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Transportation Sector (IEIT2)

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26 February 1993

Dear Colleague:

Please find enclosed your copy of INPUT's report, *European Software and Services Market, 1992-1997—Transportation Sector*. This report is the latest deliverable in INPUT's Information Services Programme—Europe.

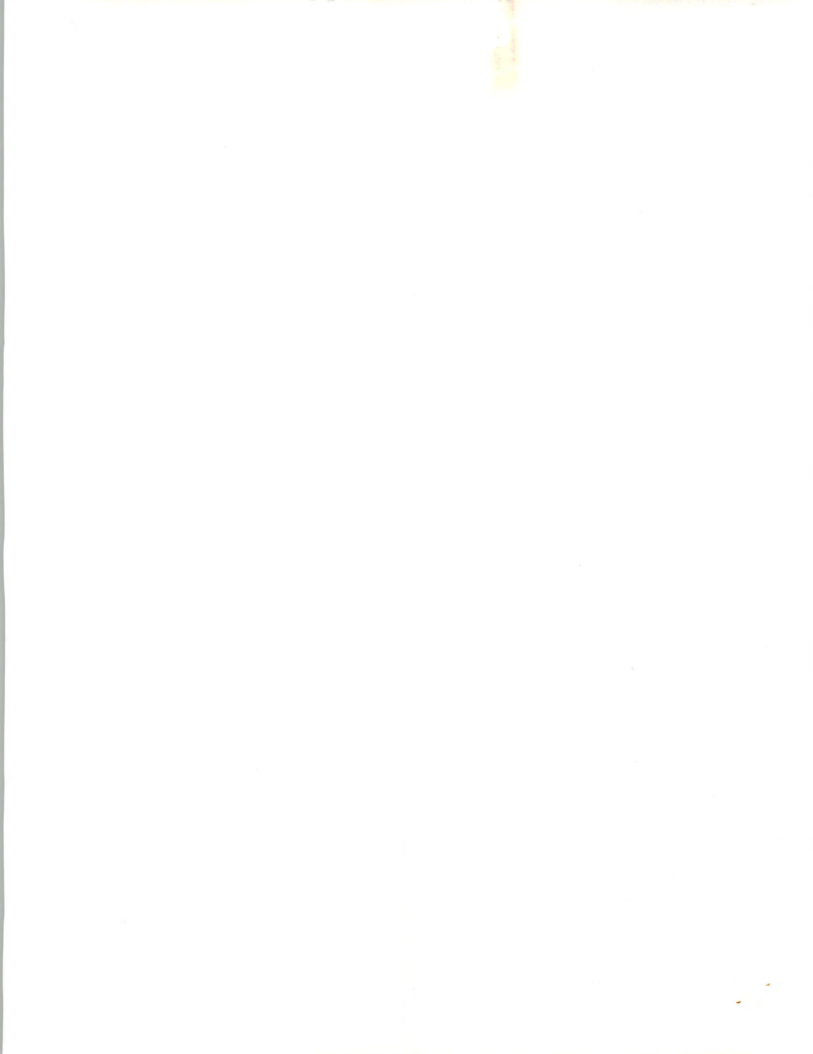
I trust you will find the report interesting and informative. If you have any queries regarding this report or any other aspect of INPUT's services, please do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink, appearing to read 'R.P. Fulton', written over the printed name.

Roger Fulton
Consultant
INPUT - Europe

Encs



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1992-1997

TRANSPORTATION SECTOR

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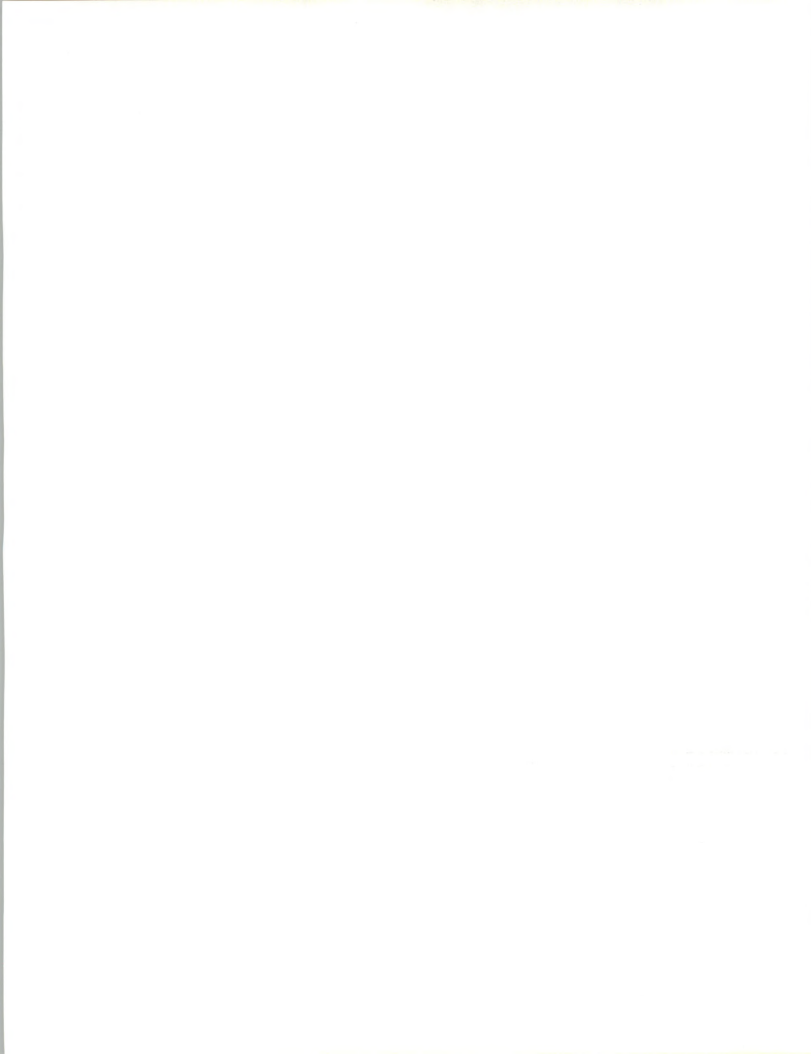
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Information Services Programme—Europe
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***European Software and Services Market,
1992-1997—Transportation Sector***

