greyhound to compete with its bigger, classier rivals. If Greyhound can turn information into better service and become a low-cost provider, it should grow in share.

## **2. Freight**

There will be a continued blending of "surface" freight, i.e., rail, truck, and water, primarily driven by the close relationship and information exchange inherent in the fast-growing intermodal traffic. The terms "seamless" and "end-to-end" will increasingly be expected by shippers and customers, with the mode of transport transparent. The question to be answered is, who will step forward to become the true "transportation companies"? CSX is at the fore today with its successful combining of all pieces. Conrail and Norfolk Southern have a new affiliation deal for rail intermodal. Secondly, who will no longer exist? Some say the compression of the links and automated data paths will end the value of the freight forwarder to shippers.



### a. Rail

The ton-miles hauled by rail are expected to grow by 2% to 3% in 1993 (U.S. Department of Commerce figures), but this is mainly a reflection of a resumption of coal shipments caused by economy improvement. Though projected volume increases for the next five years are a modest 3% to 5%, this continues the segment's modest historical increases. Intermodal is rail's real growth area, projected at 3% to 5% annually over the next five years. This mode is cheaper for shippers and highly profitable for rail, particularly with expanding double stack capability.

Intermodal growth may very well exceed current government projections because of trucking's increased fuel costs, difficulties in keeping long-haul drivers, and government actions. In addition, most truckers have tried intermodal transport and found satisfaction with rail's service capabilities. In one case, J.B. Hunt found it good enough to announce a total fleet shift from trailers to containers over the next few years and form affiliations with at least five railroads, including Canadian Pacific.

Today, there are seven major railroads in the U.S., three in the East, and four in the West. None of them is a single line that runs transcontinentally, because until recently only limited rail traffic went coast-to-coast. The eighth major railroad on the continent and the largest in terms of revenues—the Canadian Pacific—is transcontinental, and it has recently acquired the Delaware & Hudson and Soo Line that gives access deep into the U.S. Industry experts forecast that the existing U.S. railroads will combine and form three or four transcontinental companies.

### b. Truck

The trucking segment is projected by the U.S. Department of Commerce to maintain its domination of the U.S. freight market, and its share of revenues was 77% during 1992. The trucking segment contains the largest U.S. transportation company, UPS—largest in terms of revenues and 1992 profits (in excess of \$500 million). This segment also contains the largest number of carriers, some 44,174 separate firms in 1991. By the end of the decade the number of firms will be drastically cut, probably by more than half as the small "mom and pops" are eliminated by the sophisticated, well-managed carriers.

### c. Air Cargo

The rapid growth of air cargo businesses is expected to moderate to an annual 5% to 6% pattern through the decade. Competition will increase globally, particularly in small package shipping, with a trend away from overnight delivery to the less expensive second- and third-day delivery. As it does in passenger travel, Asia shows stronger growth than other regions of the globe.





The next decade for transportation will see the emergence of a transportation industry from the existing segmentation by mode. This will be most evident in freight, where the mode of transit will become even more transparent and of little concern to the shipper.

## D

### Issues

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As a group of related industries, transportation firms share some issues and impacts, and differ markedly on others. Prior to the 1980s, portrayed above, their histories have featured the most pervasive government regulation of an industry. In return, they have each benefited by significant taxpayer support during at least some point of their maturation. Because the federal government considers these industries of "strategic" importance, support in some form continues, and it will not be abandoned, regardless of its collective business viability. However, with that support, the federal government has always established controls in the form of regulation, and this may be part of the agenda.

Federal government initiatives will play a pivotal role in the economic recovery and, in some cases, have a direct impact on the transportation industry for the next several years. Pertinent issues include: NAFTA (North American Free Trade Agreement), the probability of a fuel tax, the 1992 Clean Air Act and the National Commission to Ensure a Strong Competitive Airline Industry.

Appendix B contains a description of each of these issues. Exhibit II-3 is an analysis of the sector impact of each of these actions. The purpose of the exhibit is to provide a point-in-time analysis of the interrelationships and possible effects of current federal government activities on the various sectors of the transportation industry in both short- and long-term perspectives.

The following assumptions were utilized in creating the exhibit:

- The basic amount of transport is constant; hence, what is not favorable for one mode shifts traffic to a more favorable mode.
- Factors including traffic congestion, difficulty in employing drivers, etc., are not considered in the matrix construct.
- The fuel tax is expected to be no more than ten cents per gallon; a higher level could drastically alter the effect on transportation beyond that charted.
- Because many transportation initiatives are currently being worked on, the actual results may differ markedly from this portrayal.



- Re-regulation is not considered, though it may be part of any or all enactments and may or may not be enforced.

## EXHIBIT II-3

## Transportation

## Government Activity-Effect Matrix

Sclae: 1=Severely Adverse; 5=Very Positive											
	NAFTA		Fuel Tax		Airline Competitive Act Panel		Clean Air Act		Averages By Term		
Term =	Short	Long	Short	Long	Short	Long	Short	Long	Short	Long	Composite
<i>Passenger</i>											
Airlines	4	4	1	3	4	4	3	3	3.00	3.50	3.25
Bus	3	3	2	3	3	3	2	3	2.50	3.00	2.75
Rail-Commuter	3	3	4	3	3	3	4	4	3.50	3.25	3.38
Rail-Travel	3	4	4	3	3	3	4	4	3.50	3.50	2.88
Automobile	3	4	2	3	3	3	2	3	2.50	3.25	2.88
Average	3.20	3.60	2.60	3.00	3.20	3.20	3.00	3.40	3.00	3.30	3.15
<i>Freight</i>											
Air	3	3	1	3	4	4	3	3	2.75	3.25	3.00
Package	4	3	2	3	4	4	4	3	3.50	3.25	3.38
Rail-General	5	4	4	4	3	3	4	3	4.00	3.75	3.88
Rail-Intermodal	5	4	5	4	3	3	4	4	4.25	3.75	4.00
Truck-Small	4	2	1	2	3	3	2	2	2.50	2.25	2.38
Truck-Large	4	3	2	2	3	3	2	3	2.75	2.75	2.75
Pipe	4	4	2	3	3	3	3	3	3.00	3.25	3.13
Water	4	4	3	3	3	3	3	3	3.25	3.25	3.25
Average	4.13	3.38	2.50	3.00	3.25	3.25	3.13	3.13	3.25	3.19	3.22
<i>Economy</i>	4	4	2	3	4	3	3	3	3.25	3.25	3.25
<i>Telecommuting</i>	3	3	4	4	3	3	4	4	3.50	3.50	3.50

The matrix attempts to codify these apparently unconnected activities and summarize the results in several ways that indicate a potential cumulative effect on the various modes and as groups. A severely negative result is indicated by a 1; a 5 is indicative of a very favorable result; and 3 indicates no impact. Values were assigned based on INPUT's industry knowledge and familiarity with the relative impact and perception of government action. The results are calculated averages of the columns and rows.



Much of the impact of these actions does not begin directly until 1994, but many forward-looking companies are already setting to take advantage of their expectations.

NAFTA has a positive impact in total, more so in the short term than the long. The most positive is short term for trucking, though NAFTA has a detrimental impact on smaller trucking firms, which will be hard pressed to compete with the lower-cost Mexican competition. The positive impact on other areas is based on the expected economic boost favorably impacting business travel and shipment.

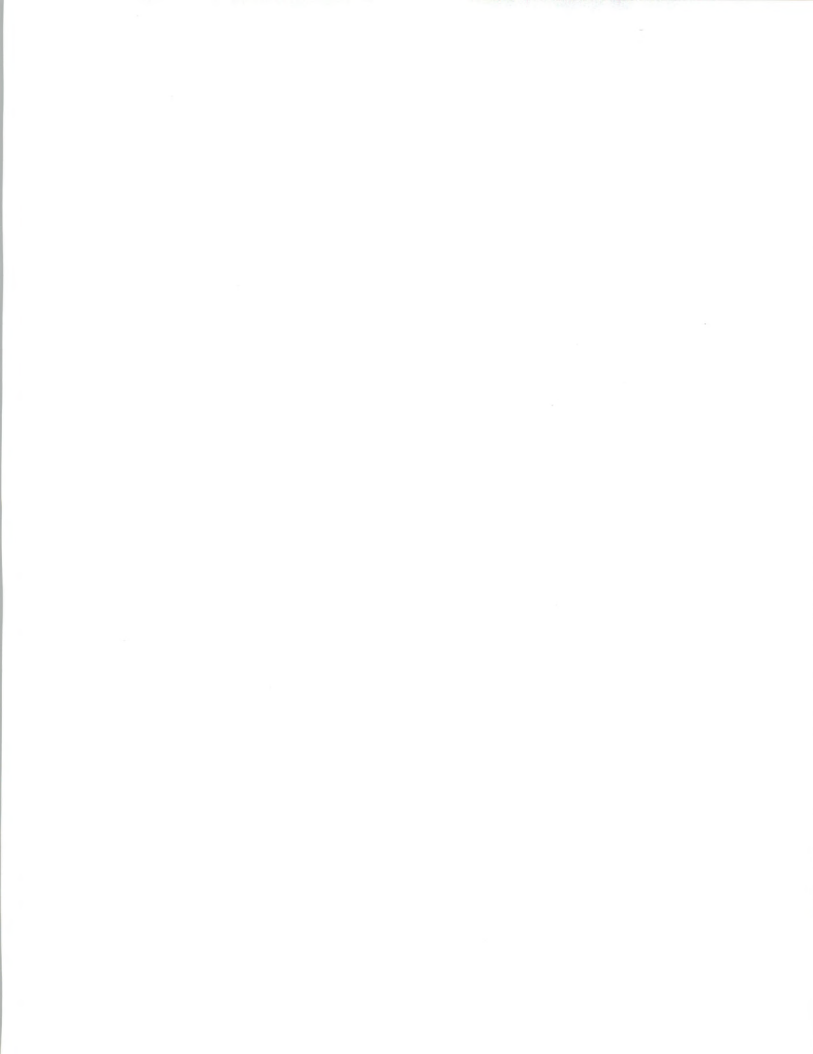
Fuel tax increases are assumed to have no transportation industry- or segment-specific relief included. The heavy users, air and truck, are the most negatively affected, which provides a big advantage to rail and its growing intermodal role in the short term. These changes are expected to increase the speed of this shift, which is expected to be permanent. Small truckers are again hit the hardest. Long-term forecasts for air modes show no further impact as rates adjust to compensate.

The Airline Competitive Panel actions are expected to influence only air carriers within transportation. Properly applied, the expected changes from this group, coupled with the economic benefit of NAFTA, may even compensate for the fuel tax hit to airlines.

The Clean Air Act will have a negative impact on diesel-powered trucks and automobile travel, particularly commutation. The rails will benefit by a permanent shift to their use.

Telecommuting was included as indicative of a positive gain that might not otherwise be considered. This mode of working at or closer to home should be more attractive as employers seek ways to avoid the Clean Air Act impact and react to employee suggestions to save both time and fuel expense. If this becomes significant, it would have a positive impact on productivity (advocates say) and traffic congestion.

In summary, these actions have a positive impact on almost all sectors over the long haul. Only the trucking sectors, particularly the smaller firms, will experience a negative impact. This should serve to increase the velocity of consolidation in the trucking segment, already projected to shed over half of its 40,000-plus companies by the turn of the century. *If* the federal government properly enacts these complex changes, the fortunes of properly prepared transportation firms look even better than projected, as these firms move into an already expected good period.



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## Information Systems

The cornerstone of the Industrial Revolution was the “separation” of work into basic elements that fostered mass production. This breakdown helped create separate industries and services, such as the transportation industry. As different modes of moving goods and people were developed, specific industries were created to work and manage the perceived differences presented by the transport method. The Information Age is replacing the specialization of the preceding era with integration and unification across former company and industry barriers. Technology, information, and communications will be the foundation for global business. Transportation will be the delivery mechanism and will have to build or conform to the information bridges among the parties, as has been done with the extensive use of EDI.

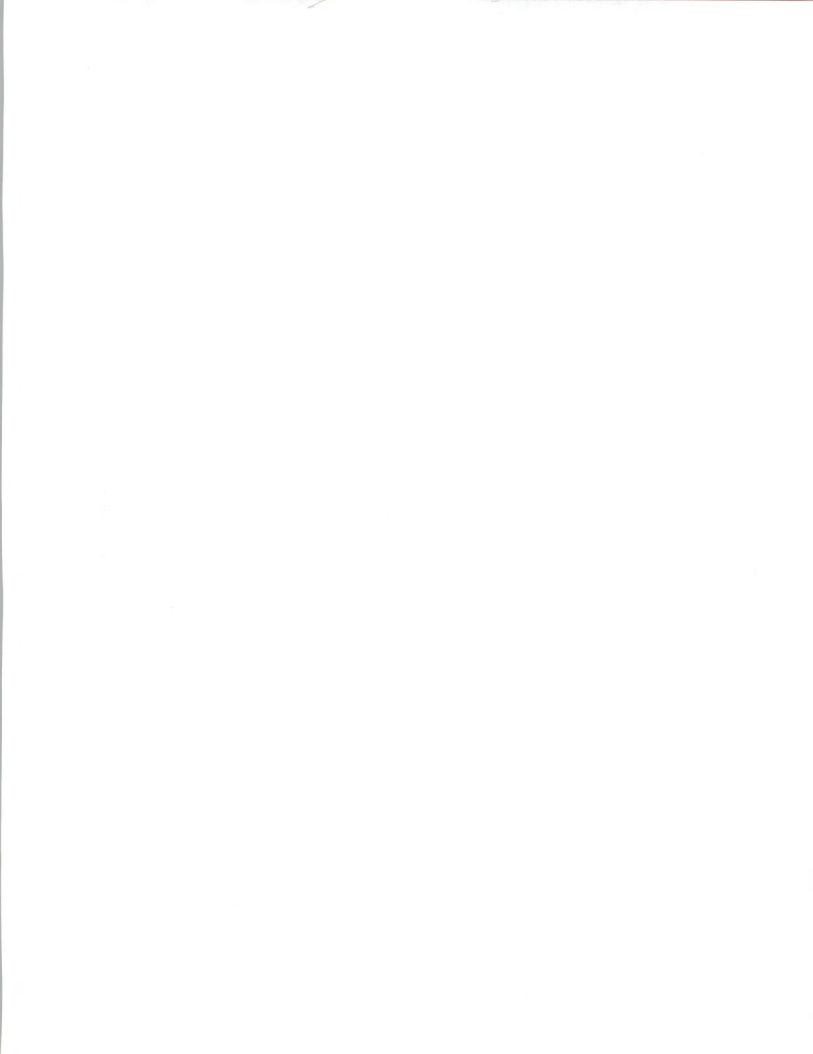
### A

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#### Organization and Use of Technology

Though there are exceptions, transportation industry IS organizations tend to be traditionally organized, i.e., centralized within a financial or operating unit. They, like other businesses, are generally moving toward the current technologies: client/server, open systems, distributed processing and network operations. This is certainly the model for the larger firms, some of which have taken steps to generate IS projects that promise revenue generation. The most active firms in this area are those mentioned as vendors (section D).

The strongest technology trend today is client/server, an opinion with which most transportation IS executives agree. (However, DHL Airways, the largest international air express firm, has delayed many of its re-engineering/downsizing projects aimed at client/server architecture.)



Transportation firms tend to view the implementation of technology as an expense and staff saver; a requirement to keep up with competitors; and, through EDI, the way to meet customer demand for end-to-end service. Smaller firms use workstations to emulate the big systems of their larger competitors.

Airborne Freight's IS activities enabled it to cut its cost per shipment by almost 20% through EDI-based shipping, invoicing and payment systems. It has also introduced a PC product that allows its customers to calculate and print their own invoices.

Roadway Services, 1992's less-than-full trucking profit leader, has deployed 5,000 bar-code scanners at its distribution centers for carton tracking and looks to put handheld units in each of its 37,000 trucks to extend shipment-tracking capabilities.

J.B. Hunt, number two in full-load trucking, is installing IBM PS/2s in each of its 6,000 trucks, which will communicate with the company's operations center and its five intermodal railroad affiliates. Though it hopes to save money by better scheduling, routing and refueling control, Hunt's primary motive is to increase driver job satisfaction and retain these increasingly scarce resources.

EDI continues to be a mainstay of transportation. Even before EDI had a name, transportation segments felt the need to interface with other transportation entities. The root cause was in the need to shift goods and passengers from one company and/or mode to another for a complete journey. To assist in this need, airlines connected their CRS systems through their existing segmentwide radio network, Airinc, and railroads, through the American Association of American Railroads (AAR), established a company (RAILINC) to facilitate the flow of paper and track rail cars across separate rail lines.

All transportation segments have associations that promote information sharing and, in at least one case, provide technology services. The most technologically active appears to be the Association of American Railroads, which formed RAILINC as a for-profit subsidiary in 1982. RAILINC's primary function is to provide network services among railroads (like EDI), maintain several data bases (car locations and financial interchange), promote communication standards and build software products. Though the primary target is railroads, RAILINC's role as an EDI communicator brings it into communication with all transport forms, manufacturers, and distributors.



The different industry segments tend to have "leading-edge" technology players who push the envelope and create temporary advantage, and who are followed rapidly by competitors. A primary case in point is Federal Express, which created the "next-day small package business" so familiar today. Beyond the operational basic of a central hub to process shipments, Federal Express's innovative use of technology for tracking and handheld driver entry devices created a new expectation for customers. Its rapid growth attracted other freight operators, who copied the basic methods and changed the competition to one based on price and volume discounting. Federal Express remains the largest in small package delivery, with 45% domestic market share in 1992. The rest of the big three are UPS at 26% and Airborne with 10% share of this market and which has moderated its growth pattern from the hot 1980s.

### 1. Budgets

Most market reports and forecasts indicate that budget growth in the transportation sector is not as fast as in other industries. This is particularly true when only the percent of budget growth is considered. A more in-depth analysis of the data underlying the results is needed to ascertain opportunities within the sector. Exhibit III-1 is an analysis of the transportation sector and its major segments. This exhibit does *not* imply that the indicated percent of increase is expected in dollar growth from 1992 to 1993. Instead, the top row reflects the mean increase (the average of the growth percentages) reported by respondents within each segment, and the bottom five rows contain the percentage distribution of all respondents within the segment by growth category. By way of example: the mean trucking percentage of 9% includes responses of 0% growth to a high of 100% and is indicative of large numbers of low-percentage responses. Still using the trucking segment, the general low growth is also reflected in the second section of the exhibit, with 60% of responses indicating a less than 5% growth, which counterbalances those with high-growth projections.



## EXHIBIT III-1

## Transportation

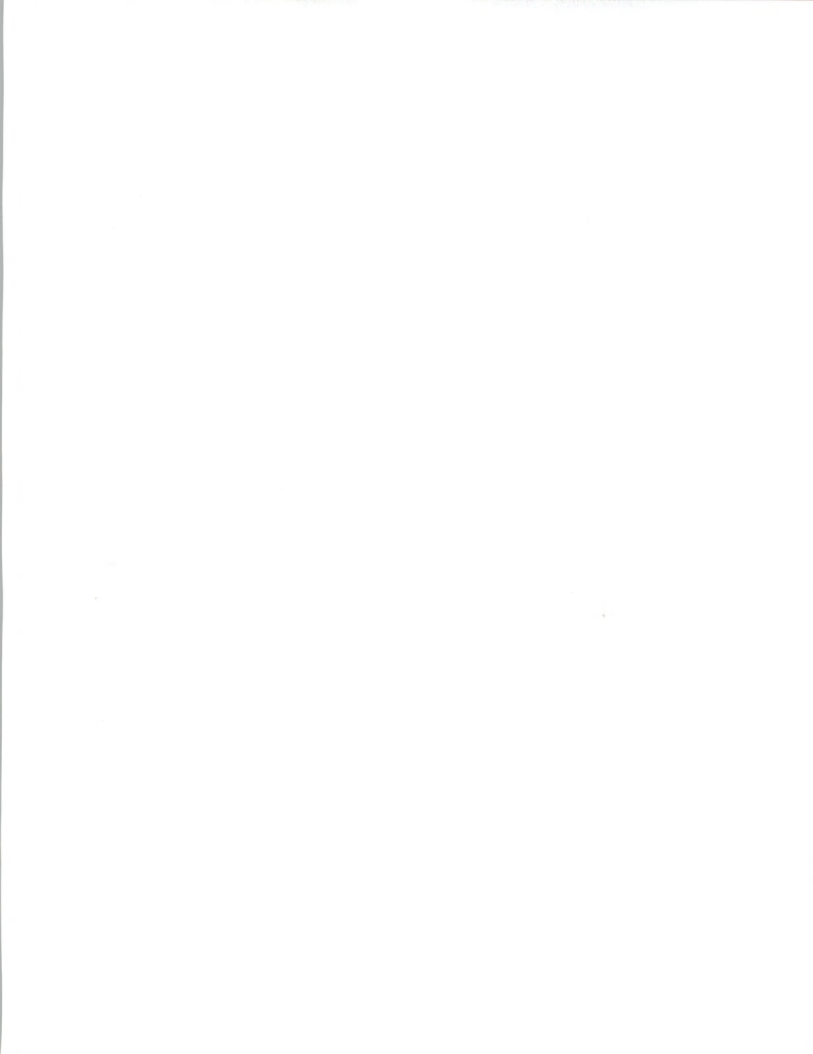
## Budget Survey Results

Segment	Rail	Truck	Water	Air	Pipe	Full Sector
Mean Increase	17%	9%	17%	16%	1%	14%
Growth Categories, Percentage of Respondents						
0% or less	17	33	0	19	100	26
less than 5%	17	27	67	0	0	21
5% to 10%	33	7	0	18	0	1
11% to 20%	8	20	17	27	0	17
greater than 20%	25	13	16	36	0	21

Source: INPUT 1993 Transportation Sector Survey

In this analysis, rails and water shipping lead in mean increase percentage at 17%, with air respondents close at 16%. Trucking, with the highest number of respondents, indicates a 9% mean and pipelines show almost no growth.

The primary indicator within the second section of Exhibit III-1 is the dichotomy within each segment, excepting pipelines. The biggest single category is "no growth" at 26% for the full sector. The unique factor is the small number of companies showing "growth higher than 20%." Though almost half (47%) of the sector indicates little growth, 21% responded with very high growth expected. INPUT believes that the split is between firms that understand technology and are using it proactively as a vehicle to save expenses, build communication networks, and establish a competitive advantage, and companies that are reacting to these leaders in the sector.





Railroads, both large and small, show increased budgets. The smaller carriers, in addition to automating basic functions like accounting and internal equipment control, are being forced to step up to EDI and interline communications by the larger railroads, and are also being pressured by their association (AAR) to conform to standards. The larger companies are moving toward advanced customer service systems, enhanced communications with locomotive crews, and intermodal partner communications. Those not spending money on IS generally do not have it.

Trucking is the largest segment in terms of numbers of participants, including over 40,000 companies, with the vast majority being small firms. Like the rest of the sector and the U.S. economy, trucking profits are down and competition is keen, with price being the frequent separator. Small firms are not projecting IS expenditure increases, because they are busy staying financially viable. The growth is in the big firms, which are attempting to differentiate themselves and can afford technology expenditures and have committed to wireless communications.

Most water shipping companies (67%) responded with low IS budget growth, indicative of their segment's general ill health. Those carriers indicating higher IS expenditure patterns are the high-end profitable firms and those working to support alliances with other sector companies, like intermodal freight, or attempting to reduce other operating expenditures.

Pipeline companies, showing the slowest growth, were unique in this analysis with no respondent indicating more than minimal increase in their budget for IS.

This analysis shows significant opportunity in the transportation sector for information systems vendors with the right products and services, who can discern the active firms.

Finally, slow growth in IS budgets does not necessarily reflect a poor vendor market. Budget increases are not needed to replace internal IS costs with external expenditures (buy rather than build philosophy), or application downsizing to less expensive platforms and revenue-generating projects. This tendency to downsize IS organizations and use external services for select project solutions is how budgets will keep in check in the financially concerned firms.



## 2. Hot Technologies

INPUT's analysis of the transportation market has identified several technologies that are now being widely implemented, or soon will be. These technologies are shown in Exhibit III-2.

EXHIBIT III-2

### Transportation

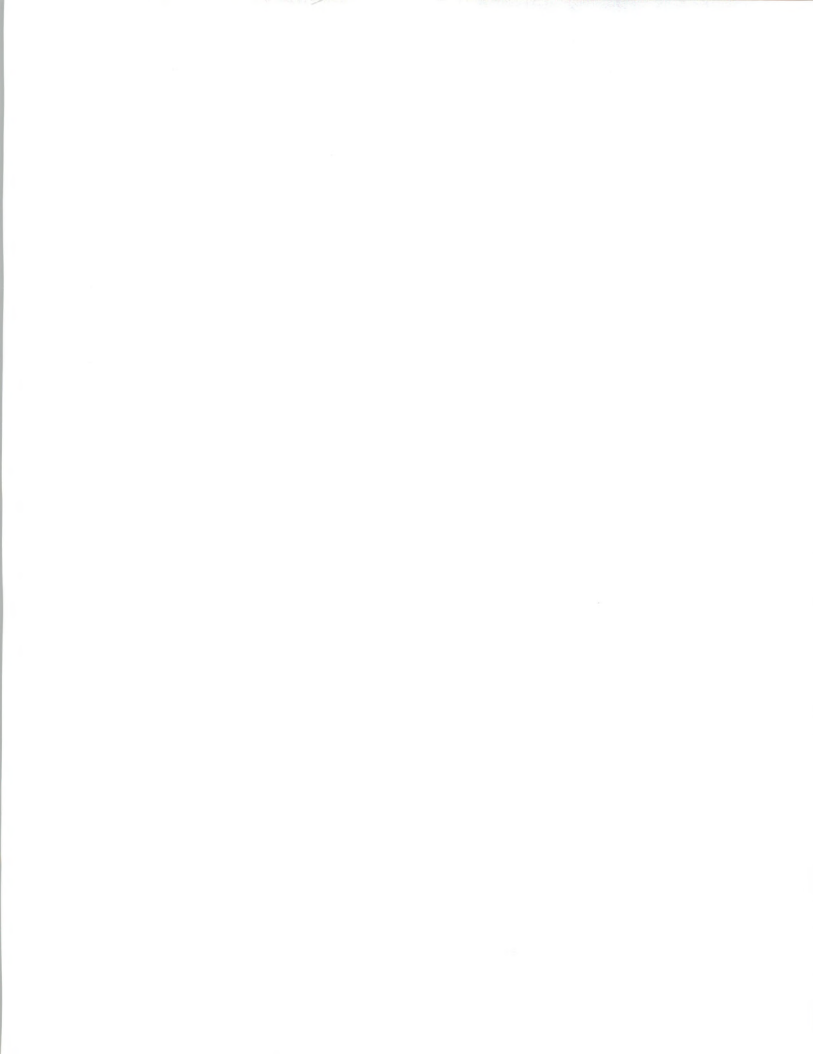
#### Hot Technologies in the Transportation Industry

- Wireless communications and network support
- Intelligent vehicle highway systems
- Vehicle-mounted computers
- Shipment-scanning devices
- Multimedia

Wireless communication and location systems are the hottest technology in transportation, particularly with all "surface" segments. The base of these systems is a transponder (see Appendix C) capable of recognizing and responding to a unit-specific signal. When coupled with digital communications and in-vehicle real-time computers that provide continuous voice and data communications capability, the application potential is vast, assuming 10% of the 56 million trucks now on the road will use the technology.

Qualcomm, Incorporated is the leading vendor of transponder equipment to the trucking sector, with some 200 companies as clients and 30,000 truck units installed. The current prices for its Omnitrac unit are steep, at \$2,000 to \$3,000 per unit, and only the big carriers are currently involved. Expansion of the market and competition should reduce the cost, possibly enough to put transponders in containers. In terms of competition, the current vendors, Qualcomm and American Mobil Satellite Corporation (AMSC), have been recently joined by Rockwell International. In addition, the partnership of ArrayComm, Incorporated and Loesat Corporation is developing a different technology that could cut the cost per unit in half.

The larger expense over time will be the cost of communications and applications software to make use of this new data flow. Most current communication is through satellite, and communications companies are preparing to expand satellite capacity to prepare for growth, including: Motorola, TRW, Qualcomm/Loral, and the AMSC/Telesat Mobile (Canadian) partnership plans for 1994. The newer approach involves cellular networks. The most recent deal involved a cobbled-together cellular group to support UPS's nationwide truck-mounted systems. The true future is probably a blending of these varied communications methods.



Once transponders and computers are installed in highway vehicles, another hot transportation technology becomes practical, the intelligent vehicle highway system (IVHS). Several significant companies are involved in this future application of available technology that has garnered federal government financial support, including:

- AT&T/Lockheed formed a partnership bringing their two initiatives together: Lockheed's truck-mounted IVHS and AT&T's high-speed toll collection capability.
- MFS Network Technologies and Texas Instruments are partners working on vehicle transponders to support a California private highway development of automated toll collection and by-mail violation ticketing of nonmembers on a special high-speed road to be built in the median of State Route 91. An added feature being considered is pricing that could be modified for premium charges during rush hour.
- SAIC, generally known for its government business, has been acquiring companies that provide technology services to various transportation segments. It is currently involved in IVHS testing in Florida with General Motors and is slated to install advanced toll collection systems in Boston and Florida.

Some of the anticipated truck applications are:

- Two-way communications with drivers regarding shipment pick-ups, bar-code reader data transmission and rapid invoicing
- Location determination of trucks to verify schedules
- Monitoring vehicles for pending problems
- When coupled with IVHS, nonstop toll charging and weigh station passage, believed worth some 20% in productivity to truckers

A less costly alternative to providing enhanced basic communication capability with drivers is a new nationwide beeper-type paging system developed last year by TRX Transportation Telephone. The advance over current communication is that dispatchers will be able to initiate contact rather than wait for periodic driver call-ins.

The railroad variant is called ATCS, Automated Train Control System, under joint development by U.S. and Canadian railroads. The major U.S. effort is through the American Association of Railroads (AAR) and its subsidiary RAILINC. Though the ultimate aim is to control train operations, the system's initial functions include monitoring car location,



locomotive performance and track crew management. The most advanced testing is by the Canadian Pacific, with true locomotive control being exercised remotely. The rails look for the system to allow closer spacing between trains and to improve both efficiency and productivity.

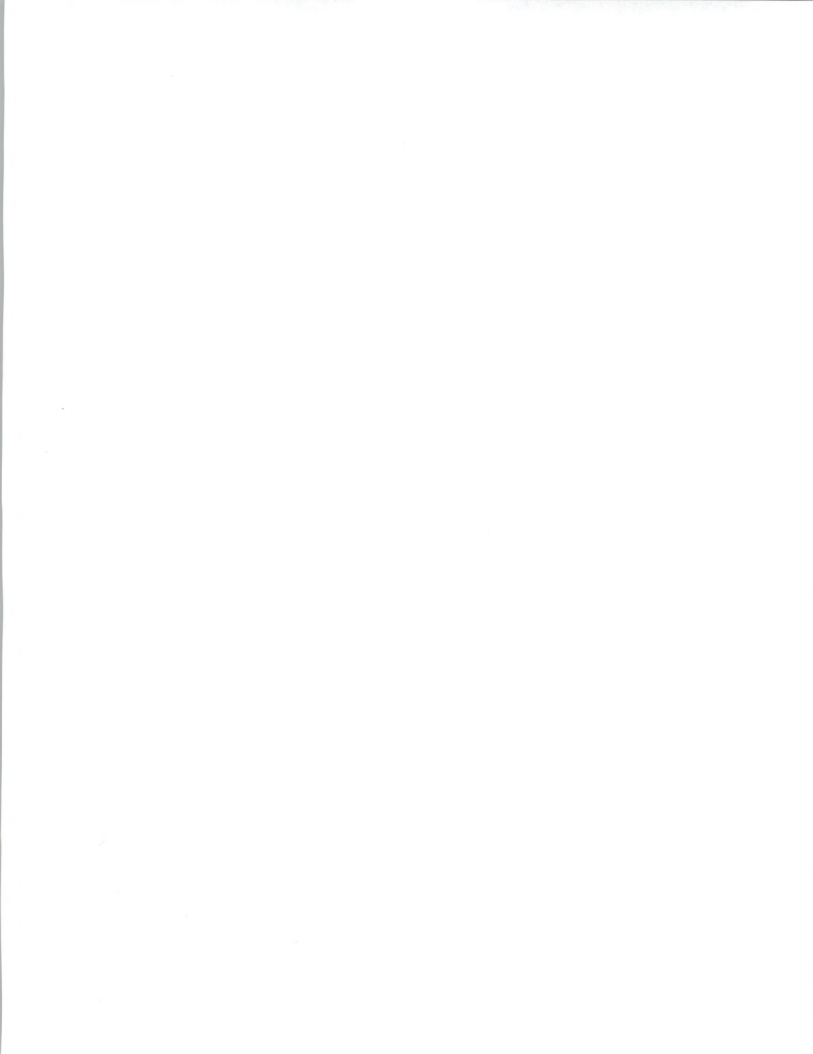
Ocean water transport looks to this type of technology for more precise position sensing, based on the U.S. Department of Defense's Global Positioning System. This is also the application being studied by the FAA and airlines for use in air traffic control.

INPUT believes that the pace of technology implementation in trucking will be rapid and pervasive. The issue is a competitive advantage on the North American continent for many, and may be required of others to just keep up. However, the problem of ending the truck driver's freedom from management is a difficult hurdle that has yet to be adequately addressed. Somehow the unit must provide advantage to the driver, as opposed to being just a tool of "big brother" that hampers freedom.

The railroads expect to do more with this technology and will, therefore, take longer to bring it into general use. However, the stakes are bigger, and visionaries see the system increasing track capacity and dependability. Also, the cooperative implementation with Canadian Pacific will probably be repeated in Mexico, potentially expanding the "controlled" sphere to cover the North American continent.

The U.S. Postal Service (USPS), in partnership with the Postal Buddy Corporation, has contracted with EDS to act as systems manager helping put together a system and network to deploy the planned 10,000 multimedia "Postal Buddy" units in kiosks around the country. In addition to dispensing stamps and post cards, the units will process change-of-address requests and sell printed labels, business cards and stationery that can be paid for with cash, credit card, debit card or the Postal Buddy Money Card. Customer interaction is through touch screens and a special keyboard. The post office expects to save \$500 million annually in mail-forwarding costs alone by transmitting change-of-address information directly to major mailers, such as magazines. In addition, initial live tests have shown ready customer acceptance of the units and commercial value in the products sold.

The sophisticated kiosk units are 486/33-OS/2-based processors driving a collection of 27 peripherals utilizing Intel's Digital Video Interactive (DVI) processors that combine full-motion video, animation, high-resolution graphics and stereo sound. The applications are based on the "Smalltalk" object-oriented language to provide rapid development and easy change. EDS is serving as systems integrator and its contract will evolve into that of a systems operator, including running the phone customer service center for Postal Buddy Corporation.





EDS believes this to be the largest OS/2-based network and possibly the model for other unattended retail locations that combine customer service and immediate product delivery. Within transportation, these could include enhanced airline and rail ticketing, unassisted car rental and hotel operations, truck driver financings, automated weigh station and routing information, and automated toll road payment.

## B

### Major Trends in the Use of Information Systems

Exhibit III-3 identifies primary transportation company needs and concerns.

#### EXHIBIT III-3

#### Transportation

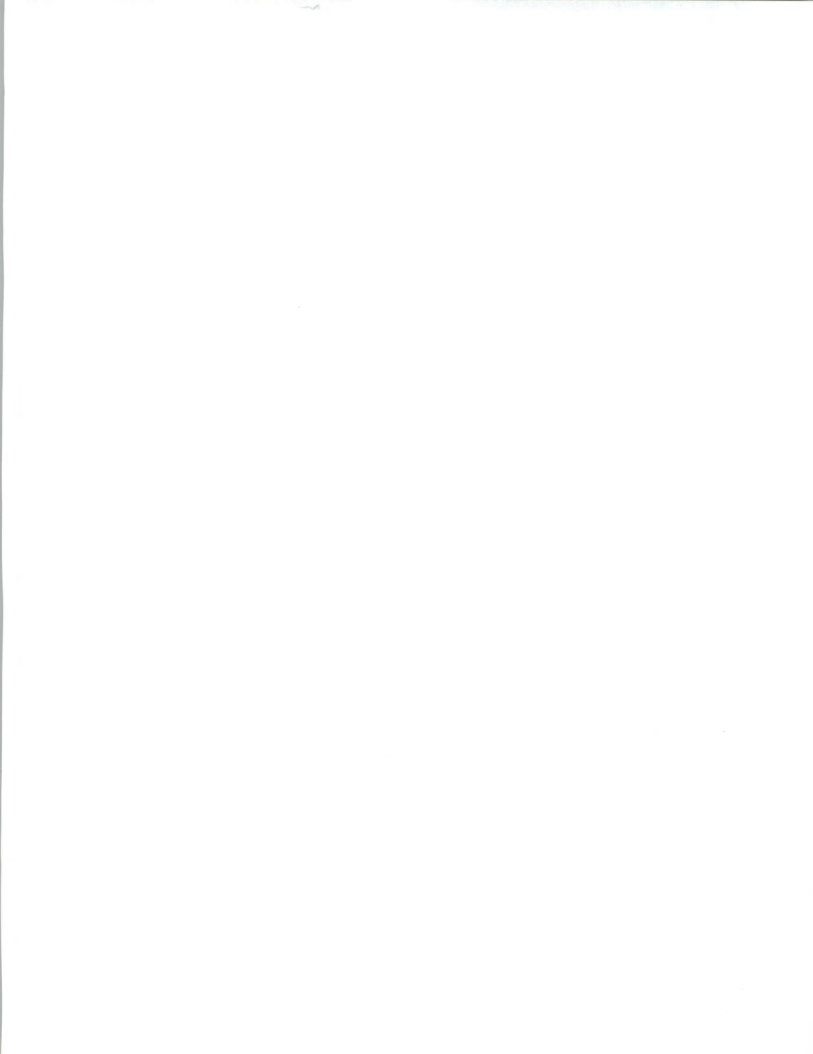
#### User Needs and Concerns

- Cost control
- Differentiation
- On-line, centralized computer service
- Integrated, end-to-end tracking

Transportation is a highly competitive industry, both between the mode-based segments and within each segment. Customer choice is based on price, timeliness, and service. Every firm must control costs so as to remain price competitive. The increased price of fuel will place a higher burden on the trucking segment, pressuring firms to tighten their use of fuel once again.

Differentiation is a key trend in an industry where transport is easily available and overcapacity exists in all segments. Once everyone trims cost and achieves low prices, competition focuses on time and service. Like all service businesses, transportation firms are moving to provide customer-oriented service, which they hope will consolidate relationships.

All of the major railroads, except Southern Pacific, have recently consolidated their previously local-service mode into centralized operations centers. Many firms have begun to connect their customers directly into their systems so the customers may track their own shipments.



Increasingly, more than a single mode of transport is involved in shipments and passenger trips, e.g., car or public transit to the airport, flight to a hub, then to the destination and rental car. Even though airlines have done a reasonable job of connecting the pieces, more needs to be done in our congested system. Freight segments still have much further to go with interconnection becoming more than just convenience, but a necessity. All segments must step up to a seamless, integrated flow of information and standardizing.

## C

### Key Applications

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Exhibit III-4 identifies the key transportation applications.

EXHIBIT III-4

#### Transportation

#### Key Applications

- Applications for network-gathered data
- Vehicle applications
- Shipping systems
- Cost-saver packages

Though application opportunities in transportation generally vary by segment, the market for application packages throughout transportation is improving. Even the big players are increasingly turning to purchased solutions to free their downsized staff for mission-critical development and maintenance. All segments will seek quality applications that can reduce costs, interface with other segment firms through networks, and improve efficiency.

Railroads and trucking firms are becoming partners as intermodal is increasingly the favored mode of transport. Both segments are moving rapidly into wireless communications with their vehicles and onboard computers. Emerging applications areas in both segments relate to utilizing the increases in real-time data communicated to central operating sites, e.g., monitoring equipment performance, rerouting, feeding on-line customer service systems, controlling locomotives remotely and making better use of resources.



For the same segments, emerging opportunities will exist for applications to run within the onboard computers in addition to central communications. Some of these applications may be: truck routing with maps, immediate invoicing, communications with other vehicles for scheduling transfers and toll payment.

Air cargo systems development has become a major item in Europe. The primary effort is a network system being developed in Germany by a consortium of 11 European and Far Eastern airlines, including Lufthansa, Air France and Korean Airlines, to provide shipment tracking among the members' systems. Also a member of this group is SwissAir, which actively markets the services of its current air cargo system to other airlines. In addition, EDS is looking at air cargo systems as a development area in its transportation group.

Airlines opportunities, beyond the systems operation potential believed imminent in CRS takeover, involve the use of expert systems in automation of routine but time-consuming tasks, like plane loading, crew scheduling and back-office operations. Airlines need the cost savings in staff reduction that further automation can bring as they struggle to survive.

## D

### Industry Firms as Technology Vendors

Though the provision of services to smaller companies is not new, several transportation companies are moving into new strata, making them potentially powerful competitors. Their records of technology success and presumed industry knowledge give them easy access across market segments.

AMR, parent of American Airlines and Sabre Technology, seems preeminent as a multimode deliverer of technology services born in transportation. AMR has been a vendor for years through its Sabre airline reservation system—still the largest CRS. It provides reservation transactions to other CRS systems for a fee and also acts as the CRS for smaller airlines. The most recent addition to Sabre is Alaska Airlines, formerly an EDS System 1 client. In one recent year, this activity made more money for AMR than its airline operations. Beyond this CRS activity, AMR has been involved with several other technology activities, including:

- The now-defunct CONFIRM System was being built primarily by AMR for Intrico, a consortium including Budget Rent A Car, Hilton and Marriott, with AMR acting as a systems integrator and eventual operator.
- AMR's partnership with IBM to build a new CRS for Aeroflot, the world's largest airline, will be called Sirena 3 and hopes for a 1996 completion.



- The combination of AMR and CSX Railroad produced a software product, Encompass, a sophisticated EDI-based global shipping logistics system featuring a client/server architecture, real-time shipping status and full spectrum communications.
- Though CONFIRM was not a technological success (in fact it became infamous in the computer trade media), AMR has been successful in being viewed as a technology leader and is capable of creating a profitable information business. Its separation of IS units into Sabre Technology, focused outside the corporation, is a formidable force in the transportation industry and perhaps elsewhere.
- Though AMR has generally taken the lead, CSX railroad has been involved with AMR in a major development project, Encompass, and its European version in partnership with the Netherlands' Postal Telephone and Telegraph.
- Though initially built for internal use, Conrail's Automated Equipment Identification system, which features scanning of moving freight and transmission to mainframes, has been adopted as a standard for the rail industry. By building a better method of shipment tracking, Conrail seeks to become a logistical outsource provider for the rail industry.
- Two inventive trucking companies, Roadway Express and Carolina Freight, provide PC-based packages to shippers to access the trucking lines' mainframe data for up-to-date information on accounts. Carolina has dispensed some 11,000 copies of its Shippingware Plus. Roadway also provides a voice response capability through touch-tone phones for rate quote, shipment location, and transit times. Carolina does faxes directly from its mainframe to some 4,500 shippers regarding daily activities. Because of the customer lock in potential of these installations, many more shippers are expected to join this trend.
- EDS provides an interesting reversal of this trend, as it is the only partial owner/operator of an airline CRS system, System 1, which primarily services Continental. Its mixed role can best be understood as: (1) the systems operator for the System 1 Corporation, owned by Continental, (2) the processor for a network of travel agents, and (3) a true CRS player to some 26 air carriers, including America West and Hawaiian Air Lines, and other travel support businesses, e.g., National Car Rental and HFS Hotels. This trend in nonairline ownership is expected to be part of the future of airline CRS processing.