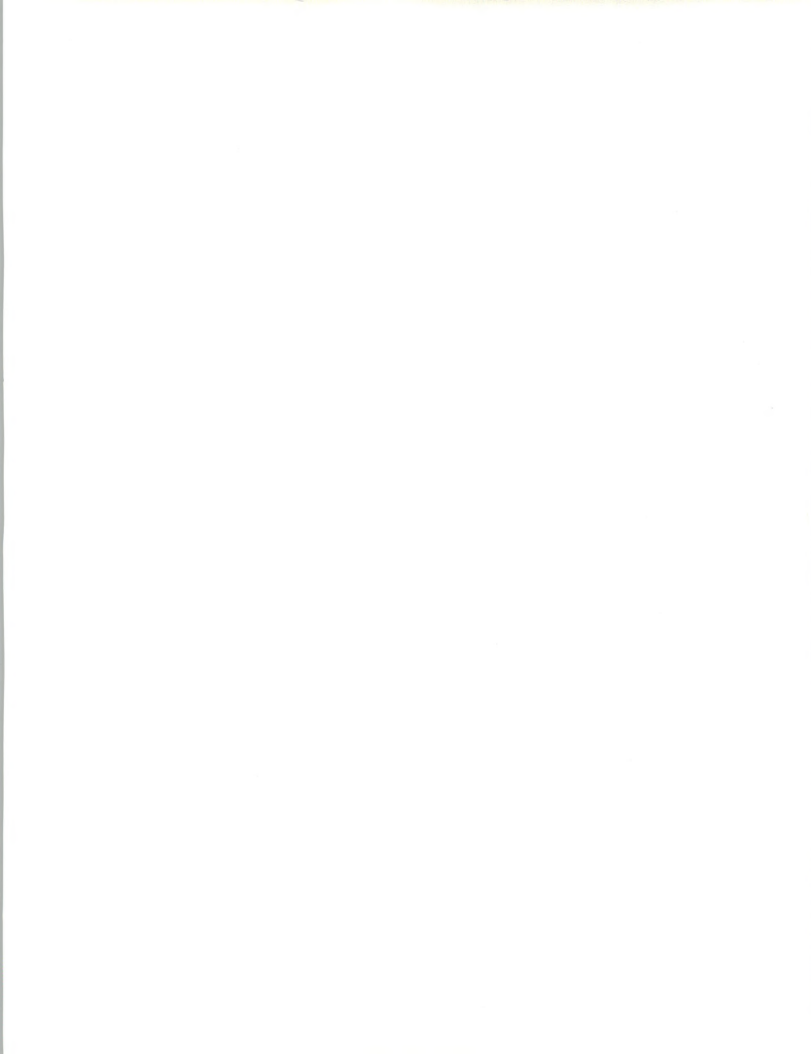
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Abstract

The single European market is being formalised in 1993. INPUT's research identifies the impact on the software and services vendors as suppliers to this industry.

Transportation is a key element in Europe's supply chains and this study highlights how electronic data interchange (EDI) and electronic commerce are expected to play a lead role in the continuing development of such businesses.

The study summarises the main business pressures in each transportation subsector. The report then forecasts the growth expected in each software and services market sector, which are defined according to INPUT's delivery modes, and the shape of developments in each of the four largest European countries. Leading vendors are identified and ranked by market share for each country.

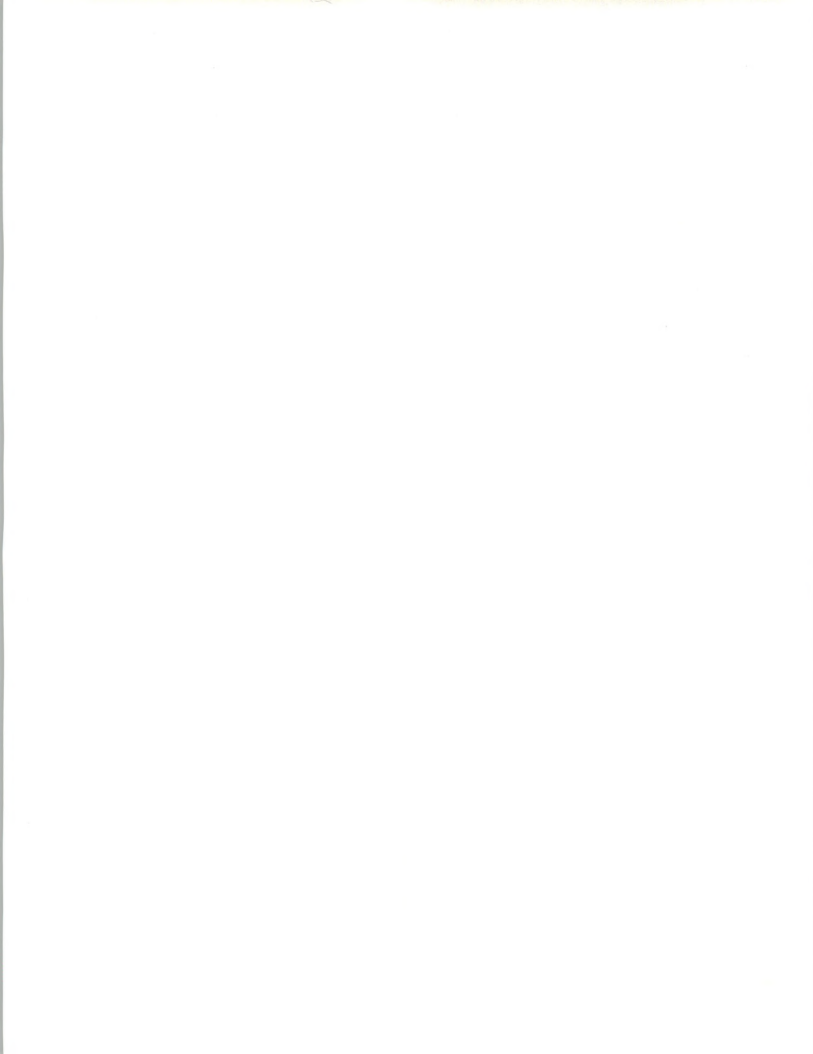


Table of Contents

I**Introduction**

- | | |
|--|-----|
| A. Scope of the Report | I-1 |
| B. Methodology | I-2 |
| C. Industry Demographics | I-2 |
| D. Report Structure | I-4 |
| E. Related INPUT Research Programmes and Reports | I-4 |
-

II**Executive Overview**

- | | |
|---|------|
| A. Faster Transportation Services at No Extra Cost! | II-1 |
| B. Market Growth is Led by EDI Demands | II-2 |
-

III**Transportation Environment**

- | | |
|---|-------|
| A. Overview—A Period of Many Changes | III-1 |
| B. Rail Transport—International Co-Operation Needed | III-4 |
| C. Road Transport—Growth in International Freight | III-5 |
| D. Water Transport—No Real Growth Prospects | III-6 |
| E. Air Transport—De-Regulation Will Spur Local Investment | III-6 |
-

IV**Software and Services Market**

- | | |
|--|------|
| A. The IS Challenge—Offer EDI at Zero Cost to the Client | IV-1 |
| B. European Delivery Mode Forecasts—Impact of EDI | IV-2 |
| 1. Transaction Processing Services | IV-6 |
| 2. Turnkey Systems | IV-7 |
| 3. Application Software Products | IV-7 |
| 4. Professional Services | IV-8 |

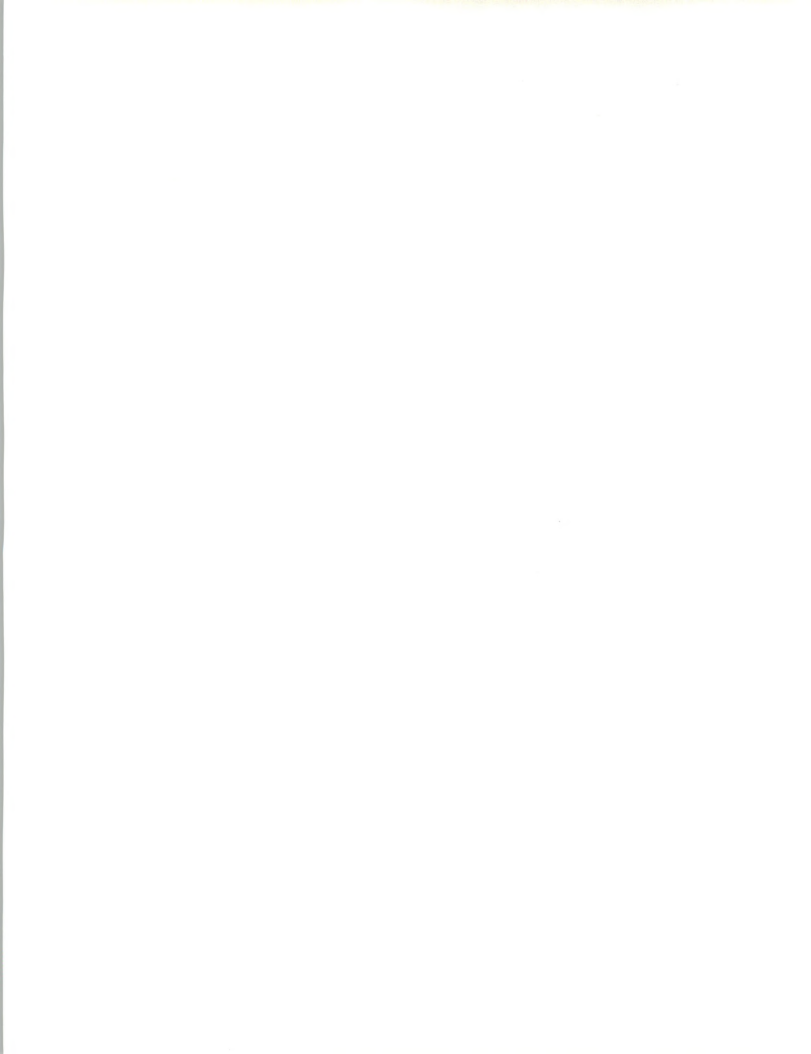


Table of Contents (Continued)