**E****Information Systems Add Competitive Advantage**

Transportation providers seeking to improve their market position are undertaking several strategies, as shown in Exhibit III-5.

EXHIBIT III-5

**Transportation****The Competitive Edge**

- Enhanced freight service
- Integrated shipping system interfaces
- Cross-segment connections

The potential of NAFTA creating a common market is creating urgency in the implementation of the expensive, but inevitable direct communication with surface segment drivers and engineers.

The members of the trucking segment see this as their edge over cheaper Mexican firms. With their leadership, the Mexican firms will have to follow or be folded into the advanced U.S. systems. Because transaction and computer services can be fee generators, the Mexican price advantage could evaporate. These systems will also provide a level of customer service that will become expected of all carriers, not just the pioneering small package experts.

U.S. railroads have stiff competition from the north, Canadian Pacific (CP). CP is currently the only integrated transcontinental railroad. It has acquired U.S. feed lines that penetrate deep into the U.S.; it is an active intermodal partner with J.B. Hunt; and it is modifying its rail system to accommodate double-stack service. CP is a technology partner with the U.S. rail's ATCS development and is currently alone in testing remote locomotive control. U.S. rails will be in a catch-up mode, with CP as its rival.

The installation by trucking firms of PC software with access to trucking's mainframes at shippers is a solid trend. Over twenty years ago, American Airlines began installing Sabre system terminals in travel agencies, creating the so-called anticompetitive CRS lock-in of the agencies, which now produce 80% of the reservation traffic. The parallel is obvious, and connection among the various carriers—very similar to the way CRS systems were connected—is inevitable. No one has stepped forward, but leadership in surface freight may start with technology that connects various firms' systems and creates a more comprehensive integration than EDI now provides.



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## Information Services Market Forecast

### A

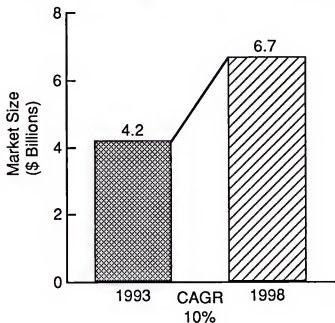
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#### Total Market Forecast, 1993-1998

The overall industry grew at a rate of 10% during 1992, and the five-year CAGR remains unchanged at 10% for the period 1993-1998. Modification to the projections at the submode level, particularly in turnkey systems and systems integration, served to negate the positive shift in others. The growth in transportation and information services expenditures is still lower than in most other industries. Exhibit IV-1 graphs the five-year period.



## EXHIBIT IV-1

**Transportation****Information Services Market, 1993-1998**

There is projected growth in all delivery modes through the five-year forecast period. However, each mode is unique and growth diminishes for some, e.g., turnkey systems and professional services, while dramatic increases are found in network systems and systems integration. Even within a delivery mode, some submodes are on a different track than others, including workstation/PC, which outstrips mainframe growth in applications software products.

Some delivery mode and submodes display a cyclic pattern over time—revenues are driven up by a new product or service and come back down as the direct market becomes saturated, a different mode offers an alternative approach, or sector spending abates. The latter can be driven by the poor economic conditions, the fact that the sector can only sustain so many major technology projects at one time, or seemingly unrelated factors, including government actions.





**B****Forecast by Delivery Mode**

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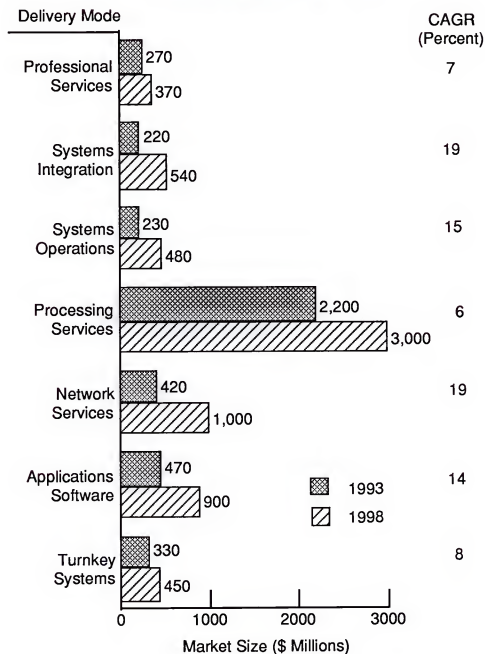
With the exception of the positive changes in systems operations and negative modifications in turnkey systems, this year's forecast mirrors last year's in terms of growth. This stability reflects INPUT's 1992 expectation for a late 1993 economic recovery, with only single percentage point growth adjustments for most modes.

Exhibit IV-2 presents INPUT's forecast for the transportation sector by delivery mode for the period 1993 through 1998.



EXHIBIT IV-2

## Transportation

Information Services Market  
by Delivery Mode, 1993-1998



## 1. Processing Services

Processing services moved up to a 5% increase in transportation expenditures from the 3% recorded the prior year, growing from \$2.1 million to \$2.2 million. Though improved, this was the slowest growing delivery mode this year, a trend that is expected to continue throughout the forecast period. The CAGR over the period from 1993 to 1998 is projected at 6%, indicating a five-year upward trend at a rate exceeding that of the past few years.

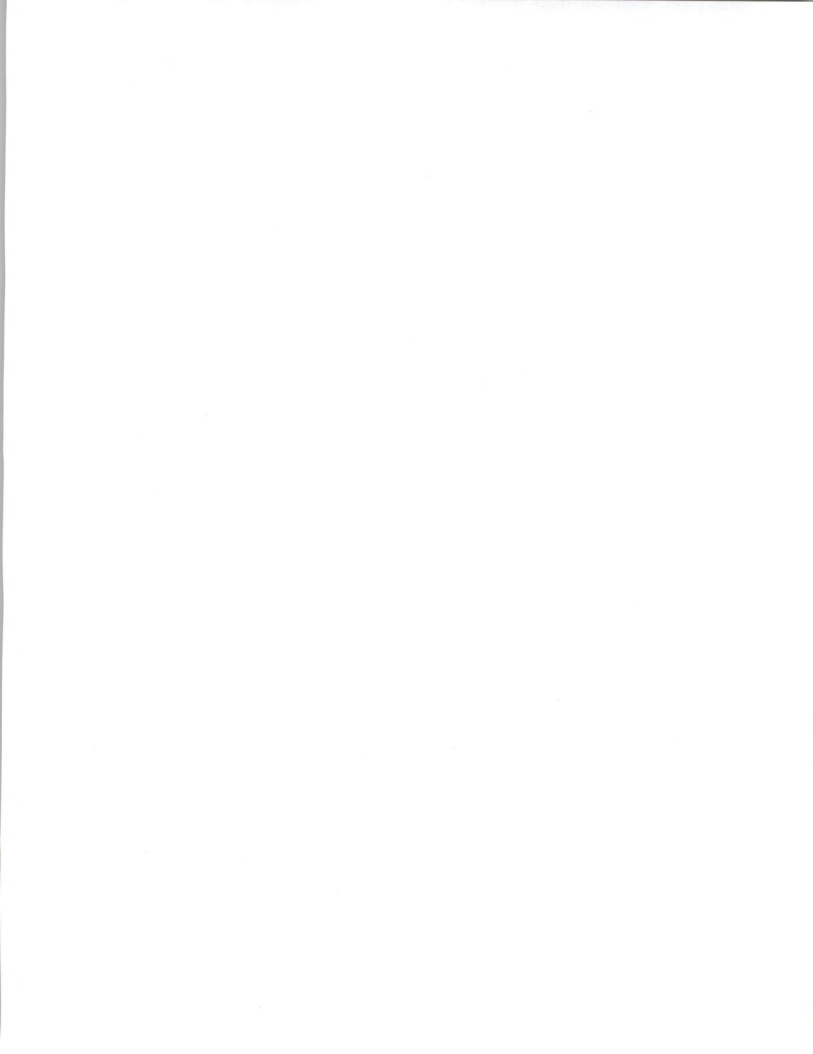
Opportunity exists in this mode because of its size; a 1% increase is bigger than the total expenditures for several other delivery modes.

The primary application within the processing services mode is reservation systems. With the airline CRS systems, the predominant entities and growth are ruled by changes in airline boardings. The forecasts cover only the revenues for transactions and service agreements, not the expenditures for third-party reservations of the owning airlines (captive revenues). Should airline ownership of CRSs diminish over the next five years, with fees then charged to all airlines, this delivery mode would grow dramatically overnight. By way of example: current fees are about \$2 per reservation, with almost 40 billion passengers enplaned by just the major airlines annually. Expanded reservation charges could yield an extraordinary expenditure total, even with cut rates for high-volume airlines. INPUT determined that this year's report would not attempt to predict the exact timing or the financial impact of this radical change.

## 2. Turnkey Systems

Expenditures for turnkey systems are projected to increase at a CAGR of 8% through the forecast period, reaching \$450 million during 1998. The trend toward installations of workstation and PC products will hold the revenue increases to a modest level in this highly competitive market. The trend toward workstation/PC is causing the turnkey producer to move products to these machines, which serves to hold down prices. In addition, the sector buyers often look for software products to run on existing machines or choose to purchase equipment separately to achieve the lowest price. This tendency will continue and increase throughout the forecast period, as user sophistication improves along with applications software quality and utility.

The slowest growth submode in turnkey systems is the equipment component, reflecting the growth in workstation/PC systems with cheaper hardware.



### 3. Applications Software Products

Applications software expenditures by transportation companies will grow at a rate of 14% between 1993 and 1998, with dollar volumes increasing by almost \$450 million.

Within the software submodes, workstation/PC products maintain an increasing portion of the demand for applications software, moving from an 18% CAGR for 1992 to 1993, to a 22% CAGR over the five-year forecast period. Though the mainframe and mini computer submodes show modest growth, the trend toward micro computers is at the expense of the other submodes. Because PC software costs much less than mainframe and mini computer equivalents, this trend also causes the growth in total dollars to be moderated. The workstation/PC submode's growth is fueled by the impact of using intelligent workstations for connection to mainframes, the trend toward client/server, application downsizing, and the need for useful software for vehicle-mounted units.

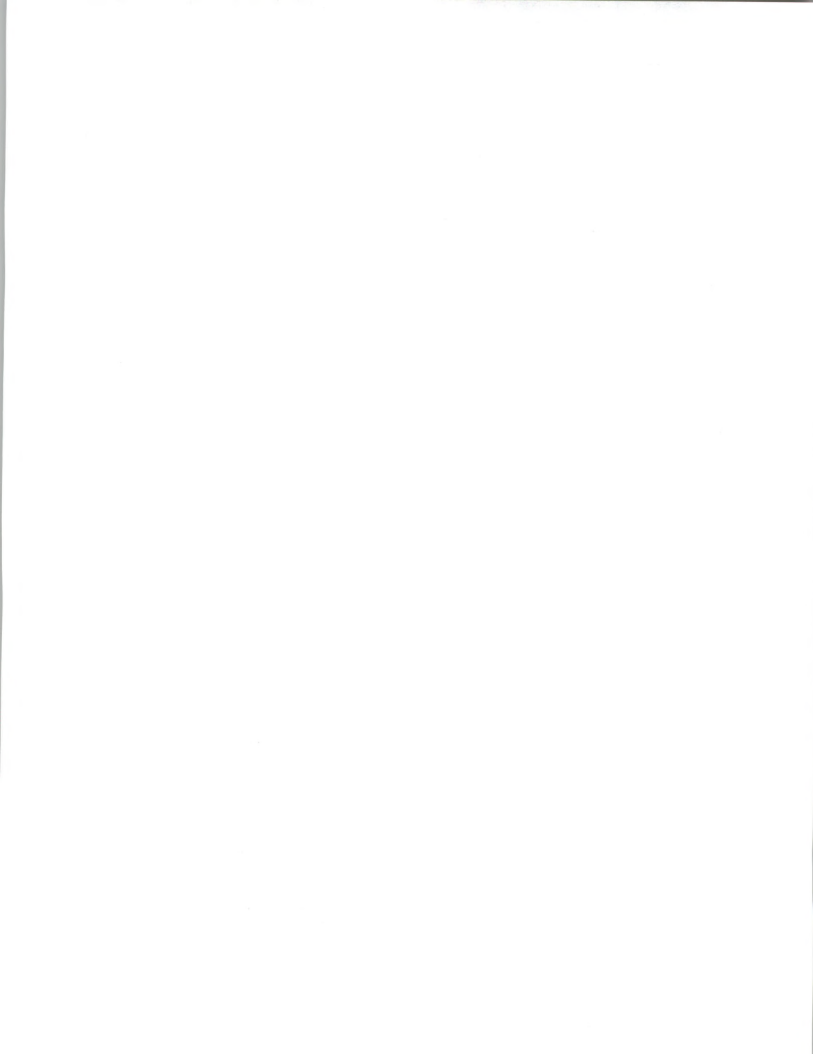
### 4. Systems Operations

Systems operations expenditures are expected to grow at a rate of 18% in 1993 over 1992, increasing from \$200 million to \$240 million. Two new submodes, desktop services and network management, both added to the forecast this year, are projected to continue their 15% and 25% respective growth rates through 1998. The entire delivery mode is forecast at a CAGR of 15%, bringing 1998 expenditures to \$480 million.

Though the new submodes are both variations of operating support for workstation/PC environments, desktop services relate to the individual units, and network services encompass the operation and support of user networks. These are generally full-service offerings and replace internal IS support, or are engaged by small firms that do not have specialists to support their growing micro-machine environments.

Recent contracts driving this growth include:

- The 1992 aborted Hertz outsourcing deal concluded with IBM's ISSC unit, reported at \$80 million over five years
- EDS's agreement with Postal Buddy Corporation to develop the micro-based kiosk units and run the centralized processing
- The Greyhound "TRIPS" system agreement with Affiliated Computer Services
- Litton's entry is based on taking over the operations for the failed Con-firm participants. Though this change only replaces the existing outsourcing arrangements, it does bring a new entrant to the CRS business.





Systems operations deals tend to require lengthy negotiations, are few in number yet large in gross dollar volume, and extend for a lengthy period. The ability of a systems operator to structure an agreement, take over control, achieve efficiencies and continue to provide quality services is the key to turning initial investments into net profits. INPUT believes that the trend in businesses to strip away all but core business units will continue to keep this delivery mode busy, addressing opportunities through the forecast period.

An emerging market exists internationally for systems operators, but many require an initial systems integration activity. This will present affiliation and partnership arrangements, to compete with the few vendors capable of supporting both delivery modes. One case, the IBM/AMR Aeroflot CRS System, is predicted to be very large, but was not included in the U.S. forecast based on INPUT's assessment of the expected difficulties in receiving dollar remuneration.

## 5. Systems Integration

Systems integration, currently the smallest delivery mode, is growing rapidly at 19% to reach \$540 million in 1998.

The growth in systems integration is predicated on the desire of the sector user to select a single vendor for major systems implementation and the requirement that the vendor must commit to risk sharing for the longer-term agreement. When this is successful, both sides win. SI is projected to grow significantly, based on vendors establishing a record of successes.

Keeping this systems integration growth at a lower level than other industries are the significant demands for capital expenditure, including these: airlines need planes (estimates exceed 10,000 over the next decade) for replacement and fleet addition; railroads are looking at expensive high-speed trains for passengers and expanded facilities for intermodal and double-stack operation growth; and, trucking firms are facing tractor replacement for clean air compliance and trailer-to-container changes. Though there are several significant SI projects in progress and beginning, the transportation sector is likely to be limited in its absorption rate for major systems.

## 6. Professional Services

Expenditures for professional services will grow at a rate 7% CAGR over the forecast period, while user expenditures increase modestly to \$370 million in 1998. This is essentially a mature submodule.

Professional services firms, fortunes are inversely linked to the movement to systems integration and systems operations. The larger system projects will go to complete servicers. Though some large-scale projects will make use of professional services firms for assistance, the competition for this work will increasingly come from full-service vendors.



INPUT continues to project that vendors who have historically featured professional services, e.g., Big 6 firms, niche specialists, etc., are likely to feature systems integration based on their business analysis capabilities. Professional services, as currently defined, will diminish as a standalone activity. Smaller firms will move into affiliations that allow them to share in SI projects. Those who remain strictly professional services suppliers will find business as subcontractors and in specific niche areas of the sector. Beyond competition from SI firms, the professional service offerings to support turnkey and application systems sales by those firms will also cut into the professional services market size.

Helping rail and truck segment firms make full use of the information gathered by wireless communication capabilities in vehicles should be an SI and professional service opportunity that grows over the next decade.

## **7. Network Services**

INPUT forecasts network services to become the second largest services mode, with user expenditures expected to grow very rapidly. This forecast is driven by the network applications submode, with an expected growth of 21% CAGR through the forecast period. The primary cause of this forecast change is the surprisingly rapid pace of the deployment of wireless communications devices by trucking and rail segments. To support this increase, at least two new communications satellites are expected to be launched in 1994 by the consortium including American Mobile Satellite and Telsat of Canada, and several more in the following years.

INPUT believes this submode will grow in cycles, with growth slowing as communications capabilities become saturated and resuming as more capacity comes available. The growth in this network application is also a predictor of opportunity in service modes to fulfill the growing need for systems to make use of the new flow of information from vehicles.

Location sensing and improved driver/engineer communications are only the beginning as transportation firms seek ways to justify the expense of interconnection.





## Vendor Competition

### A

#### Introduction

---

This chapter presents a view of the climate for information services vendors to the transportation sector in the following sections:

- Competitive Positioning
- Participating Vendors
- Leading Vendor Profiles

INPUT's data is gathered through monitoring published data, in-depth interviews with transportation users, vendors who market to the sector and published financial data. The data is constantly reviewed, analyzed, cross-checked with alternative sources and updated accordingly. The result is a set of over 3,000 continuously updated files on IS vendors as a basis for extraction in creating sector reports.

### B

#### Competitive Positioning

---

All Big 6 firms and other professional services providers are active with transportation industry groups. One of them, Andersen Consulting, is profiled in Section D. As with other industries, a key to client acceptance is being able to display industry knowledge and a successful track record. Because the transportation sector is viewed as a low-growth area by most general vendors, their tendency is to form alliances and partnerships with more sector-focused firms.

Some specific areas are very active and because of their sector specialization bear reference:



## **1. Freight**

### **a. Air Cargo**

- Cargolux, part of Luxembourg Airlines, is a vendor of applications software and systems operations support.
- Alitalia, the Italy-based carrier, and SwissAir offer systems operations and cargo systems.
- Unisys's USAS System has one of the largest carrier bases with 11 air carriers.
- At least two different initiatives to develop a new air cargo information system are under way, led by consortiums of users.

### **b. Wireless Communications, Surface Carriers**

- Qualcomm's Omnitrak System is the leader in truck-mounted transponders.
- American Mobile Satellite Corporation (AMSC), a vendor of truck and rail transponders, is also in partnership with Telsat, Canada in two 1994 satellites.
- Rockwell International, a major truck parts manufacturer, has also introduced a transponder.
- SAIC, Science Applications International, is involved with Intelligent Vehicle Highway Systems (IVHS) for toll collection and EFT billing.
- Lockheed/AT&T have also partnered in IVHS studies.
- Arraycomm and Leosat are working on low-cost transponder technology.

### **c. Logistics**

- CASS Logistics operates a logistics system, used primarily by shippers, and sells applications software, primarily to transportation firms.
- The Encompass application product developed jointly by AMR and CSX is a new competitor.
- Several sector companies also provide this function, e.g., Federal Express, Roadway Express and Conrail.





**d. Rail**

- Most of the activity for the railroad segment is focused through the AAR's RAILINC subsidiary, which sells applications software, but primarily runs a North American EDI and car control network.
- Railcar Management offers a new PC-based railcar management system.
- ALK Associates is working with Southern Pacific on a location and control system.

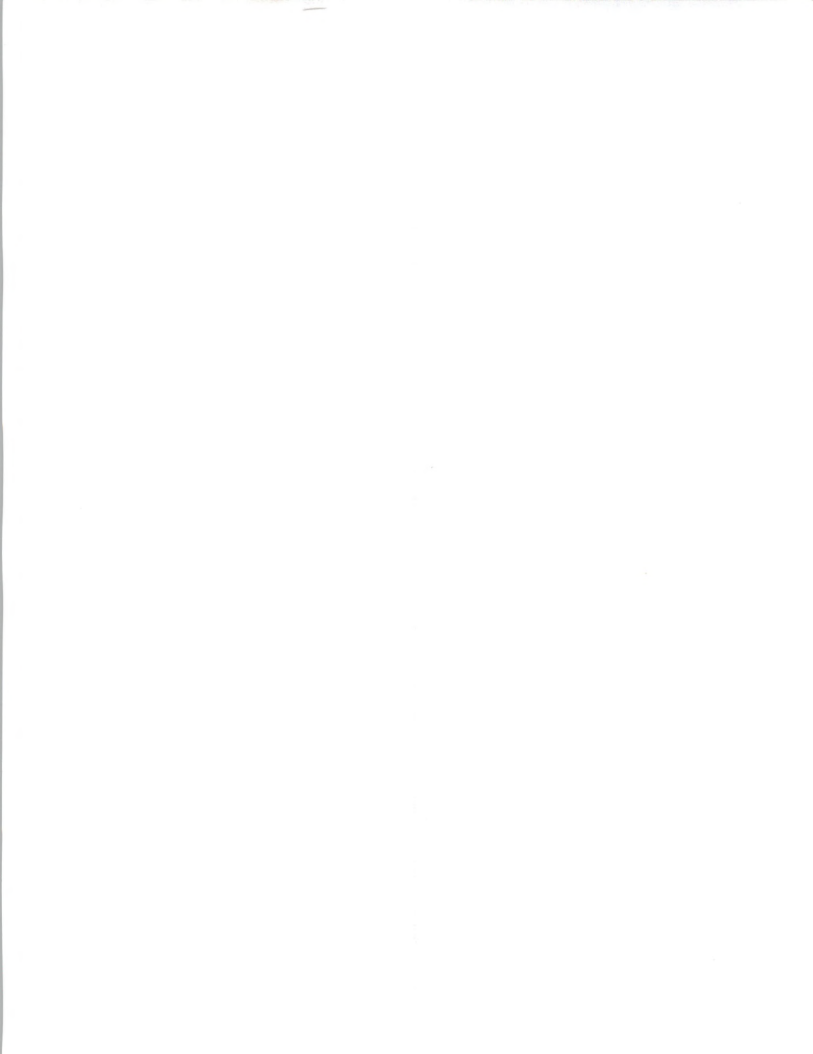
**C****Participating Vendors**

Though the majority of vendor names are familiar, what is different in the transportation sector is the relative importance of the various delivery modes as evidenced by their proportion of revenues, as shown in Exhibit V-1 below.