IV

5. Network Services and EDI	IV-9
6. Systems Operations	IV-11
7. Systems Integration	IV-12
8. Leading Vendors	IV-12
C. France	IV-13
D. Germany	IV-16
E. United Kingdom	IV-18
F. Italy	IV-21

Appendix

INPUT Definitions, 1992—are available separately upon request



Exhibits

I

- | | | |
|-----|--|-----|
| - 1 | EC Transportation Services World Trade, 1980 and 1989 | I-3 |
| - 2 | EC Transportation Services Intra-EC Trade, 1980 and 1989 | I-4 |
-

II

- | | | |
|-----|---|------|
| - 1 | Software and Services Market, Transportation, Europe, 1992-1997 | II-3 |
| - 2 | EDI—Key Transportation Benefits, Europe | II-3 |
-

III

- | | | |
|-----|--|-------|
| - 1 | Historic Growth in International EC Trade in Transport Services | III-2 |
| - 2 | Historic Growth in Intra-EC Trade in Transport Services | III-3 |
| - 3 | International EC Road Freight Traffic, Market Shares by Leading Member Country, 1989 | III-6 |
-

IV

- | | | |
|-----|--|-------|
| - 1 | Software and Services Market Growth, Transportation, Europe, 1991-1997 | IV-2 |
| - 2 | Delivery Mode Forecast, Transportation, Europe, 1992-1997 | IV-3 |
| - 3 | Software and Services Market, Transportation, Europe | IV-4 |
| - 4 | Software and Services Market by Country, Transportation, Europe | IV-5 |
| - 5 | Major Country Market Comparison, Transportation, Europe, 1992-1997 | IV-6 |
| - 6 | Expected Growth of EDI by IT Users in Transportation, Europe | IV-11 |
| - 7 | Leading Software and Services Vendors, Transportation, Europe, 1991 | IV-13 |



Exhibits (Continued)

IV

- | | | |
|-----|---|-------|
| - 8 | Delivery Mode Forecast, Transportation, France, 1992-1997 | IV-14 |
| - 9 | Software and Services Market, Transportation, France | IV-15 |
| -10 | Leading Software and Services Vendors, Transportation, France, 1991 | IV-15 |
| -11 | Delivery Mode Forecast, Transportation, Germany, 1992-1997 | IV-16 |
| -12 | Software and Services Market, Transportation, Germany | IV-17 |
| -13 | Leading Software and Services Vendors, Transportation, Germany, 1991 | IV-18 |
| -14 | Delivery Mode Forecast, Transportation, United Kingdom, 1992-1997 | IV-19 |
| -15 | Software and Services Market, Transportation, United Kingdom | IV-20 |
| -16 | Leading Software and Services Vendors, Transportation, United Kingdom, 1991 | IV-20 |
| -17 | Delivery Mode Forecast, Transportation, Italy, 1992-1997 | IV-22 |
| -18 | Software and Services Market, Transportation, Italy | IV-23 |
| -19 | Leading Software and Services Vendors, Transportation, Italy, 1991 | IV-23 |

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Introduction

This report is produced as one of a series of reports in INPUT's Software and Services Planning Services for the Computer Software and Services Industry in Europe.

The report is designed to assist vendors in:

- Assessing the potential opportunity offered by the transportation sector
- Obtaining insights into market developments
- Quantifying the potential success of competitive threats
- Identifying potential vendor partnerships

A

Scope of the Report

This report reviews and analyses the next five years of change within the software and services markets in the European transportation sector.

The report assesses trends for the seven major sectors, or delivery modes, which constitute INPUT's definition of the industry specific information services market:

- Transaction processing services
- Turnkey systems
- Applications software
- Professional services
- Network services
- Systems operations
- Systems integration

Market sizes and forecasts are given for Europe as a whole, as well as for France, Germany, the United Kingdom and Italy.

Full details of the definitions used by INPUT are given in the appendix—INPUT Definitions, 1992.

Software and services continue to attract widespread vendor attention—especially in the transportation sector. This report should be read in conjunction with other INPUT reports in order to identify key market and product trends, vendor strategies and opportunities.

B

Methodology

This report is based principally on European research activities conducted by INPUT during 1992, specifically the overall market analysis programme for Europe that included the following:

- Detailed interviews with 20 leading transportation sector users across Europe (used specifically for this study).
- A vendor research programme of over 500 interviews with key software and services vendors across Europe (some 35 of these had a particular focus on the transportation sector).
- Desk research into a variety of sources for economic and IT related information.

Additionally used was INPUT's extensive library and database of information that relates to the software and services industry.

It should be noted that occasionally vendors are unwilling or unable to provide details of their revenues by market sector or delivery mode, or the categories that they report do not match INPUT's definitions of market segments. In these cases, INPUT consultants make best estimates for each vendor in order to determine overall spending in the sector and to rank vendors within each market.

C

Industry Demographics

The following transportation software and services market segments are included in this report:

- Railroad transportation (SIC 40), including freight and passenger operations and railway switching and terminal establishments.
- Local transportation such as buses or trams.
- Motor freight transportation (SIC 42), including for-hire and common carriers, but excluding warehousing/storage and terminal facilities, which are covered in the distribution sector analysis, and privately owned

carriers, which are considered captive and therefore not included in the market sizing. Private cars are excluded.

- Water transportation (SIC 44), including freight and passenger services, both inland and at sea.
- Air transportation (SIC 45), including freight, passenger, and cargo reservation services, but excluding passenger reservation systems, which is classified in the consumer services sector.
- Transportation services, including freight forwarding and custom brokerage services (SIC 4731), but excluding travel agencies that are classified in the consumer services sector.

EXHIBIT I-1

EC Transportation Services World Trade, 1980 and 1989

Total Trade with world	1980		1989	
	Credit (ECU Millions)	Debit (ECU Millions)	Credit (ECU Millions)	Debit (ECU Millions)
Sea Freight	17,725	17,395	24,477	26,602
Sea Passenger Services	789	498	1,440	1,159
Air Freight	1,613	792	3,688	2,161
Air Passenger Services	6,422	4,373	14,037	12,084
Other Transport	19,829	19,684	33,212	34,353
Total EC Trade	46,378	42,742	76,854	76,362

Source: *Eurostat* (excludes road passenger transport, local and urban transport)



EXHIBIT I-2

EC Transportation Services Intra-EC Trade, 1980 and 1989

Total Trade with other EC Countries	1980		1989	
	Credit (ECU Millions)	Debit (ECU Millions)	Credit (ECU Millions)	Debit (ECU Millions)
Sea Freight	6,367	6,243	9,042	10,048
Sea Passenger Services	326	352	703	749
Air Freight	310	217	988	638
Air Passenger Services	1,620	1,180	4,123	3,484
Other Transport	10,153	9,897	16,127	17,269
Total EC Trade	18,776	17,889	30,983	32,188

Source: Eurostat (excludes road passenger transport, local and urban transport)

D Report Structure

The remaining chapters of this report are structured in the following way:

- Chapter II is an executive overview offering a concise summary of the contents of the report.
- Chapter III describes the diverse and rapidly changing business environment being experienced by the transportation industry.
- Chapter IV provides market forecasts and leading vendor analyses for the software and services industry operating in the transportation sector for Europe as a whole and also for the four major regions.

E Related INPUT Research Programmes and Reports

The following reports contain a detailed analyses of key market sectors, offering commentary and recommendations for vendors active in Europe.

- *European Software and Services, Distribution Sector, 1992-1997*

- *Computer Software and Services, Europe 1992-1997*
- *Systems Integration Europe—Market Analysis and Forecast 1992-1997*
- *Systems Operations Europe—Market Analysis and Forecast 1992-1997*
- *Software Applications Maintenance Opportunities*
- *The Impact of UNIX on Software and Services*
- *Analytical Profiles of Leading Independent Software and Service Vendors in Europe*



Executive Overview

The single European market is being formalised in 1993. The most obvious initial impact is in the relaxation of customs inspection procedures at internal European Community (EC) country borders and the introduction of new documentation for reporting trade movements across EC borders.

Transportation is a key element in the competitive nature of Europe's supply chains. EDI and the associated electronic commerce are expected to lead the continuing development of such businesses, but with the proviso that such improvements in information flow are implemented without increasing business operating costs.

A

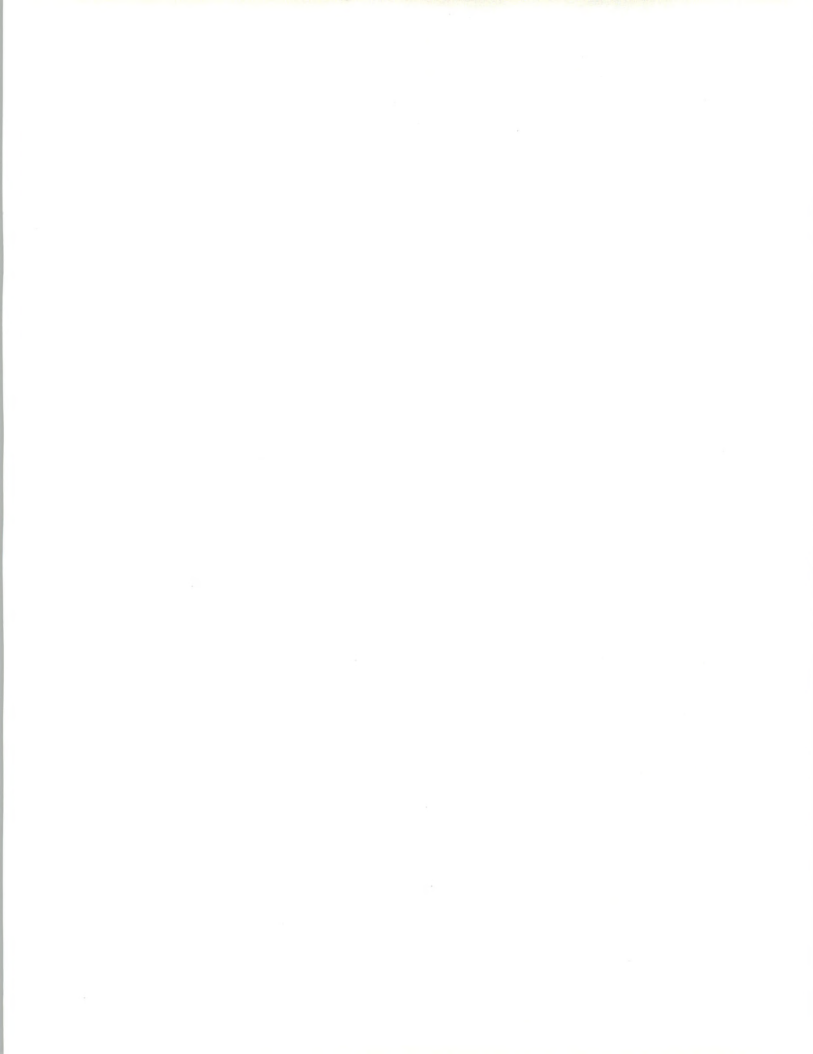
Faster Transportation Services at No Extra Cost!