EXHIBIT V-1

**Transportation****Information Systems Market Share  
by Delivery Mode**

Delivery Mode	U.S. Market Share (Percent)	
	1993	1998
Processing Services	52	42
Turnkey Systems	8	7
Applications Software	11	13
Systems Operations	6	7
Systems Integration	5	8
Professional Services	6	5
Network Services	13	19



The dominant delivery mode is processing services, primarily driven by the now 30-year-old airline CRS systems. The presence within this industry of these pioneers of technology and the size of these systems is unique in U.S. industry sectors. This delivery mode, though dropping in share, is important to vendors because of the potential opportunities from anticipated moves by airlines to generate capital by selling at least some of their interests. American had an open offer during 1990, i.e., \$15 million for each 1% ownership of Sabre, up to 50%, so only those with deep pockets need apply. Exhibit V-2 identifies these market leaders.

## EXHIBIT V-2

**Transportation****Processing Services Vendors—CRS**

Vendor	U.S. Passenger Traffic Share (Percent)
Sabre	36
Galileo International	31
Worldspan	20
System 1	13

AMR's Sabre system retains its market share lead in all categories, though the new Covia/Galileo consortium moved up several percentage points through the addition of Galileo's international locations to the combined U.S.-based system. Positive gains were also made by Worldspan and System 1, run by EDS, based on a recent split of Sabre's government business.

The trends evidenced in a shift from turnkey systems to applications software is not unique to this sector, but a mirror of the rest of the U.S. industrial base. Implicit in the shift is the increasing move to micro-based hardware that features lower cost solutions. Many are specialized vendors to this sector and few use cross-industry solutions, but none have big shares of the market.



## EXHIBIT V-3

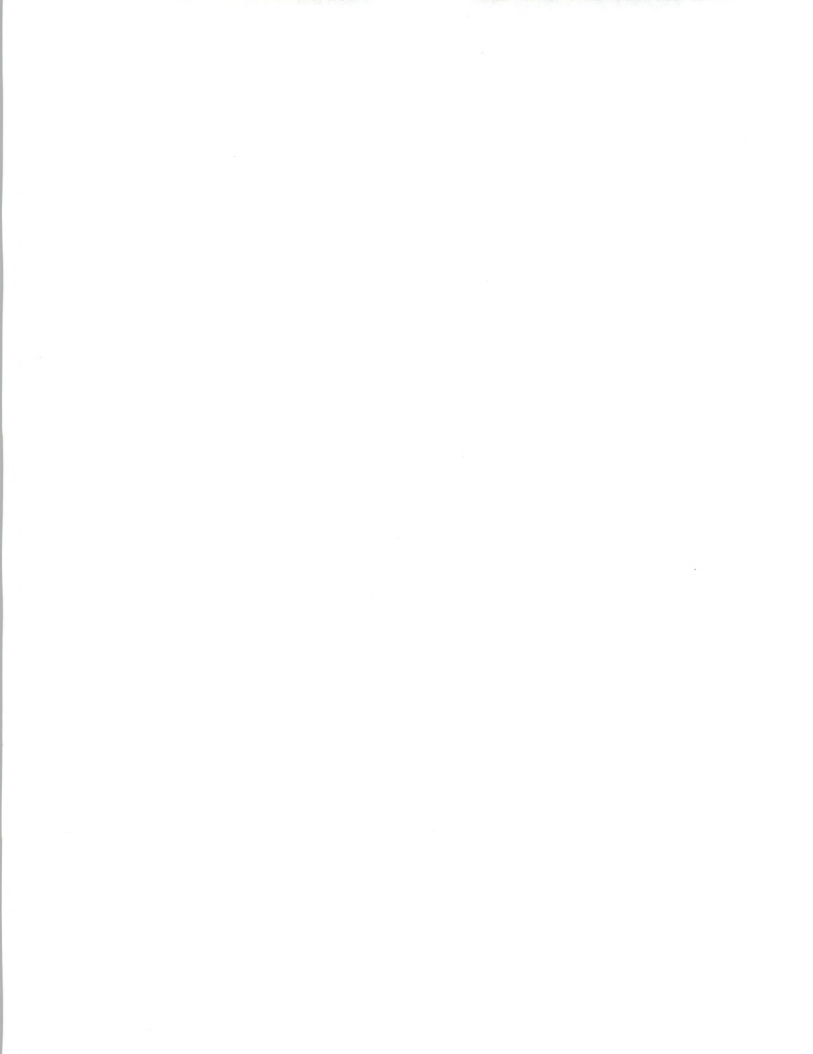
## Transportation

## Systems Operations Vendors

Vendor	U.S. Market Share in Percent
ISSC	5
EDS (non-CRS)	4
SAIC	3
Affiliated Computing	2
RAILINC	2
Litton	2

As shown in Exhibit V-3, no systems operator is seen as having even a two-digit share of this market. ISSC and EDS lead with 5% and 4%, respectively. SAIC is the operator of several toll and traffic control operations, though systems operations (SO) is not the primary thrust of its business. Affiliated Computing of Texas is the primary SO vendor to Greyhound, and Litton expands its business by picking up the CONFIRM system participants.

Systems operations is a smaller entity within transportation because of the significant disparity between big and small players and the wide fragmentation of the sector's firms. Big firms tend to view technology as a means to competitive advantage and would be difficult targets for wholesale outsourcing. Small carriers are in the main new entrants to technology and do not have significant systems to outsource. INPUT believes that this will change in a positive direction for the systems operations delivery mode. The data explosion created by the growth in vehicle communications will have to be contained and processed by larger systems, even for relatively small carriers.



## EXHIBIT V-4

## Transportation

## Systems Integration Vendors

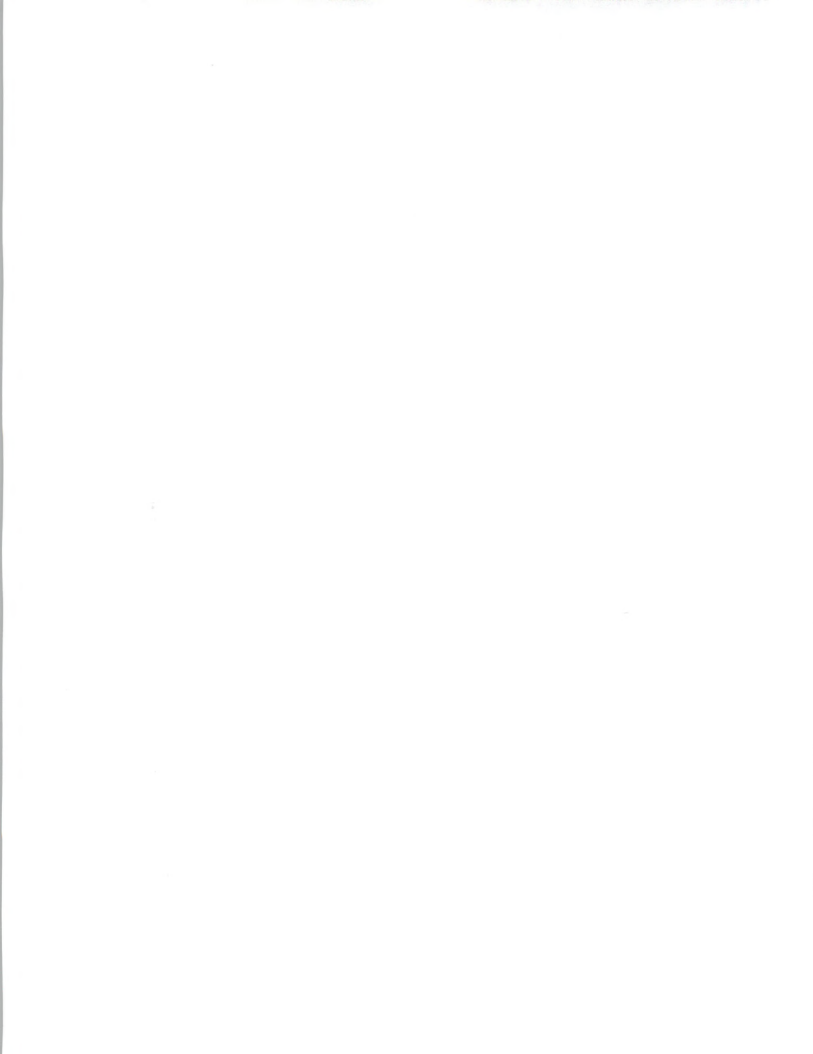
Vendor	U.S. Market Share in Percent
ISSC	20
SAIC	18
EDS	8
Andersen Consulting	6
Sabre	4

ISSC is the leader in SI, and SAIC may be a surprise by being ranked second (see Exhibit V-4). Although transportation projects are a minor part of its overall business, SAIC has garnered a significant share through its extensive work with all levels of government on IVHS and toll collection facilities. With the relatively small shares of major SI vendors, EDS and Andersen are testament to the difficulty posed by limited industry exposure. AMR's Sabre, having respected sector expertise, is a serious entry and should do well if CONFIRM can be put in the past.

Systems integrators will prosper if they can develop the means for their clients to cost effectively utilize the data generated by their expenditures for wireless communications equipment. Vendor capability to support business re-engineering and produce complete solutions will be their main advantage. INPUT predicts SI's share of services revenues to grow by 2%, with sector expenditures more than doubling over the next five years.

As in other industries, professional services providers will drop in share because of the sector's need and desire for more integrated solutions.

Network services' spectacular growth to 19% share, though a vendor opportunity in itself, is also significant in predicting the pending scramble of sector firms to make use of their new information flow and justify these expenditures. INPUT expects the trend to be toward a true transportation industry that will need to vastly improve information connections. Included in these connections will be the direct shippers and receivers who will increasingly demand real-time information. Small firms must either be part of the information mix or be eclipsed by more technologically advanced companies.





**D****Selected Vendor Profiles****1. Sabre Technology Group**

Post Office Box 619616  
Dallas - Fort Worth, TX 75261-9616  
Phone: (817)963-1234  
Fax: (817)931-1652  
CEO: Kathy M. Misunas  
Parent: AMR Corporation  
Total Employees: nearly 11,000  
Total Revenue: \$1,200,000,000  
Fiscal Year End: 12/31/92

**a. Corporate Background**

The Sabre Technology Group was formed in April 1993 by parent AMR Corporation, which also owns American Airlines. The unit has over 10,000 employees in five separate divisions: AMR Information Systems (AMRIS, subsidiary formed in 1986); Sabre Travel Information Network; Sabre Computer Services; Sabre Development Services; and AMR Project Consulting and Risk Assessment.

Prior to the group's formation, a history of activities outside the bounds of the corporation existed for at least ten years. This new combination is just a formalization of an outward-facing organization that is part of a company that also runs the largest U.S. airline. Its singular and collective mandate is to derive 50% of revenues from external sources and maintain its 20% profit margin. Some of its activities include:

- Encompass—a real-time freight logistics system developed in partnership with CSX Corporation (major railroad parent) and marketed as a modifiable application software package
- Sirena 3—a systems integration project to develop a CRS for the world's largest airline, Aeroflot, in partnership with IBM Corporation
- A joint venture with the French government-owned railroad SNCF, *Fortune's* 1991 largest global transportation company, to develop and run a passenger railroad reservation system called SOCRATE
- Running the largest third-party travel industry reservation system for hotels and car rental companies
- An alliance with telecommunications companies Northern Telecom and Racal-Datcom to jointly market data communications network services



## **b. Strategy**

Sabre plans to take advantage of its extensive worldwide network, major systems operations, development reputation and transportation industry knowledge to provide services within the transportation sector. Additionally, it seeks entry to other industries—health care and retail are often mentioned—through partnership and acquisition. Most of its engagements have been partnerships, presumably to share risk and gain knowledge.

## **c. Products and Services**

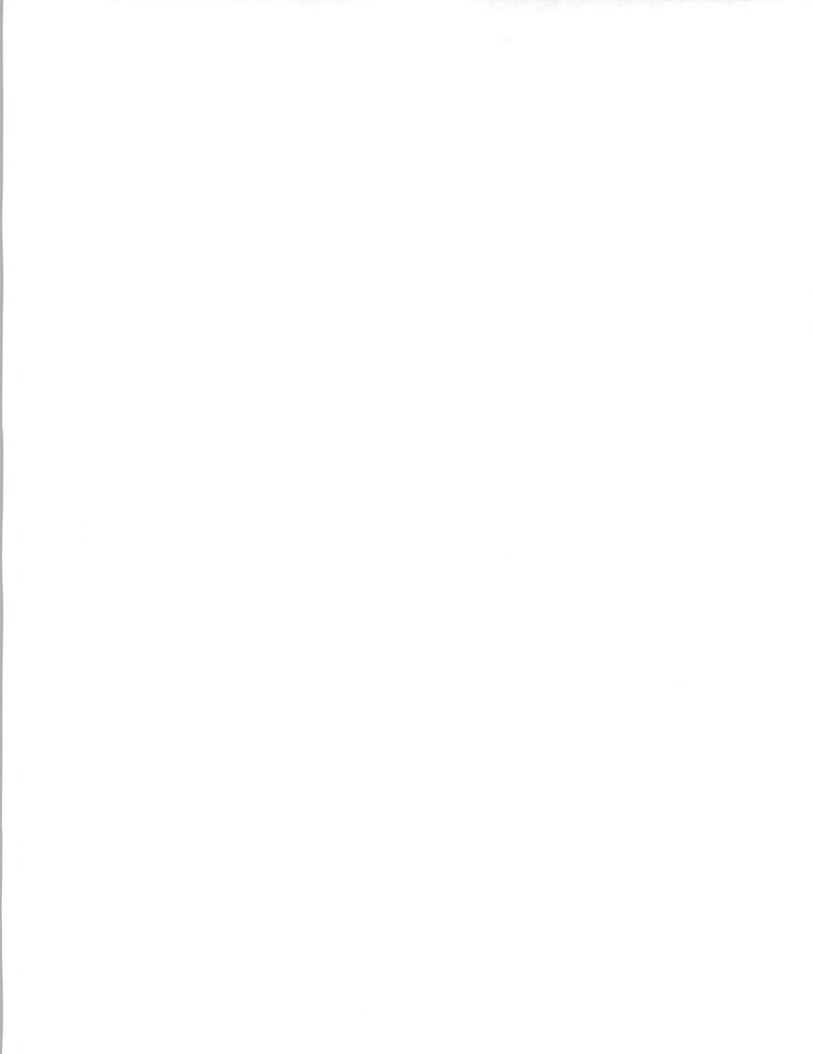
The Sabre Technology Group is seen to be a player in at least four technology delivery modes:

- **Processing Services**—As the sole owner of the largest airline CRS system, Sabre is a major player. It has the bulk of the installed base of U.S. travel agents, the largest number of smaller airlines as clients and the busiest system. Should its relationship with AMR become that of an arms-length provider, with AMR paying for reservation transactions, it would become the biggest nonairline player. It is also active in attempting to become the major reservation source in Canada.
- **Applications Software**—Sabre is a partial owner, with CSX Transportation, of the corporation that sells Encompass, a real-time logistic information system for freight.

In addition, a separate AMR subsidiary, American Airlines Decision Technologies (AADT), not as yet a part of Sabre, offers a diverse set of decision support software products, like INTELA, a family of workstation-based airline support systems, and INTELIPORT, airport operations systems.

- **Systems Integration**—With partner IBM, Sabre is involved in the development of the CRS system for Aeroflot, called Sirena 3. Though the details of the agreement are not known, Sabre is believed to be the SI partner. Sabre is also an active partner in Encompass, which requires significant custom support for installation, and in a railroad reservation system called RESRAIL which is based on the successful SOCRATE.
- **Systems Operations**—Based on the structure of the relationship, Sabre could be viewed as a systems operator for American Airlines, the Encompass data base server, SNCF's SOCRATE system, Canadian Airlines and the future Aeroflot system.

Nonpassenger airline clients include Federal Express, Amtrak, Ryder Truck, Holiday Inns, UPS, Club Med and ESPN.



#### **d. Key Issues**

Though Sabre has had some significant project successes, will it be able to shift gears to being a vendor-selling service? Its largest current customer is American Airlines. The real question is, will it be able to survive the profit drag of AMR's airline operations? To make the transition to a transportation technology services company, which is also in the airline business, is a strategy Sabre and AMR will find challenging.

#### **2. Science Applications International Corporation (SAIC)**

10260 Campus Point Drive

San Diego, CA 92121

Phone: (619)552-4785

Fax: (619)458-5053

Chairman & CEO: J. R. Beyster

Status: Employee Owned

Total Employees: 15,000

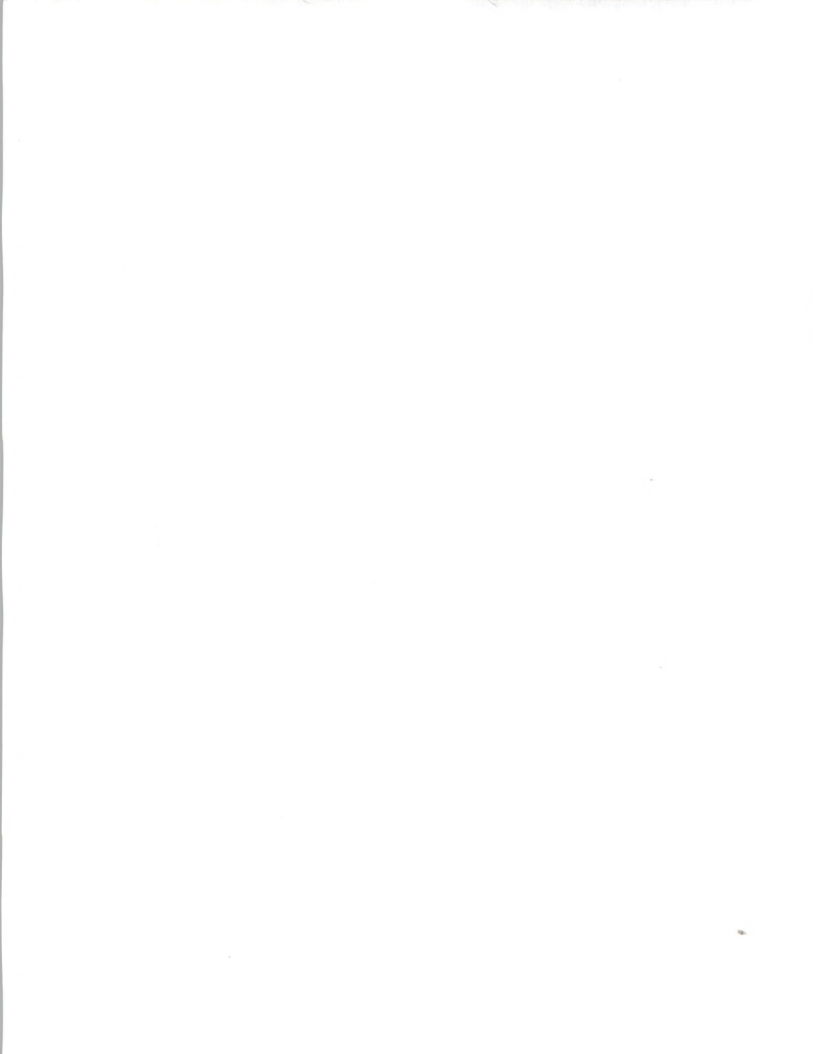
Total Revenue: \$1,500,000,000 (INPUT estimates that 50% is information services-based)

Fiscal Year End: 1/31/93

##### **a. Company Background**

Founded in 1969, SAIC offers diversified research and engineering services as its primary product, delivered through a fully integrated systems approach. The company has historically been primarily a supplier of services to the federal government, particularly in national security areas, and has used its strengths as a respected government contractor to successfully gain contracts in nondefense areas such as energy, environment, health, transportation, etc. Though its revenues in 1992 had dropped to 53% from national security, and other government businesses contributed 40% of revenues in the same period, SAIC is committed to increasing its nondefense and commercial businesses.

The Transportation Services Division is perceived as a growth area, as SAIC moves to reduce its dependence on the shrinking federal defense dollars. Its estimated 1992 revenues attributable to the transportation sector, though a modest \$100 million, were primarily derived from local, state and federal agencies for highway and airport toll collection (ARCS—Advanced Revenue Collection System), traffic management systems, IVHS projects and airport security systems.