The liberalising of transportation regulations within the EC is adding to the competitive pressure arising from the economic recession that affects most of the region to increase the pace of change. Goods and passenger traffic continue to increase and the services offered by transportation businesses are striving to be better, faster and cheaper.

There is an exceptionally high demand for EDI-based services within the transportation sector. The implementation of EDI, and the new applications and integration opportunities within communicating information systems are the areas of greatest opportunity for software and services vendors in these sectors.

However, the transport businesses want all the benefits of EDI-based services at the same or at a lower operating cost than their present systems—a requirement meaning that EDI will be joined by significant changes in working practices and operating cost structures. Transportation companies need to offer integrated services in order to compete effectively in the 1990s.

Individual European rail networks are still losing market share to road and air services. International co-operation is needed to stimulate a restructuring



of the railways to form a high-speed European network of "freight villages".

Cross-border road freight is increasing at 10% per year compared to only 6% for national traffic. The main European beneficiaries are the transport industries of the Netherlands and Belgium, which account for over 30% of international traffic.

Imminent de-regulation of the air routes in Europe is expected to generate another level of route infrastructure—routes between smaller airports and the main airport hubs that compete with road freight.

All these developments will lead to more integration between different types of transport modes (intermodal services) in order to provide more trackability, flexibility and speed at a lower overall cost to the customer. Integrated co-operating information systems are central to the success of such transport services.

B

Market Growth is Led by EDI Demands

INPUT forecasts that the software and services market will grow an average of 13% per year between 1992 and 1997 (refer to Exhibit II-1). The fastest growing delivery mode for transportation is network services—especially the use of EDI.

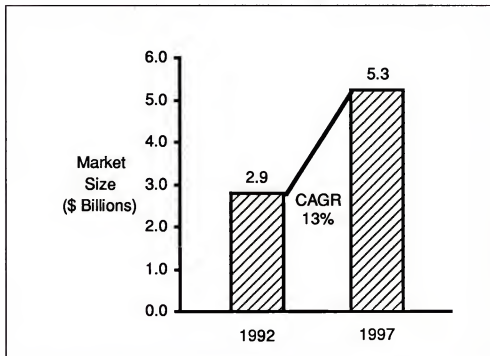
The most significant factor inhibiting adoption of EDI is the initial investment cost. IT departments are being asked by management to implement EDI, but to contain or reduce operating costs at the same time. Despite this constraint, EDI still emerged as the most important transportation application development in IT managers' short-term plans.

Among those already using EDI—for an average 23% of their business transaction volumes—there was an expectation that this percentage would double to 46% over the next five years. Adding to this the impact of other companies implementing EDI from scratch, INPUT forecasts a growth in network services of 27% per year during the period up to 1997.

Although EDI is in general use within air and rail freight markets, it is not yet well established as a value-added service for road hauliers, especially at the pan-European level. Vendors will have to lower the entry cost to encourage a larger proportion of small to medium-sized transportation companies to join the EDI communities.



EXHIBIT II-1

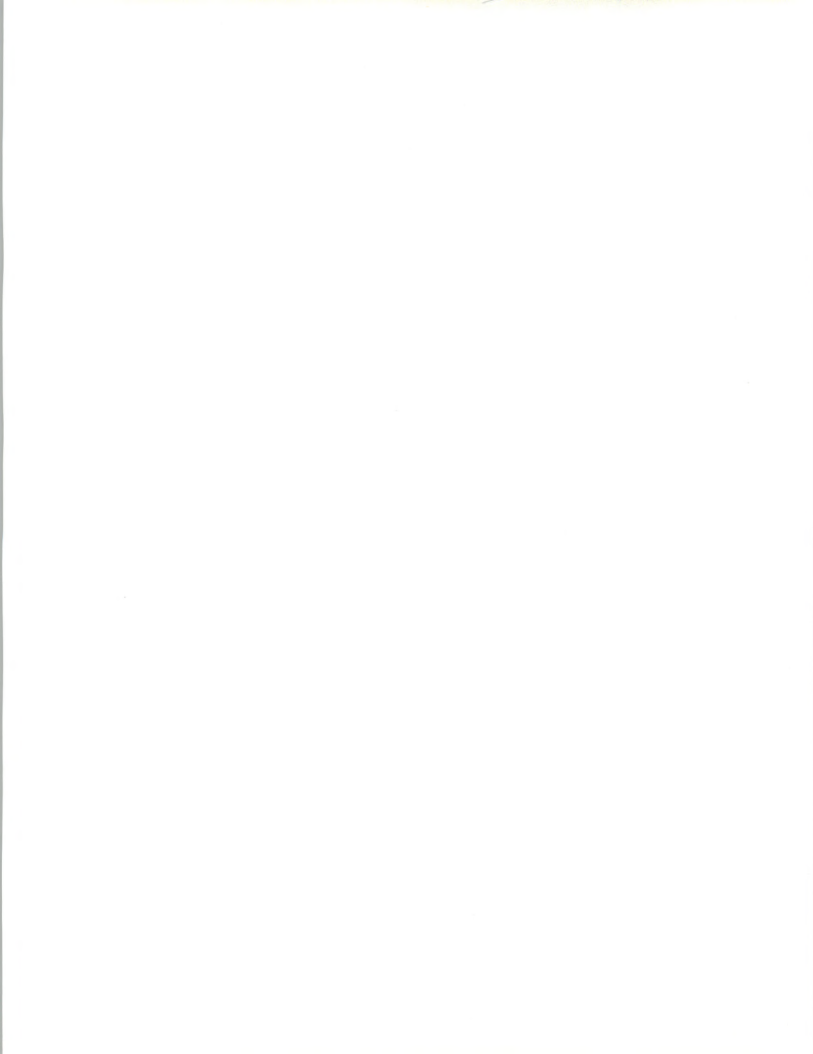
**Software and Services Market, Transportation,
Europe, 1992-1997**

For all the high demand and awareness of EDI, only 30% of users interviewed had achieved a measurable benefit from their own use of EDI. Exhibit IV-2 shows the most mentioned benefits reported by these users.