### **b. Strategy**

SAIC is a recognized authority on automated vehicle identification systems technology and its practical application. Current expenditures are generally of public funds, which plays to its strength as a government contractor. SAIC believes that it can utilize its research-based experience, history of producing rugged field equipment and its multidiscipline technology capabilities to become a major player supporting the wireless communications surge in the transportation sector.

SAIC acquired the Transportation Division of Video Masters, Incorporated in February 1993, adding rail industry "radio frequency-based" technology for automated railcar and cargo identification to its existing highway, air, and ocean capability. Other recent acquisitions include Callow Associates, a transportation engineering and consulting firm, and Logistic Systems Architects, a defense logistics automator.

Additionally, SAIC has formed a Transportation Policy and Analysis Center just outside Washington, D.C. to be more responsive on transportation planning and operations initiatives.

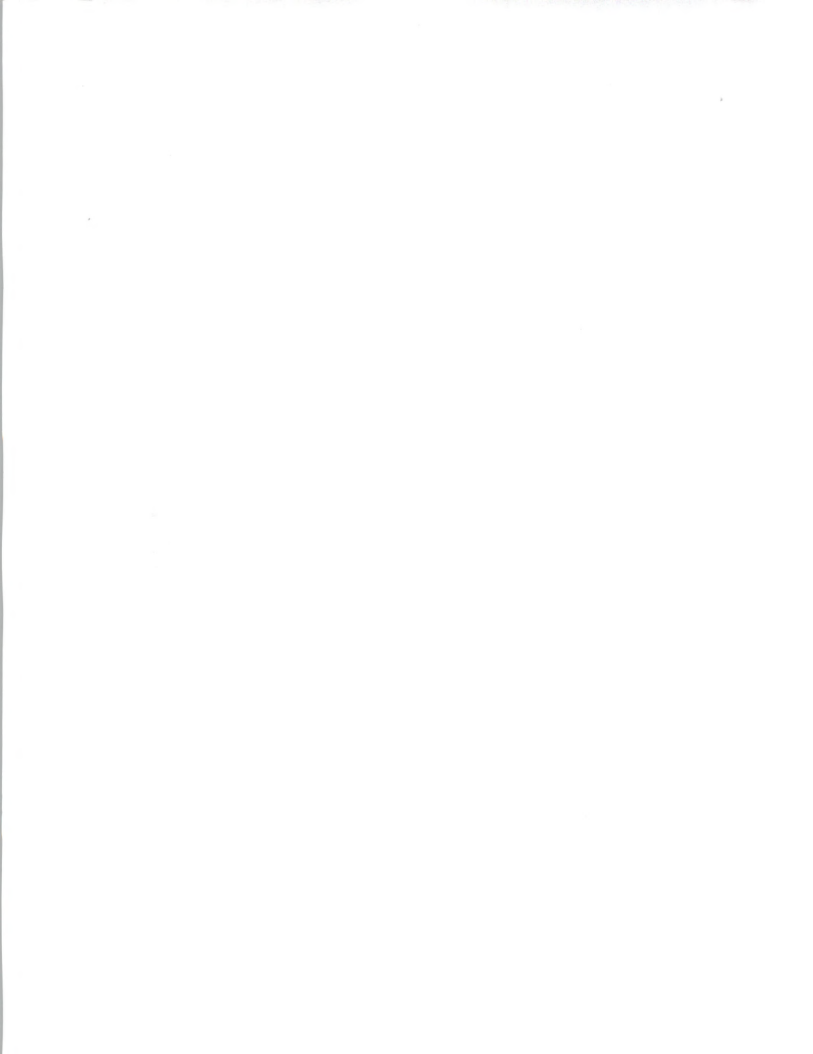
### **c. Products and Services**

SAIC states that slightly more than half of its revenues were derived from systems integration and professional services. Of that revenue, INPUT estimates that 55% was systems integration, 35% professional services and the remainder from processing services and applications software sales.

SAIC's state-of-the-art transportation sector systems feature standards-based open architectures, neural networks and LAN/WAN design with interfaces to all platform levels.

Its primary software product, built from the Automated Vehicle Identification (AVI) research is its ARCS—Advanced Revenue Collection System, a comprehensive toll collection system that can even bill through EFT bank connections and is used in Florida, California and Massachusetts. SAIC's Integrated Toll Collection System puts together all the pieces from plaza planning to AVI readers, treadles and collector terminals.

The company's present strength is in highway toll automation, but the future lies in the real-time tracking of cargo movements regardless of transport mode.





#### **d. Key Issues**

SAIC's primary issue is to translate its considerable capabilities into products that will serve the commercial transportation sector. Secondly, it will need to acquire the ability to market to a fragmented industry that functions on different motivations than government agencies.

### **3. RAILINC Corporation**

50 F Street, N.W.  
Washington, D.C. 20001  
Phone: (202) 639-5500  
President: Henry W. Meetze  
Status: Subsidiary  
Parent: Association of American Railroads  
Total Employees: 130  
Total Revenue: \$18,700,000  
Fiscal Year End: 12/31/92

#### **a. Company Background**

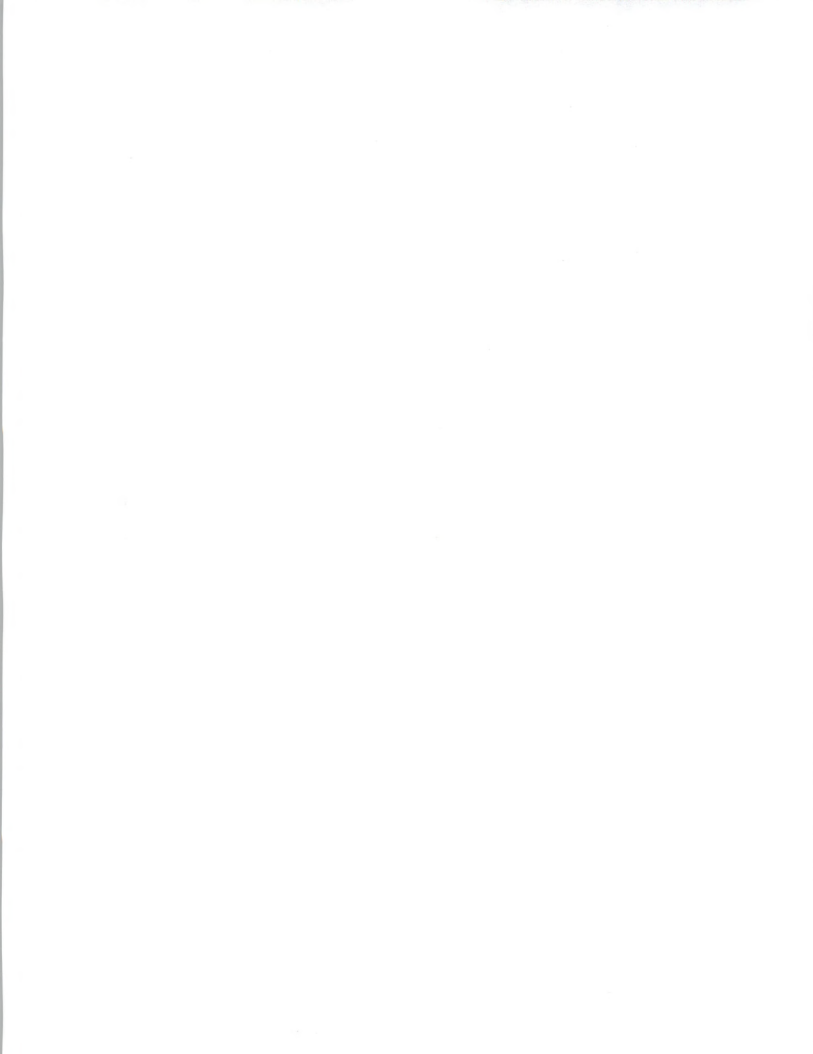
RAILINC®, founded in 1982, provides network services—including electronic data interchange (EDI) and industry data bases—and software products to the transportation industry. Clients include the major North American railroads as well as short lines, equipment-leasing firms, shipper and rail industry, and government agencies. RAILINC is the data processing subsidiary of the Association of American Railroads (AAR).

RAILINC's 1992 revenue of \$18.7 million includes approximately \$12 million from AAR and its members. All of RAILINC's revenue is derived from North America.

#### **b. Strategy**

RAILINC is a for-profit subsidiary and pursues business opportunities in rail and nonrail industries.

RAILINC is positioned more as a captive processing service for the railroad industry than as a value-added network services vendor. Client satisfaction is high with the niche services RAILINC offers. RAILINC may face competition in the future from VAN providers as it seeks to expand its services.



### c. Products and Services

Approximately 90% of RAILINC's 1992 revenue was derived from network services and 10% from software products.

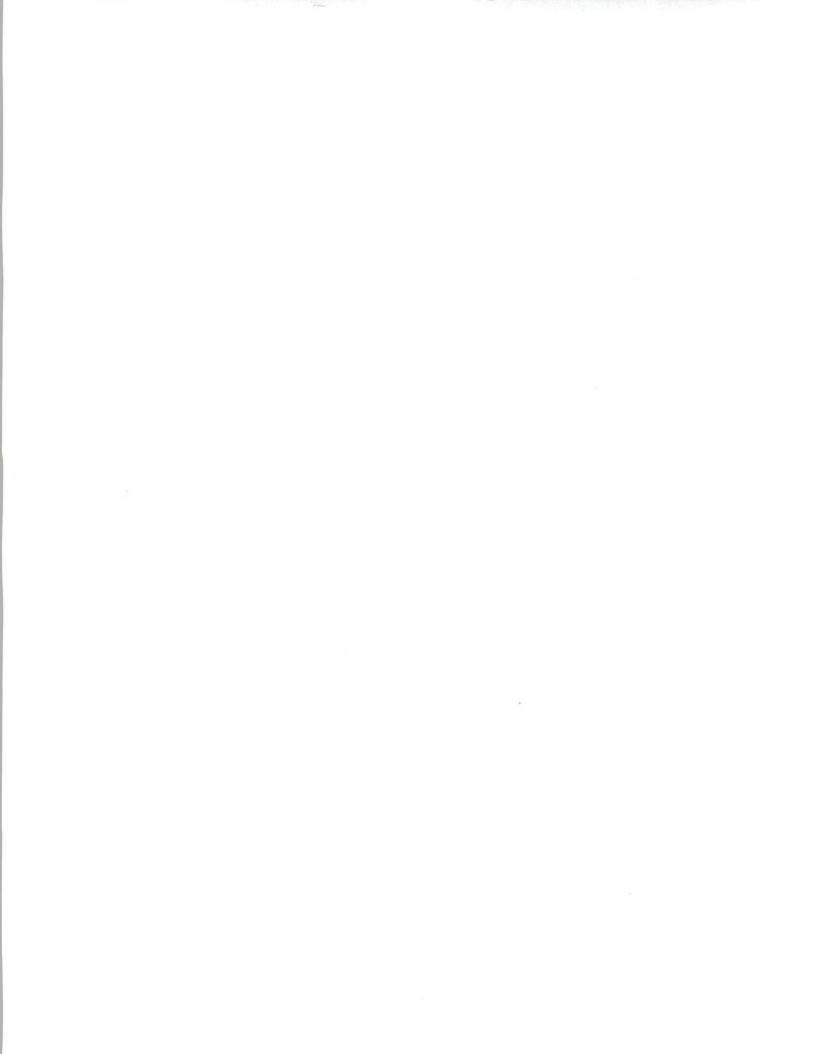
RAILINC's network services include the following:

- The CLM Collection Service electronically collects Car Location Messages (CLMs) from most major rail carriers in North America and provides shippers with a single source of CLM information.
- The Data Exchange System consolidates car hire or car repair bills from over 230 railroads and provides them to rail car owners in computer-processible form.
- RAILINC's telecommunications network is currently used for EDI transmissions by over 400 clients, including rail carriers, manufacturers, ocean carriers, trucking companies, short lines, equipment-leasing firms, and government agencies.
- Data bases maintained by RAILINC include the following:
  - TRAIN II® (Telerailed Automated Information Network) is an international freight car data base. TRAIN II collects information on freight car, trailer, and container movements across the U.S., Canada, and Mexico. There are currently over 150 subscribers to this service.
  - UMLER® is a computerized version of the Official Railroad Equipment Register. This data base contains information on the physical characteristics of more than 3 million registered freight cars, trailers, and containers.

Marketing efforts are directed primarily at railroads and their trading partners. Network subscribers include all major rail carriers.

### d. Key Issues

RAILINC is primarily a captive processing service for the railroad industry rather than a full-service, value-added network (VAN) provider aggressively marketing across all industries. However, RAILINC occupies a specific niche that VAN providers may be interested in serving. RAILINC is well-managed and provides excellent service to its clientele.



#### **4. Andersen Consulting**

69 West Washington Street  
Chicago, IL 60602  
Phone: (312) 580-0069  
Fax: (312) 507-2548  
Managing Partner: George Shaheen  
Status: Private  
Total Employees: 26,730  
Total Revenue: \$2,720,000,000  
Fiscal Year End: 12/31/92

##### **a. Company Background**

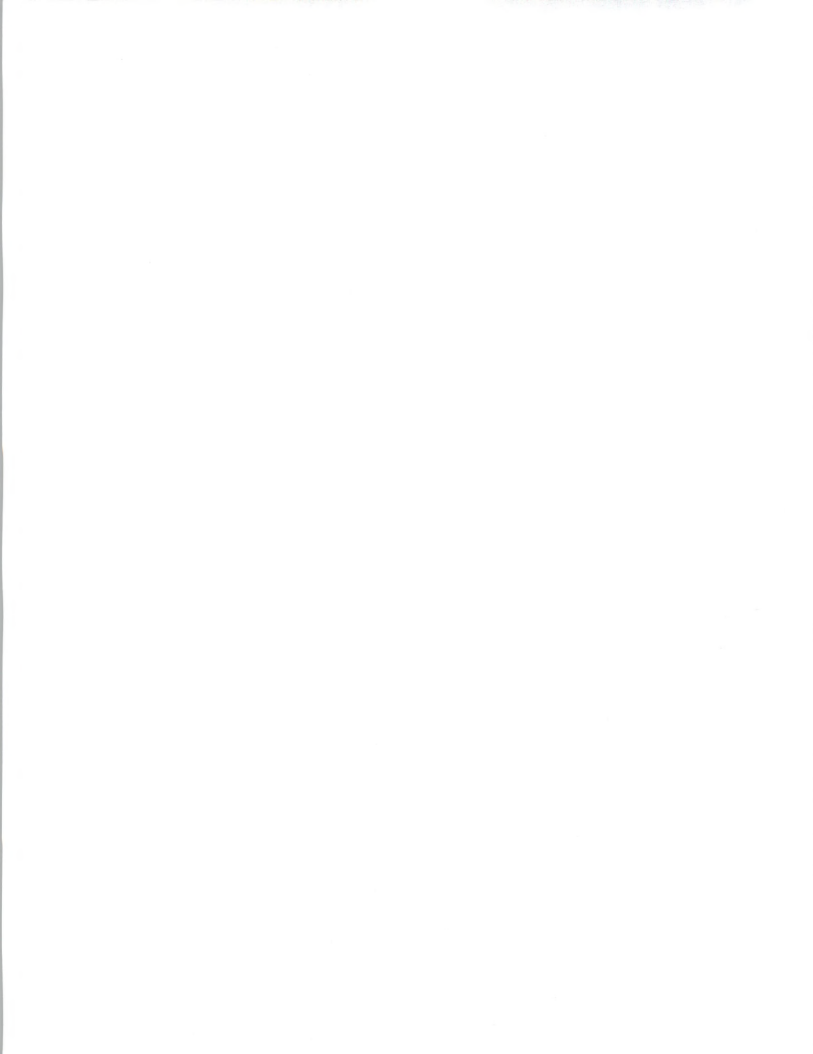
Andersen Consulting is an international management and technology consulting organization. It was established by Arthur Andersen & Co. as a separate corporation in 1988 to address its rapidly growing information services business, which began as a management consulting outgrowth of its public accounting client base. Andersen Consulting's structure is unlike its peer Big 6 accounting-based consulting firms, which continue to provide IS services out of their basic partnership structure. Estimated worldwide revenues in 1992 for Andersen Consulting were \$2.7 billion, a 16% increase over 1991. During the same period, U.S. revenues increased 12% to \$1.25 billion. In 1992 its international business accounted for 54% of revenues.

##### **b. Strategy**

Andersen utilizes its ability to access senior management, knowledge of industries and applications to make presentations and conduct front-end consulting studies to suggest opportunities to gain revenue and improve earnings at the companies they contact. Andersen uses its reputation and knowledge of a group of industries as well as demonstrations of working solutions to industry problems as a means of appealing to and closing business with prospects.

Andersen's basic organization is structured along its service lines and industry practice groups delivered through national accounts and local office modes. Its basic thrust is to turn initial engagements into full-service relationships that feed clients into its basic service lines, which include systems integration and systems management. The firm also uses acquisitions and alliances to gain additional specialized resources and knowledge to address its areas of interest.

Andersen Consulting provides systems integration and professional services to a growing number of transportation sector firms in all segments: trucking, water carriers, railroads, intercity buslines and primarily the air segment, e.g., airlines and airport facilities.



Some of the services supplied to transportation involve the use of Andersen's manufacturing and logistics expertise, operating models and software products to solve sector problems, e.g., maintenance and repair workflows, and electronic exchange of data with engine and airframe manufacturers.

### c. Products and Services

Andersen states that roughly 65% of 1992 revenues were derived from systems integration services, up from a 1990 estimate of 50%. Its stand-alone professional services include revenues generated from change management, business process management (systems operations activities), strategic services and application product sales. When professional services engagements lead to SI tasks, that revenue is rolled into SI.

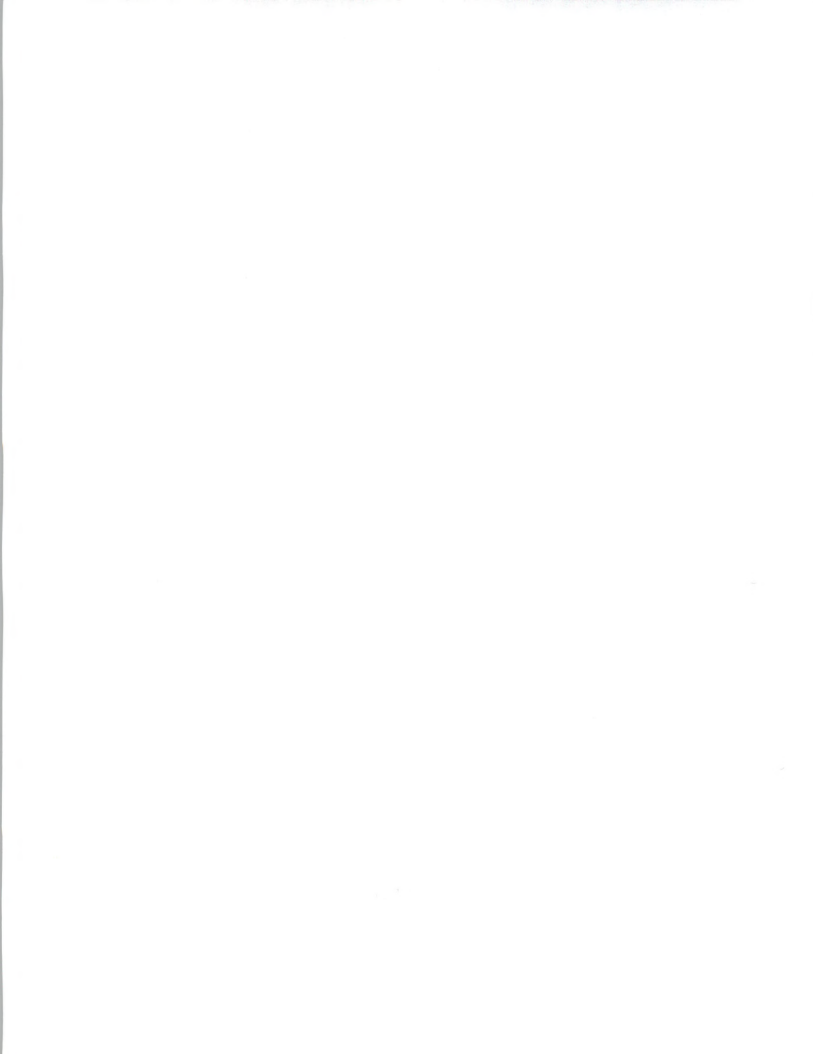
Though the portion of Andersen's revenues attributed to the transportation sector are not available, its segment specialization is airlines to which it offers two application products:

- M&RC (Maintenance and Rebuild Control) assists airlines with maintenance control and improving aircraft availability. The software is 70% mainframe and 30% client/server, utilizing bar code readers built on a DB2 and Windows base.
- PRA (Passenger Revenue Accounting) is a client/server-based system developed with Northwest Airlines to accurately account for revenue and assure proper fares, using data from used flight coupons. Prior to this system, airlines at best were able to spot check this true source of revenues. Images are lifted from the coupons and amounts are extracted and cross-checked for accuracy. Though Northwest uses a mainframe version, new client Delta processes 400,000 transactions a day through 500 terminals and 50 servers, a proven high-volume client/server implementation. The software is available for purchase or as an outsourced, per-transaction service.

Andersen's other airline segment activities involve:

- Reservations
- Change management
- Ground services support, including catering
- Cargo operations

Beyond air cargo, Andersen also is involved with various freight segments providing distribution and logistics solutions for single mode and multi-mode shippers. This is a natural offshoot from its manufacturing expertise to provide time-critical support of that sector's JIT needs and re-engineered invoice processing.





#### **d. Key Issues**

Andersen's issue relates to its lack of visibility to transportation industry firms. This is compounded by its view of transportation as a slow-growth industry, which yields a lower resource commitment than it provides to other industries. If transportation becomes a more significant target industry for Andersen, it will have significant catch-up to gain the market share it is accustomed to holding elsewhere.

#### **5. Electronic Data Systems**

7171 Forest Lane  
Dallas, TX 75230  
Phone: (214) 604-6000  
FAX: (214) 605-6546  
Chairman, President & CEO: Lester M. Alberthal, Jr.  
Parent: General Motors Corporation  
Total Employees: 71,000  
Total Revenue: \$8,218,900,000 (41% captive GM portion)  
Fiscal Year End: 12/31/92

#### **a. Company Background**

EDS was founded in 1962 to provide systems operations support for the IS operations of health insurance organizations. This role has expanded and the company is now a world leader in the application of information technology (IT) to solving client problems, for both public and private organizations globally. EDS's employees number in excess of 71,000 and serve a client base of more than 8,000 in all 50 states and 29 countries. Global revenues in 1992 were reported at \$8.2 billion, an increase of 16% over 1991, with 77% derived from U.S. operations.

EDS's transportation Strategic Business Unit (SBU), a 2,000-employee unit formed in 1991, is involved with all segments of the sector, including running the CRS that supports Continental Airlines' System 1 subsidiary, a CRS business that provides reservation support for 26 airlines, a newly acquired network providing card-based payment systems for truck drivers, and a system supporting National Car Rental operations.

#### **b. Strategy**

Traditionally, EDS has used its reputation and enviable track record as the premier U.S. systems operations/facility manager to expand within an industry and to other industries, often being the only logical choice for a client. It has augmented this basic strategy with an open mind to affiliation and acquisition (over a dozen in 1992) to gain market share, expertise, and open new horizons of business. Beyond its significant systems operations services, the firm provides technology products and services, including systems integration, applications software, professional services and network support.



### c. Products and Services

Over half of 1992 global revenue was derived from EDS's core systems management business, and professional services accounted for about 16%, systems integration 14% and software products were 7%. The remainder, about 7%, was derived from miscellaneous activities for clients. Mere percentages can disguise its position in these technology areas, with the systems integration revenues in excess of \$1 billion during 1992.

Though the portion of EDS's revenues attributed to the transportation sector are not available, most of its transportation clients are in the airlines and air freight segments:

- Reservations
- Air cargo, considered a significant SI and SO opportunity
- Maintenance and engineering
- Revenue accounting, including yield management

Beyond its significant presence in the air segment, EDS is expanding its youngest SBU, freight, with services aimed at the rest of the sector:

- Truck driver financial support, through 1992 acquisition of Cummins Cash (CCIS)
- Logistics and distribution, partly by expanding GM's JIT networks
- Seamless freight interchange support

EDS's established geographic SBU's presence in Canada and Mexico has it well-positioned to take advantage of NAFTA-generated business opportunities and provide cross-border support for its clients.

Finally, within EDS's government SBU, its eight-and-a-half-year agreement with the USPS contractor Postal Buddy for the development, deployment, operation and ongoing support of unattended, multimedia kiosks provides EDS with a unique SI experience and enhanced reputation. EDS's technologically innovative combination of advanced technologies is a model for application in other transportation segments.



## **6. Unisys Corporation**

Post Office Box 500  
Bluebell, PA 19424-0001  
Phone: (215) 986-7740  
Fax: (215) 986-7744  
Chairman & CEO: James A. Unruh  
Status: Public  
Total Employees: 55,000  
Total Revenues: \$8,421,900,000  
Fiscal Year End: 12/31/92

### **a. Company Background**

Unisys was formed in 1986 by the combination of computer pioneers Sperry and Burroughs. Its most recent corporate objective and frequent marketing promotion is "Customerize." The meaning of this has become a corporate mission: to help its customers. To accomplish this is an underlying strategy to more broadly address its customers' service needs by facing other industry players across the spectrum, from the technology firms like Compac to service-oriented firms like Andersen Consulting. In 1992, Unisys was relatively unique when compared to its much larger mainframe peer IBM; it was profitable.

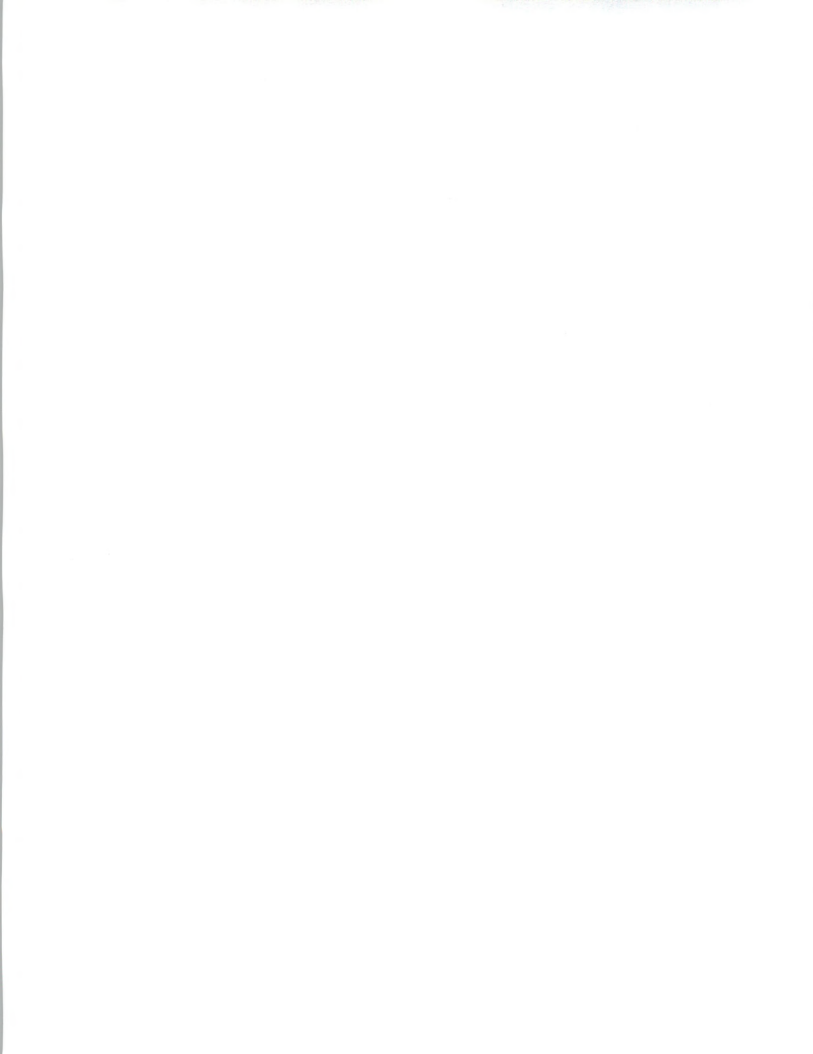
### **b. Strategy**

The history of Unisys and its predecessors is in the mainframe equipment business. Unisys sees its future moving toward vision and concept-based service delivery, e.g., re-engineering and systems integration. Unisys will utilize alliances and partnerships to supplement its respected global marketing and service organization to resolve its customers' issues.

Transportation has primarily meant airlines, which have long been a focus industry for Unisys. Its airline reservation systems efforts began in the 1960s with United Airlines and have constituted a \$150 million investment over the past 30 years. Unisys employs 1,000 marketing, consulting and development people in its airline division, which is focused on both cargo and passenger carriers. Its current emphasis is on Europe and Asia, as it waits for the U.S. airlines to recover.

### **c. Products and Services**

Unisys is a global company, with slightly more than half of its 1992 revenues derived outside the U.S. Unisys is positioned as providing open information network solutions to high-transaction-volume businesses, with some 140 of the world's airlines as customers.



Its primary transportation product is its family of airline software systems, USAS. There are three underlying applications—passenger services, departure control, and cargo. Both passenger and cargo systems contribute about 40% of the total revenues, with flight operations and maintenance providing 20%. The current company thrust is to assist in evolving existing CRS systems, which only know passengers as seat occupants, into customer management systems. Its solutions involve the creation of specialized data base systems that “surround” a CRS to provide customer relationship data even at the point of sale. These system additions will allow airlines to deepen customer relationships.

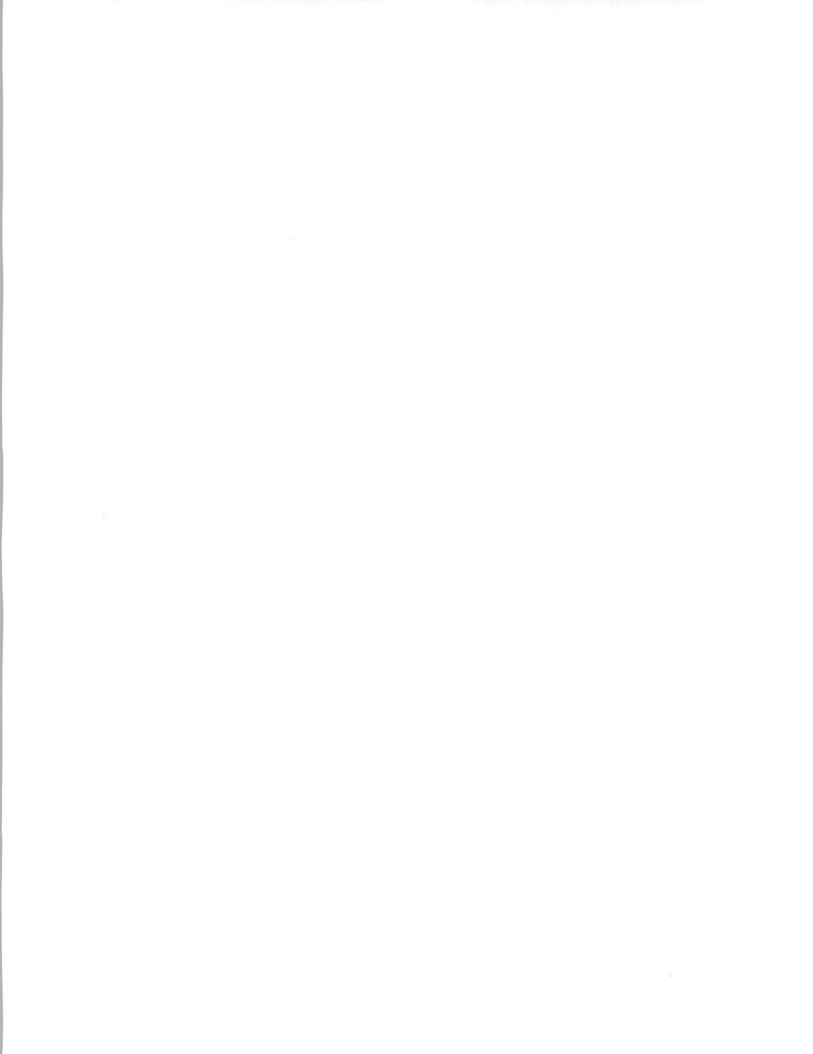
In addition, Unisys is a systems integrator based on its contract with Bangkok Airlines and its status as a transportation outsourcing provider. Through its Paramax subsidiary focused on government contracts, Unisys has provided multivendor support services since 1979 to the U.S. Department of Transportation’s Volpe National Transportation Systems Center. This relationship is unique, because the center utilized almost no Unisys equipment.

Beyond airlines, Unisys also provides systems to passenger rail and ferry operators in Europe.

#### **d. Key Issues**

Like other traditional large computer producers, such as IBM and DEC, Unisys is trying to change its internal focus to providing solutions to customer problems. The challenge is also external; as it broadens the scope of its services, it comes into competition with specialists who have been providing these services much longer.

Unisys’s partnership and affiliation strategy is sound and it adds value by providing an in-place worldwide support and service capability. The difficulty Unisys faces is the apparent pervasiveness of this strategy among technology vendors, as it attempts to expand service offerings and extend its client relationships.





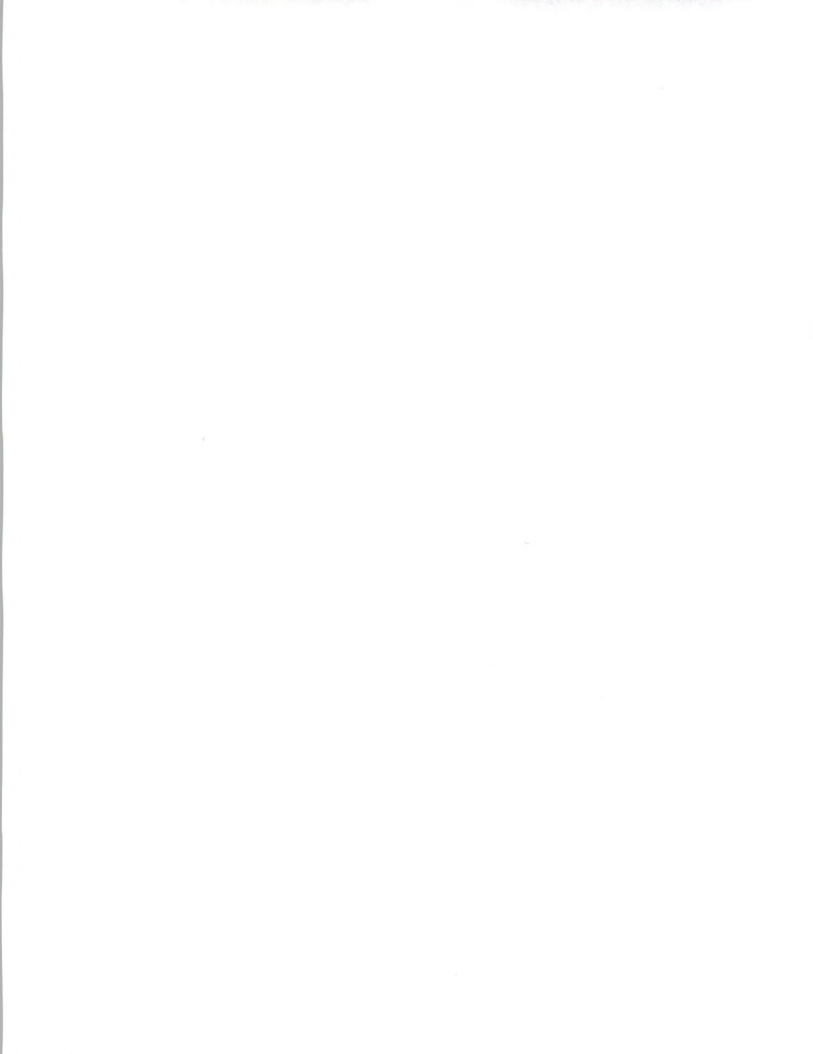


## Summary and Conclusions

The key to the sector's recovery is primarily economy-related. Though many sector firms have learned how to make money in slow times, the whole sector needs a strong economy, and year-end 1993 will probably not show widespread profitability. 1994 may be transportation's year.

The next several years will see major shifts in the transportation sector unprecedented in its history. There will be a blending of transport modes in freight that will result in a transparency of mode to the shipper. This blending will take the form of merger, acquisition, and affiliation. An open question is: will one sector be capable of becoming the dominant face to the shipper? Today, this is generally trucking because trucks are usually the first and last leg of all shipments. Unless railroad names are on the side of truck fleets, the truckers would seem to have the advantage.

Passenger travel patterns will see a shift to rail, potentially more rapidly than government projections. Higher-speed trains and the congestion of other transport modes will drive people to trains. Passenger airlines have their eyes focused on the high-growth international arena and more alliances will take place. Though many of the early deregulation start-up airlines are but memories, there will be a new wave of small start-ups to fill in the routes that the bigger airlines will abandon.



## A

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**Sector Business Trends and Opportunities**

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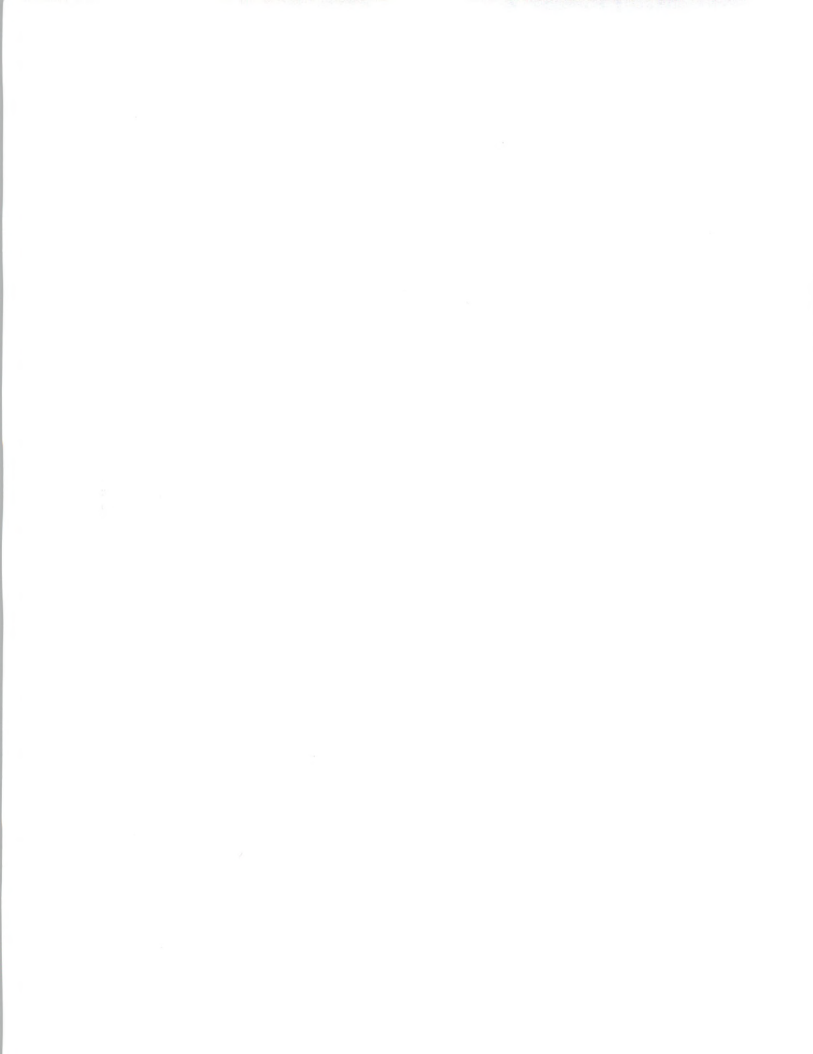
Major trends currently identified in the transportation industry are:

- Creation of transportation industry for freight
- Trucking segment—massive contraction, continentwide competition
- Airline, passenger subsegment—losses cut, international will be hottest and there may be a possible separation of the CRS function
- Airline, cargo subsegment—growth expected, particularly international
- Railroad, passenger subsegment—diversion to rail from the overcrowding of other transport modes will be a pattern, helped by the advent of higher speed trains
- Railroad, freight segment—growth higher than expected in intermodal, but there is strong competition from the north
- Water segments—strong domestic growth based on coal resurgence, assuming proper weather; international growth depends on the global economy

Eventually a true transportation industry for freight in North America will emerge. This will be driven by many factors and fostered by the blending of the modes and technological interconnection of the players. This blending will be needed to provide the best level of service for their customers who wish to become mode-insensitive.

The trends in trucking that are reducing the number of U.S. competitors will accelerate, in part because of the new cost of technology for wireless communications. However, the resulting immediate information and management advantages will far outweigh the initial cost. This will also help U.S. carriers to be dominant in the growing Mexican market.

Competition for the major U.S. airlines will increase as well-heeled international competitors establish their domestic presence. U.S. airlines will remain major players in the globalized market and are believed to have finally learned how to make rather than lose money. They may look at their expensive, but lucrative CRS holdings as a means of raising capital by selling off part or full ownership.



In the air cargo sector, new systems developments (there are at least three in progress) are signs of renewed competition. The basic systems for air cargo have their base in the early days of airline CRS systems. The need for replacement has been recognized by the carriers and SI vendors alike. Only one of the major U.S. airlines, Northwest, has cargo-only planes and the rest carry cargo on their passenger flights. This move to new systems development may indicate a market sufficiently active for U.S. passenger carriers to consider re-entry.

For rail the resurgence has taken hold, beginning with the expected return of coal markets in 1993. One leading factor for rail's growth will continue to be the move toward intermodal transport, which will be one of the driving forces for the re-emergence of transcontinental single railroads in the future. Industry experts expect the seven major railroads to combine, creating three or four. The model for this is already in existence—the Canadian Pacific.

Internationally, water carriers will hold their own with high-value cargo, but the lower cost foreign carriers will experience growth. Domestic water shipping should share in the growth in bulk coal and grain expected in 1993. Weather in the major shipping areas will be an issue: too little rain and barges cannot be moved full; too much rain and navigation becomes impossible.

## B

### Federal Government Activities

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Washington, D.C. is the focus of the U.S. transportation industry in 1993. The results of the deliberations and compromises will have an impact on all segments of the industry in both the short term and long haul. The key government initiatives are:

- North American Free Trade Agreement (NAFTA)
- Potential fuel tax increases
- Airline competition panel
- Clean Air Act, 1992 modifications

These activities are all expected to be approved, though their actual form and enforcement guidelines are incomplete. The first promises an economic shot in the arm beginning in 1994 for all of transportation, but will increase competition over time for surface segments. The overall impact is mixed among the segments and subsegments. The short-term outlook for air is improved, though not enough to return the segment to profitability in 1993. Large trucking firms should expect to break even, with the small firms negatively impacted by these initiatives. Railroads, because of their leaner structures and lower levels of congestion as compared with roads and airports, stand ready to be the biggest gainers.