EXHIBIT II-2

**EDI—Key Transportation
Benefits, Europe**

- Faster reaction times
- Tracking made easier
- Generates more business



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Transportation Environment

A

Overview—A Period of Many Changes

The European transportation industry is at the forefront of the effects of the emergence of the single European market in 1993. Change means opportunity and there is certainly no shortage of changes within this sector.

Concern for safety and the environment, road congestion, pollution, de-regulation initiatives, harmonisation of regulations across Europe, removal of border restrictions and other EC directives aimed at liberalising the transport industry are all strong agents for change in this sector.

The drives to grow the transport sector and carry more people continue to be fed by individual desires for greater personal freedom of movement and by the growth of pan-European and global business operations.

The impetus to increase goods traffic results from a broad application of just-in-time principles—the business benefits of externalising many inventory costs onto the transport infrastructure, instead of holding local stocks, which encourage the use of major distribution centres or hubs feeding larger areas. The result is that higher volumes of goods will be in transit "money on the move", rather than waiting in warehouses.

Trade within the EC represents more than half the total EC trade and is rising. The single European market initiatives will continue to drive more growth within the community.

The following two exhibits show the growth in international trade for the 12 EC member countries in the 1980s. The first shows all trade, the second shows trade with other member countries. The data for these exhibits are noted in Chapter 1 (source Eurostat).

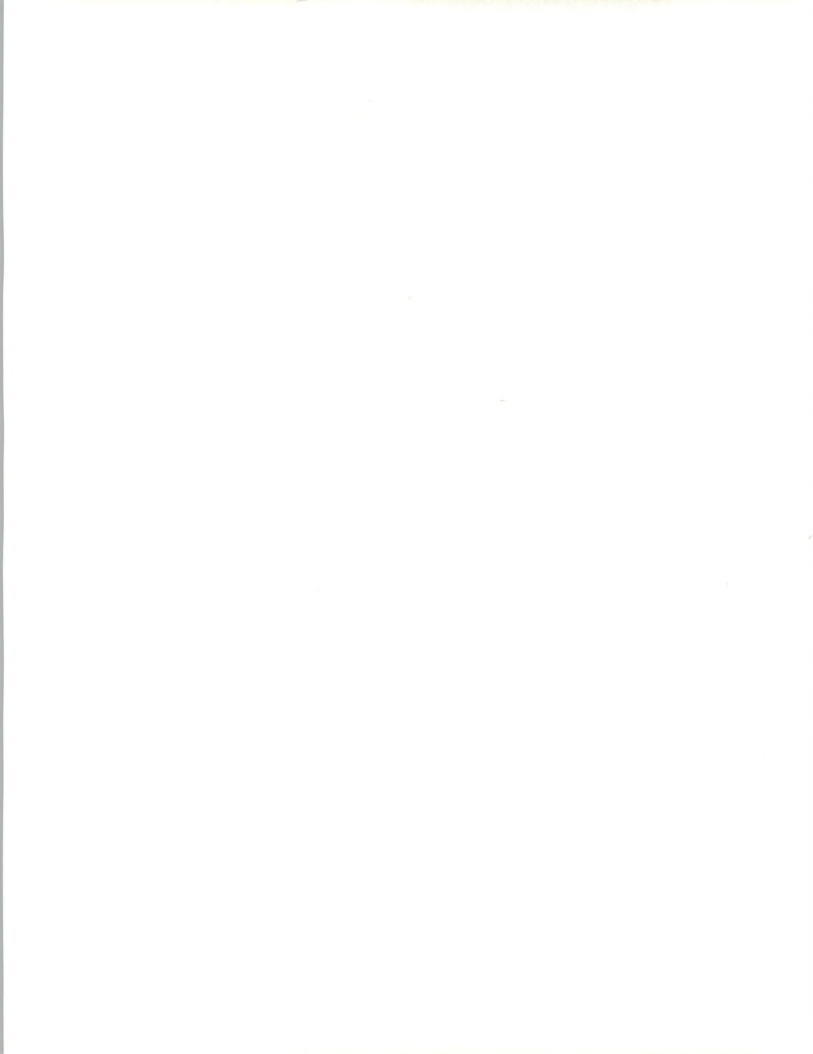
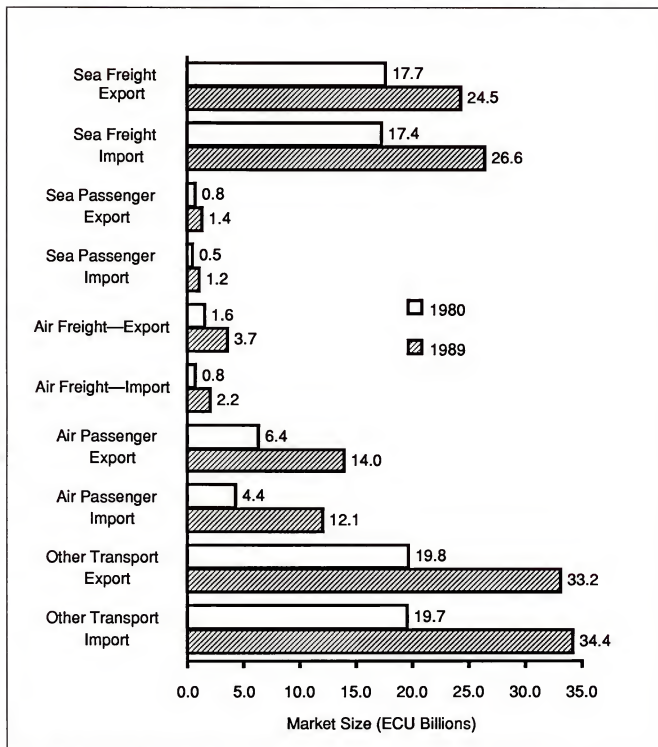