## C

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**Transportation Technology Trends and Opportunities**

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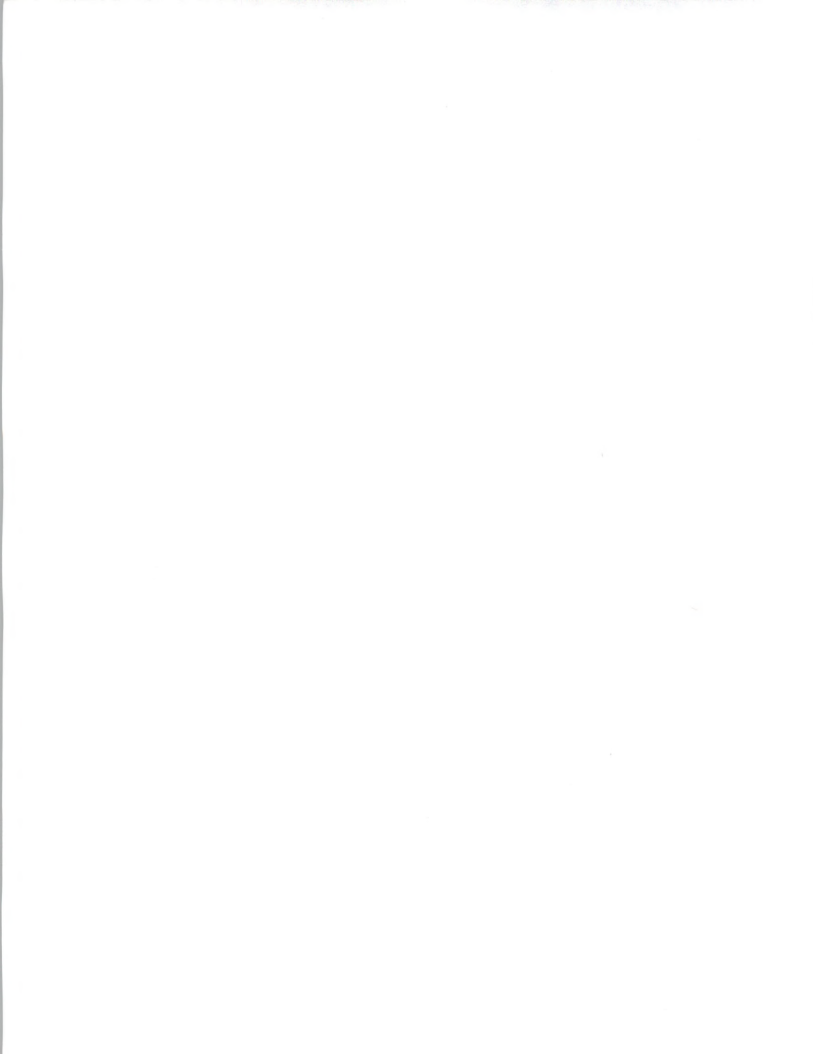
Listed below is INPUT's summary of major technology trends within the transportation industry.

- Surface transport is going deep into wireless communications, and yields network services' jump in performance and opportunity for the development of applications.
- Systems operations will show continued growth from outsourcing, but some will go to transportation industry firms.
- Processing services is believed to be headed for airline/CRS disconnect.
- Systems integration will garner significant business from transportation for coming big projects, and internal transport industry firms will be a factor also.
- Applications software and turnkey systems, through having strong growth for micros and client/server approaches, will be otherwise slow.
- EDS's implementation for Postal Buddy of multimedia retail units could be the model for many industries.

Many of the areas of opportunity relate to the forces in motion within technology. The transportation sector is moving, like other industry sectors, toward client/server, open systems, distributed processing and networks. Firms are reducing their staff and moving to focus on business-enhancing and dollar-saving developments.

Some specific opportunities concluded by this study are:

- The probable increases in the price of fuel and fuel taxes are a major impact on trucking segments. Though there are many packages available for improved routing and maintenance, the segment will be looking deeper for savings. This is particularly true of the smaller firms that rely on workstations and PCs for much of their processing.
- Systems integration and systems operations vendors will continue to find opportunity, potentially in partnerships, as major systems continue to be developed (IBM/AMR Aeroflot CRS, and several air cargo systems) and as transportation firms tire of the increasing costs of system upkeep.





- The primary increase area in 1993 is in network services to support the hot market for vehicle-mounted transponders for both truck and rail wireless communications. These devices are capable of bringing the businesses vast amounts of real-time logistical information, first regarding trucks and locomotives, then about specific containers. The development of applications to use this information and drive decisions should be a fertile area for vendors as sector firms will look for extended benefits from the data flow. Secondly there is a need for vehicle unit systems that will assist the driver/engineer and also gain their acceptance of this invasive technology.
- The ability to provide shipment information directly to shippers is being used by several sector firms. This is the same tactic used by airlines when they placed CRS terminals in travel agent's offices. Though installed to provide enhanced customer service, the equipment also solidifies the relationship. The future may hold a competition similar to the CRS competition over travel agent relationships. The connected logistic systems exist only at the freight forwarder level today, but sector firms could take over this function in the future.

## D

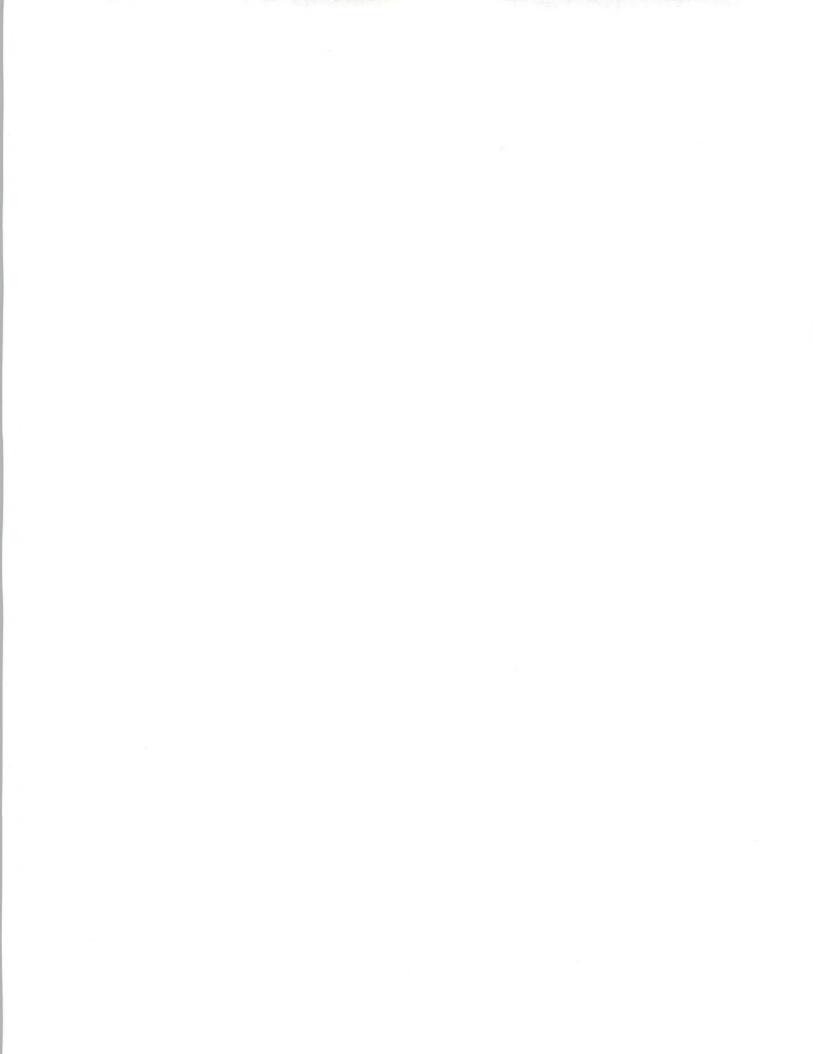
### Conclusions

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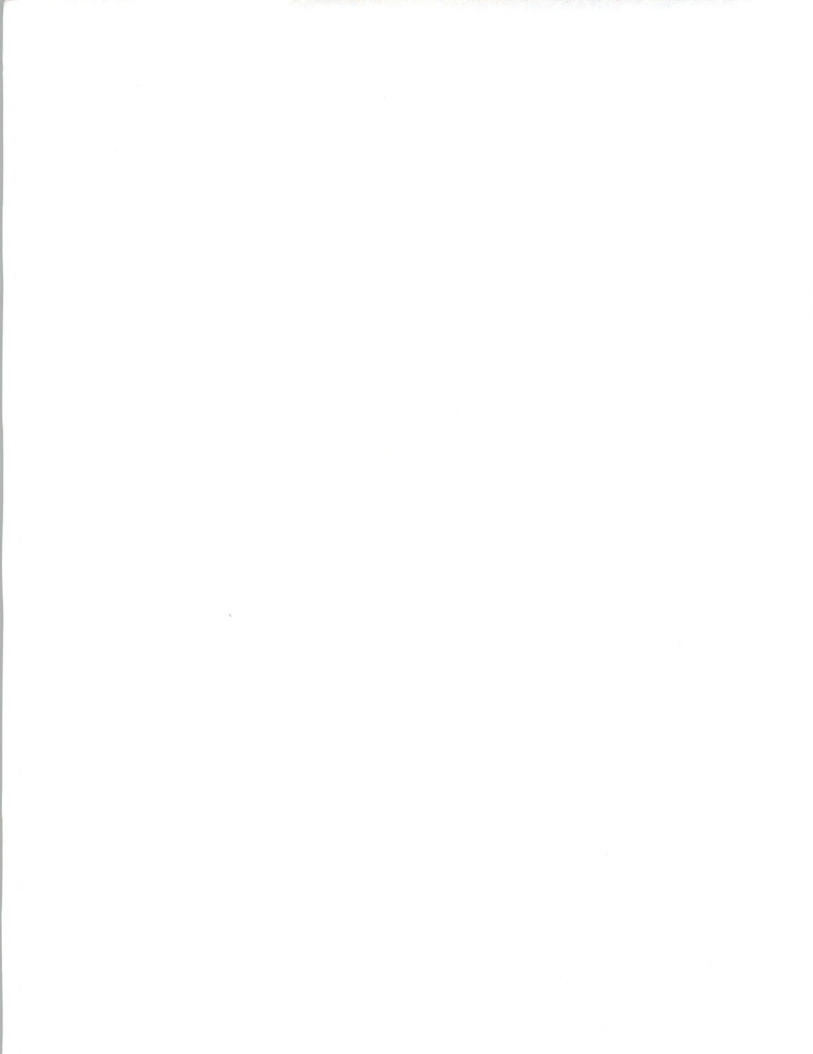
Vendors should not be fooled by the low growth projected for the transportation sector, because of the vast differences in activity by delivery mode. There is considerable opportunity. The primary areas for opportunity are in addressing the problems of the segments and subsegments, hot technology issues, and the future applications of a more connected and blended industry.

INPUT believes vendors that acquire the needed sector business knowledge and know the technology directions will find considerable demand for their services. Those firms already servicing this sector will have an advantage. Sector knowledge is the key, as evidenced by the success of some sector firms translating their technology leadership into being perceived as SI and SO vendors, even across segments.

Finally, federal government actions during 1993 will provide the improved financial situation firms will need to pursue needed technology as the competition changes to a more global perspective. U.S. carriers will need to use their technology advantage to control their destiny and succeed in the information-based future of transportation.



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## Forecast Data Base and Reconciliation

### A

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#### Forecast Data Base

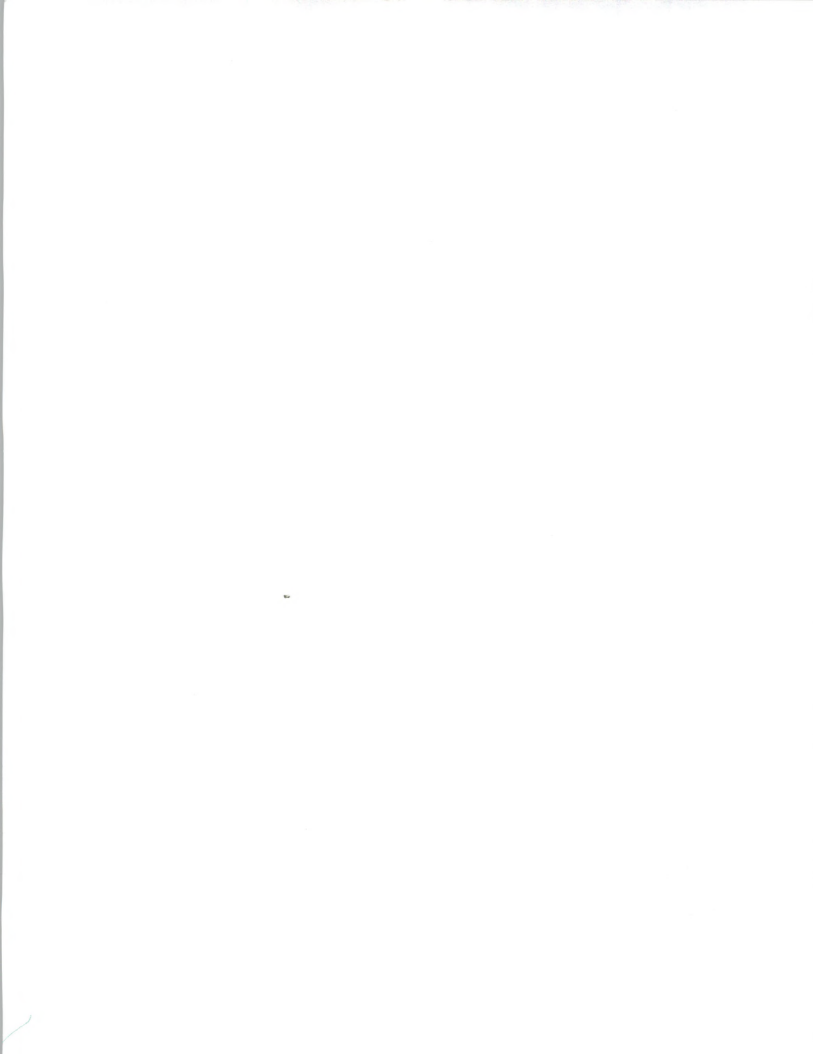
Exhibit A-1 presents INPUT's detailed 1992-1998 forecast for the transportation sector.



EXHIBIT A-1

### Transportation Sector Market Size by Delivery Mode, 1992-1998

Delivery Modes	1992 (\$M)	Growth 92-93 (%)	1993 (\$M)	1994 (\$M)	1995 (\$M)	1996 (\$M)	1997 (\$M)	1998 (\$M)	CAGR 93-98 (%)
Sector Total	3,799	11	4,162	4,570	5,015	5,517	6,058	6,685	10
<i>Professional Services</i>	246	8	266	286	308	329	350	370	7
- IS Consulting	58	14	66	73	80	88	97	107	10
- Education & Training	33	9	36	40	43	46	48	53	8
- Software Development	155	6	164	173	185	195	205	210	5
<i>Systems Integration</i>	187	19	222	268	320	385	461	539	19
- Equipment	66	17	77	95	115	140	170	190	20
- Software Products	11	27	14	17	20	26	30	38	22
- Applications Software	8	25	10	12	14	18	21	26	21
- Systems Software	3	33	4	5	6	8	9	12	25
- Professional Services	104	19	124	148	175	207	247	295	19
- Other	6	17	7	8	10	12	14	16	18
<i>Systems Operations</i>	206	14	235	278	321	363	415	477	15
- Platform Operations	105	10	115	130	145	160	175	190	11
- Applications Operations	65	15	75	93	110	125	145	175	18
- Desktop Services	21	19	25	30	35	40	45	50	15
- Network Management	15	33	20	25	31	38	50	62	25
<i>Processing Services</i>	2,105	6	2,239	2,370	2,500	2,650	2,800	2,950	6
- Transaction Processing	2,105	6	2,239	2,370	2,500	2,650	2,800	2,950	6
<i>Network Services</i>	350	21	422	498	586	708	836	997	19
- Electronic Information Services	260	17	305	355	414	500	585	695	18
- Network Applications	90	30	117	143	172	208	251	302	21
<i>Applications Software</i>	425	11	472	538	615	688	786	904	14
- Mainframe	150	3	155	163	170	178	186	194	5
- Minicomputer	110	11	122	135	150	160	170	180	8
- Workstation/PC	165	18	195	240	295	350	430	530	22
<i>Turnkey Systems</i>	280	9	306	332	365	394	420	448	8
- Equipment	135	7	145	155	170	180	190	200	7
- Software Products	105	11	117	129	143	158	170	184	9
- Applications Software	90	11	100	110	122	135	144	155	9
- Systems Software	15	13	17	19	21	23	26	29	11
- Professional Services	40	10	44	48	52	56	60	64	8





**B****Forecast Reconciliation**

The systems operations forecast for 1992 was increased by \$15 million dollars in the 1993 report, which measured actual market size, to adjust for the inclusion of additional desktop services and network management revenues. The forecast for 1997 has been similarly increased by 36%, recognizing the on-going revenue contribution from these two submodes. Additionally, revenues from the Hertz/ISSC contract have been included in the 1993-97 period, based on this contract being signed earlier in 1993.

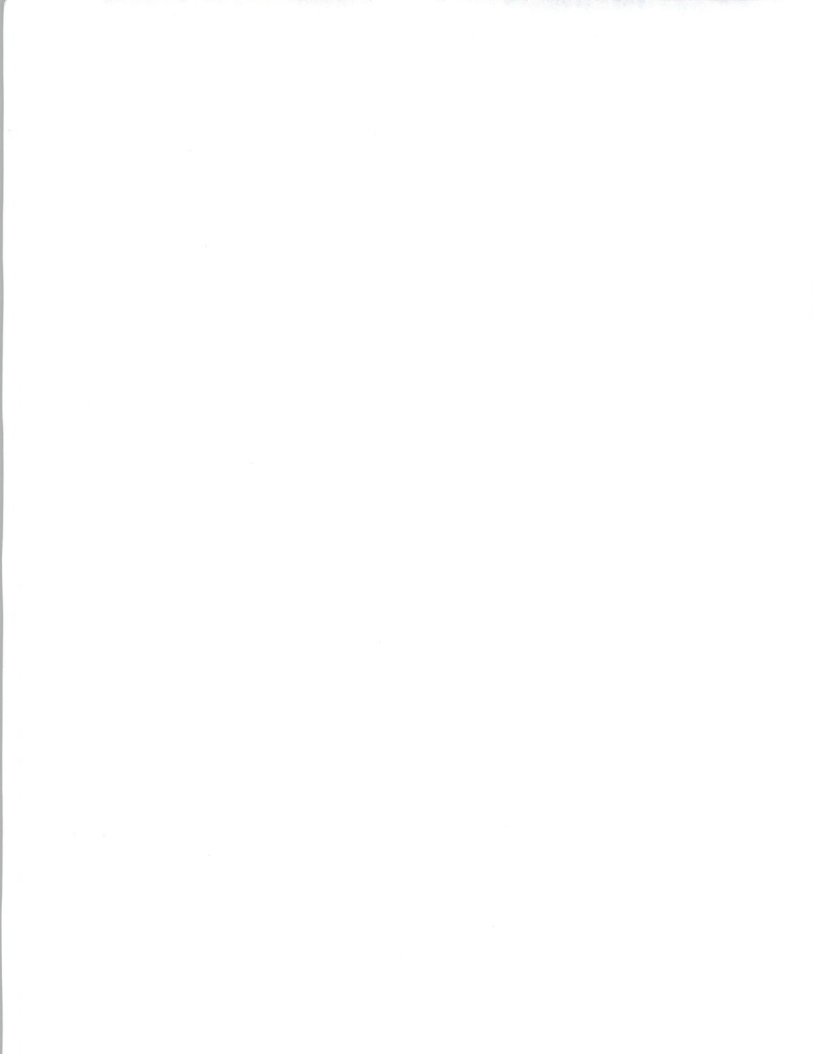
EXHIBIT A-2

**Transportation Sector  
1993 MAP Data Base Reconciliation**

Delivery Modes	1992 Market				1997 Market				92-97 CAGR per data 92 Rpt (%)	92-97 CAGR per data 93 Rpt (%)
	1992 Report (Fcst) (\$M)	1993 Report (Actual) (\$M)	Variance from 1992 Report		1992 Report (Fcst) (\$M)	1993 Report (Fcst) (\$M)	Variance from 1992 Report			
			(\$M)	(%)			(\$M)	(%)		
Total	3,840	3,799	-41	-1	6,124	6,058	66	-1	10	10
Professional Services	252	246	-6	-2	355	350	-5	-1	7	7
Systems Integration	202	187	-15	-7	506	461	-45	-9	20	20
Systems Operations	167	206	39	23	306	415	109	36	13	15
Processing Services	2,132	2,105	-27	-1	2,827	2,800	-27	-0	6	6
Network Services	354	350	-4	-1	859	836	23	-3	-19	19
Applications Software	431	425	-6	-1	776	786	10	1	12	13



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## Government Activities Discussion

Appendix B contains a discussion of four federal government activities pertinent to various sectors of the transportation industry. It is included not as a recitation of the actions, bills or acts, but to explore the areas of impact on transportation. Because of the timing of the report they are based on the best available knowledge, but the results may vary as the discussions reach conclusion.

### A

#### North American Free Trade Agreement

Though NAFTA is a hotly contested issue in Washington, it is generally conceded that at least a short-term boost in economic activity will occur, because the U.S. enjoys a positive trade balance with Mexico. Transportation benefits from economic improvement as well as the anticipated increased flexibility of movement to destinations in Mexico. Detractors, generally organized labor, feel that the lower wage market in Mexico for manufacturing and transportation will actually create unemployment in the U.S. over the long term. Advocates, of course businesses, believe that the elimination of tariffs and other restrictive practices will be good for U.S. exports into Mexico and that the consequent improvement in the Mexican economy will add to its consumer demand, outweighing the potential negative impact even in the long term. INPUT believes that NAFTA only formalizes and extends what has been happening over the past few years in terms of cross-border traffic.

Signed by President Bush December 18, 1992, the agreement establishes a closer economic framework among the three countries of North America, a unified market of 360 million consumers and \$7 trillion in commerce. It is currently pending approval by Congress in the U.S. The basic agreement extends, but is similar to, the existing CFTA (Canadian Free Trade Agreement) that has made Canadian trucks a common sight along the East Coast's U.S. Interstate 95.



There is heavy pressure within Mexico and by Mexico in Washington to support its passage. The current Mexican government, led by President Carlos Salinas de Gortari, believes that the country's economic future and Gortari's own political fortunes depend upon this agreement. To this end, Mexico has spent enormous sums to support NAFTA in Washington. The total is expected to be \$30 million, more than any prior foreign effort.

At this writing, environmental interests had been successful in obtaining a court order to force the administration to produce an Environmental Impact Statement before continuing negotiations. The Clinton Administration responded that it will continue on the current path, which envisions negotiating a side agreement regarding issues of the environment. Government sources believe that this will not constitute a serious impediment to the main NAFTA agreement.

#### WHAT IT IS:

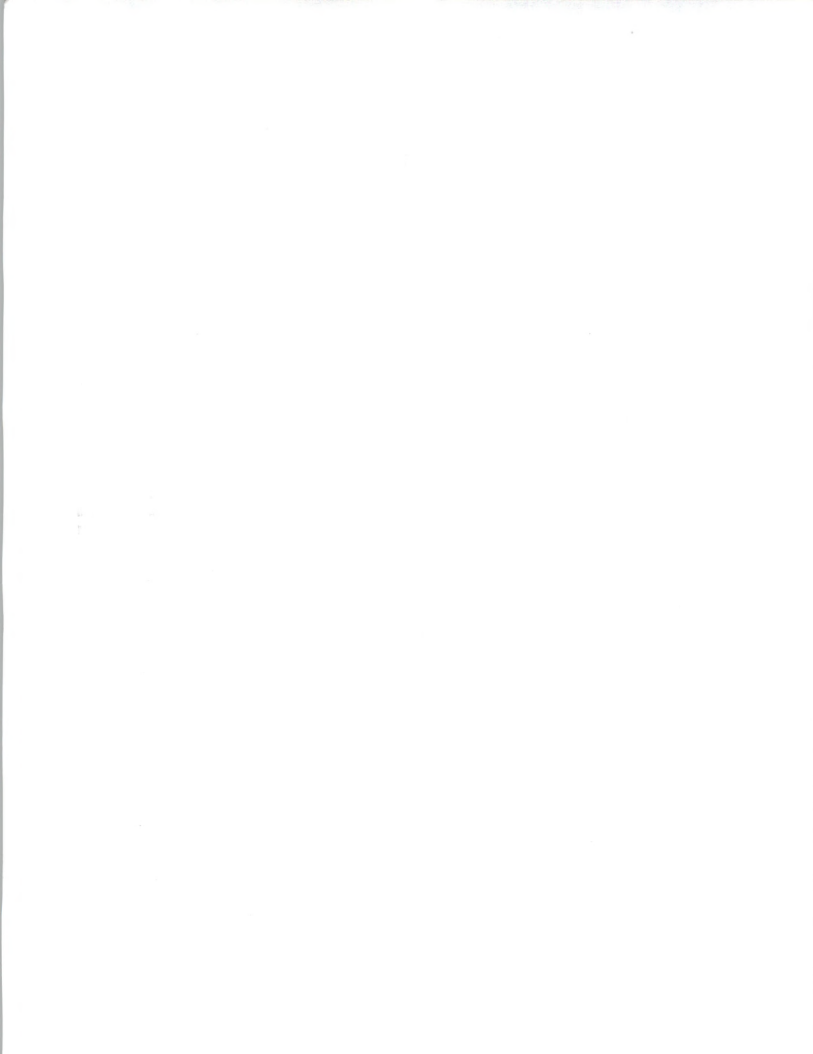
1994—Eliminate duties on 65% of U.S. goods. Change will benefit autos, trucks, and textiles the most and lower import prices on either side of the border.

1995—Transportation companies will be allowed to haul international freight directly to points in the six Mexican border states and Mexican trucks in the four U.S. border states. Halted will be the current requirements that force interchange of trailers and rules that restrict the crossing points; U.S. firms would be allowed to own up to 49% of Mexican freight companies. The result should be reduced costs, more rapid transit of goods, and improved efficiency.

The inefficiency of the current situation is most felt by the "less-than truckload" (LTL) trucking firms. There are currently four too many participants on cross-border trucking. In addition to the U.S. truck driver, there are at least a Mexican crossing agent, a Mexican drayman, a Mexican linehaul carrier, and a Mexican pickup/delivery firm. Mexican traffic entering the U.S. is not quite as complex, but it is still time wasted.

Though neither country's carriers will be allowed to haul purely domestic freight, return hauls must consist of cross-border or international freight. This is expected to be a great deal, since 40% of Mexican traffic is defined as "international"—i.e., point of origin or termination is outside country.

1998—All three partners are to standardize regulations. The biggest differences exist with Mexican trucking: trailer size, as Mexico does not allow the standard U.S. and Canadian 53-foot trailers; weight limits, as Mexico uses 100,000 lbs, while the U.S. limits to 80,000 lbs; and drivers, because a U.S. driver must be 21, while a Mexican can drive at 18 with less-specialized training.





Also ending in 1998 is the border-state restriction for both sides.

Cross-border ownership rules for transportation companies do not allow full ownership until 2002.

#### WHAT HAS HAPPENED SO FAR:

Much has happened in anticipation of the agreement. U.S. trucking companies have formed alliances with Mexican carriers and some have given them access to their computer systems. Most notable are Averitt Express, Yellow Freight, Carolina Freight and J.B. Hunt. These companies already provide "apparent seamlessness" in single bills of lading for shippers.

Railroads have also become party to agreements with the Mexican companies. In particular FNM, Mexico's railway system, is installing the Union Pacific's Transportation Control System; Santa Fe has agreed to buy cars from a Mexican company, and Burlington Northern is a partner with a Mexican firm to move cars on barges from Galveston to Mexican ports for transfer to FNM rails.

Only one airline has reacted—the small regional LA Air has agreed with Aero Mexico to a code-sharing arrangement and will be serviced by the Mexican airline's CRS system.

Most business observers believe that the U.S. economy needs this boost in economic activity and that the positive effect of decreasing restrictions on transportation within the continent will bring dramatic change to this industry. Further, the concerns of detractors regarding a significant loss of jobs may prove to be overstated in the long term.

## B

### National Commission to Ensure a Strong Competitive Airline Industry

The Clinton Administration formed this group, commonly known as the Airline Competition Panel, with the stated purpose of recommending policies aimed at revitalizing the U.S. air industry, which includes airlines and equipment manufacturers. The impetus is money and the losses sustained or projected for these two segments of different, but related industries. Estimated losses for airlines range from \$8 to \$10 billion in net operating income over the past four years. The aircraft equipment industry faces both the decline of defense orders caused by the end of the Cold War and a drop in orders by a financially strapped global airline industry. The solutions are not necessarily compatible, because one of the primary causes of the protracted airline slump is system overcapacity—there are too many planes to fill.



The panel is expected to review several areas for change, including the following:

Within direct control of the federal government are several issues under discussion: ticket excise taxes, expected to be dropped from the current 10%; and loan guarantees, suggested to assist the replacement and addition of planes (estimated at 12,000 aircraft by 2015) and address the airport congestion issue by the release of some \$7 billion held in trust for that purpose.

Currently, foreign investment in U.S. airlines is restricted to 25% of control. The trend in globalization of the airline industry seems to be at odds with the concern for national security on which this restriction is based. The much-needed capital is often more readily available outside the U.S., e.g., British Air/USAir, KLM/Northwest and Air Canada/Continental.

Internationally, the panel is expected to recommend that the administration increase pressure to help level the playing field, considering issues like uneven route policies, favoritism in gate-and-slot allocation, and other international policies.

Also under review will be miscellaneous areas that are potential sources of unfair competition and financial concerns—rules that allow protracted operation, pension obligations, and CRS systems.

Because projections are for robust growth in air transport over the next decade, maybe these industries would be cured without intervention. INPUT believes that the panel's recommendations will be significant in both accelerating a return to profits in the short term and promoting the long-term health of this industry segment.

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## C

### Fuel Tax

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What started as a "BTU" tax seems to have become a fuel tax by the second quarter of 1993. The size of this tax is expected to be between 4 and 7 cents a gallon. Assuming that there are no exceptions to the tax, all of the transportation industry will be evenly impacted.

- Airlines—On the average, jet fuel cost 62 cents a gallon in 1992. The fuel tax could raise it to 69 cents; a cost increase of about 11%. However, this is still nowhere near the 81 cents a gallon airlines spent during 1991, when fuel cost bore much of the blame for the airlines' poor financial year.



- **Automobiles**—Though not a pleasant thought, seven cents per gallon added to the \$1.10 average cost for regular unleaded is still less than a 10% increase. The impact on the private car driver is generally short term.
- **Trucking**—These companies will be the most impacted by the imposition of higher fuel taxes. Excluding airlines, the ton-per-gallon miles within the trucking industry are the lowest. This will be one more problem for this highly priced, competitive sector and will drive more freight to rail, particularly intermodal.
- **Rails**—Costs will only rise slightly by comparison for rails, and gains within the highly lucrative rail-intermodal traffic should provide an offset. Though the shift to intermodal is already happening, the more favorable rates will only move it faster.

## D

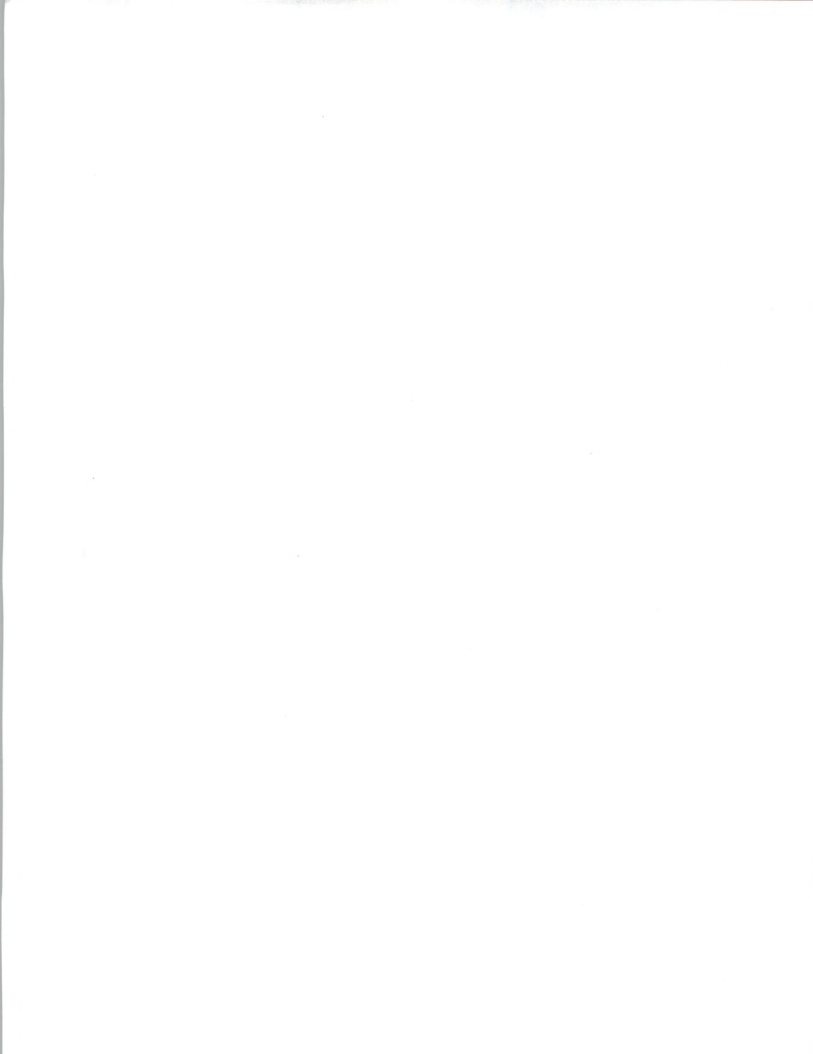
### Clean Air Act

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The original version of the Clean Air Act is over 20 years old and brought us all unleaded gasoline and catalytic converters. Its most recent revisions will impact commuters, diesel fuel users, water transportation and utilities.

Companies with over 100 employees are required to drop the number of vehicles their employees use to commute by 25% by 1994. This should make mass transit more attractive and positively impact transportation companies that carry commuters.

The trucking industry uses more diesel fuel than do other forms of freight movement. The cost of the "low sulfur" fuel is expected to be three to seven cents higher per gallon. New trucks with improved emissions equipment will cost more and require more maintenance. This translates into an annual cost of \$1.7 billion for just the fuel cost and probably the same amount for equipment and maintenance, or \$3 to \$4 billion in increased rates.



The standards are a mixed blessing for the maritime companies. They can expect more controls on their equipment air emissions and environment damage avoidance for tankers. However, water transport of low-sulfur coal may increase to assist utilities forced to cleanse their emissions.

Finally, utilities are required to reduce their emissions. The solutions that impact transportation involve the shift to lower sulfur coal, or some other form of fossil fuel. Should there be a significant shift to natural gas or oil, caused by lower transport costs pipelines will win and rails lose (40% of all rail freight is coal).

In summary, the Clean Air Act's recent changes, when added to the expected fuel tax (possibly 15 cents a gallon), should improve the cost advantage of rail-intermodal as trucking costs rise dramatically. However, rail's primary commodity, coal, may be less in demand by the highest user utilities.







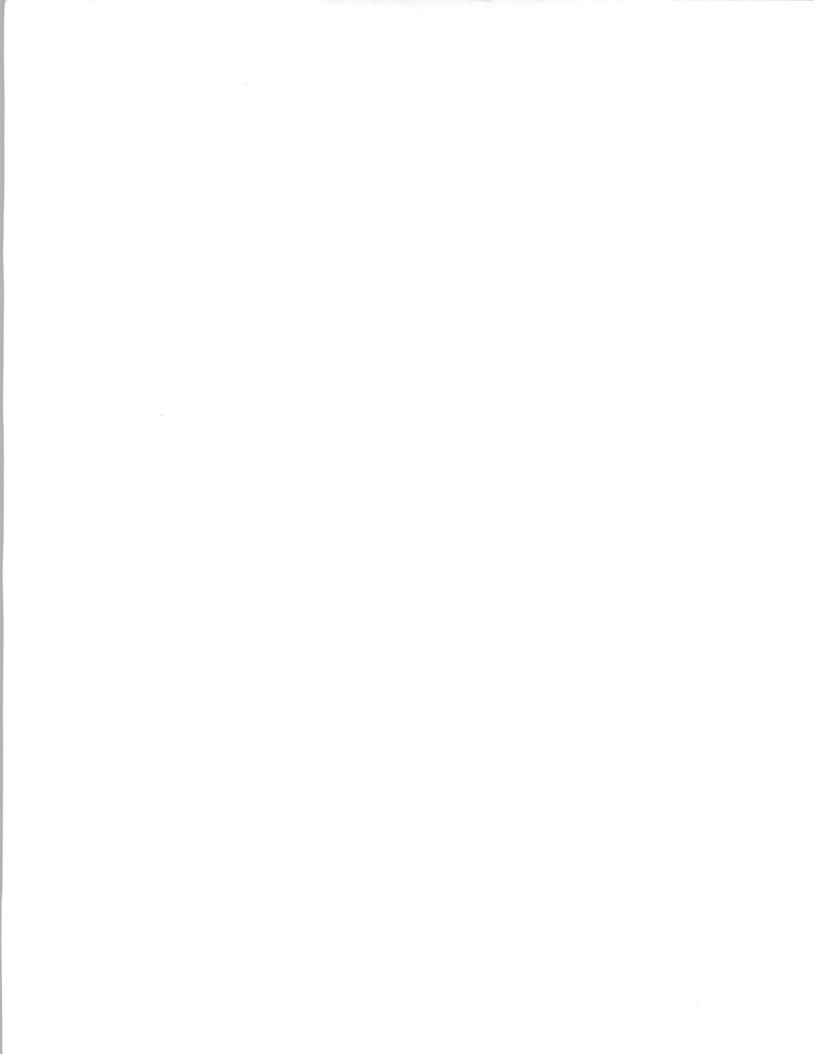
## Definitions

*Code sharing* - These agreements, which must be approved by the U.S. Department of Transportation, allow the combining of flight numbers within CRS systems for different air carriers. The purpose is to facilitate customer servicing by providing a view of a single carrier regardless of the airline or corporate boundaries. For example, the USAir ticket package for a U.S.-originated flight that terminates on a British Air subsidiary in Europe would contain a full set of boarding passes and provide final destination luggage forwarding. For the unfamiliar passengers, the downside is a lack of prior knowledge that they are on a multileg journey, with potentially significant time lags.

*Double stack* - These are special low flatbed railcars that permit containers to be loaded two high. The advantage is in doubling the capacity of a train without increasing its length. The disadvantage is that these heavier loads cannot travel in all areas, particularly in many parts of Mexico.

*GPS* - Global Positioning System is a satellite communications-based system developed by the U.S. Department of Defense to provide precision global location determination. Though built for military purposes, the basic theory is being used in nearly all transportation segments. It requires a special frequency transponder in the vehicle, which can be interrogated from many locations. Its ability to provide continuous location sensing is superior to other methods. Airlines and the FAA (Federal Aviation Administration) see this as the eventual replacement for radar-based systems for air traffic control. Its implementation by land and sea transport firms is to gather data on locations when, and if, transponder prices drop enough to make this practical.

*Intermodal* - A railroad term for any shipment transported by a railroad in a trailer or container that begins and ends with another transportation mode.

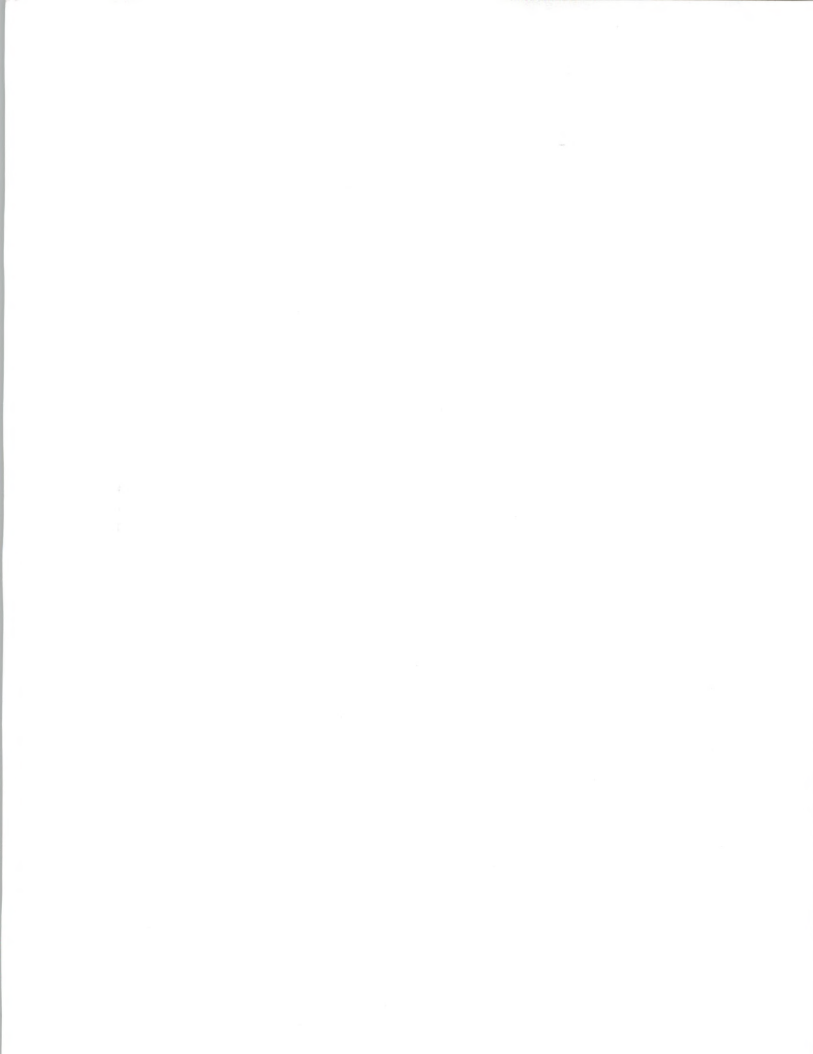


*IVHS* - The Intelligent Vehicle Highway System generally utilizes land-mounted radio equipment to identify passing vehicles equipped with special transponders and, potentially, communicate to them. The initial application appears to be for automated, nonstop toll collection by deducting from a prepaid account for each passage and traffic advice. Advocates see cutting congestion, possible nonstop truck weights and, in the future, automated highways where close-spaced vehicles drive themselves under computer control as advantages. Detractors see invasion of privacy as a problem, because vehicle locations could be known by those with computer access.

*Multimodal* - A transportation term used to describe a shipment that is moved by various modes during its journey from shipping point to the customer. It is used to designate those which do not directly fit the railroad "intermodal" definition. However, many use the two terms interchangeably.

*Roadrailleurs* - Specially built truck trailers, manufactured by Wabash National Corporation, that have a "bogie" of railroad wheels and couplers for rail travel. Early roadrailleurs suffered from nonremovable rail wheel units and nonstandard couplers. The current generation has eliminated those disadvantages. Norfolk Southern uses its 2,800 earlier generation units as part of its "Triple Crown Service," but they must be special trains. Amtrak, the passenger-only carrier, has conducted successful tests with regular trains aimed at using the units to improve its service of USPS contracts.

*Transponder* - The dictionary defines a transponder as: "a radio or radar receiver-transmitter activated for transmission by reception of a predetermined signal." The use of these devices is in conjunction with GPS and IVHS technologies, which utilize radio signals to activate vehicle-mounted transponders to identify and communicate with specific vehicles.





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