EXHIBIT III-1

Historic Growth in International EC Trade in Transport Services



Note: Import denotes trade into any EC country, export denotes trade from any EC country.

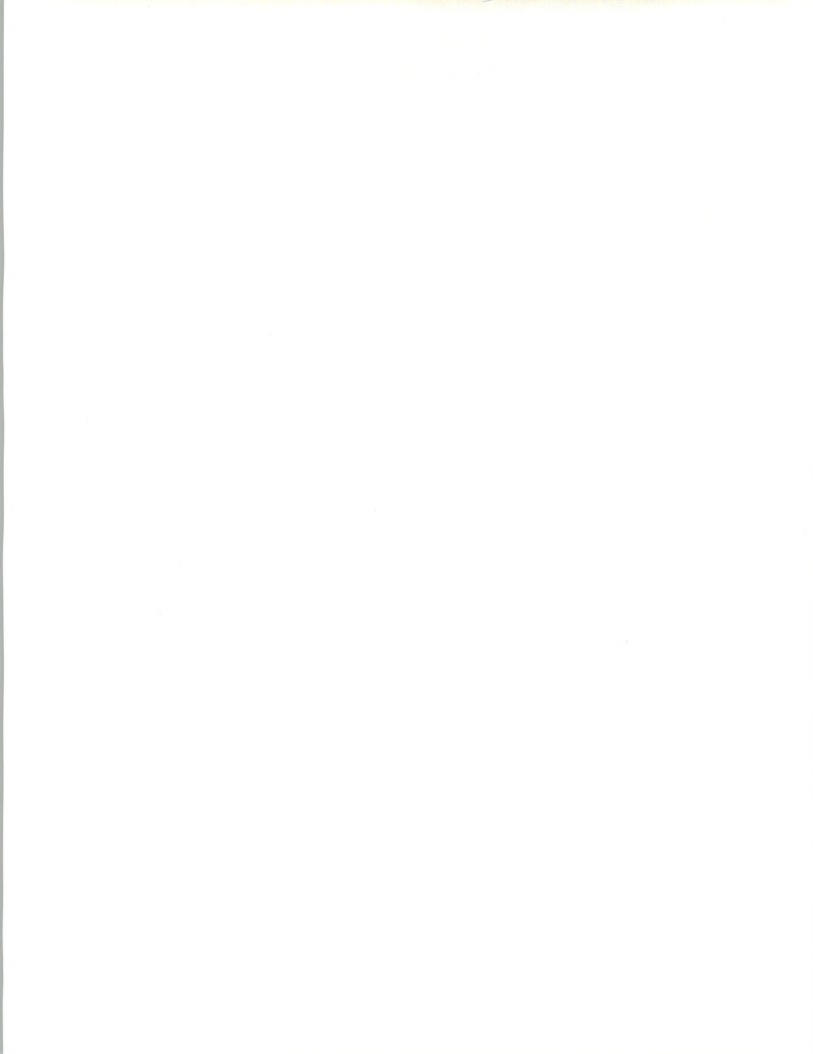
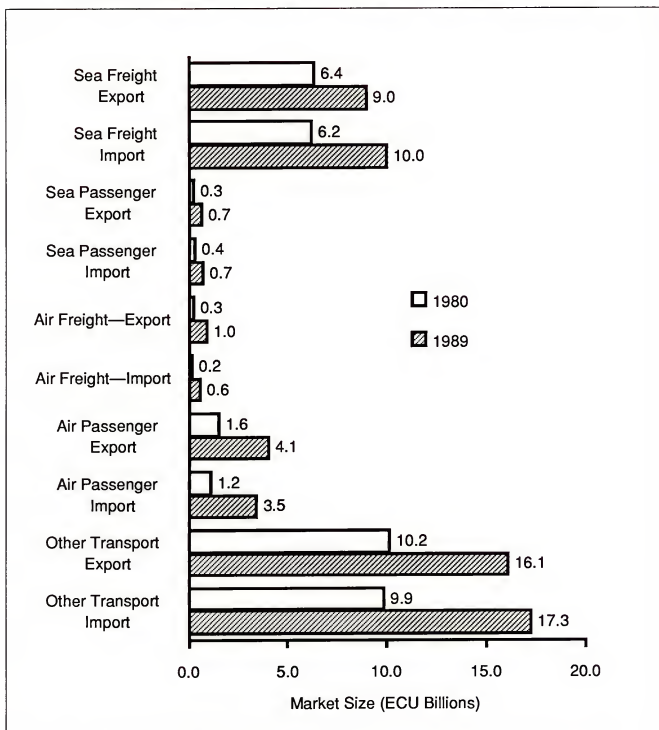


EXHIBIT III-2

Historic Growth in Intra-EC Trade in Transport Services



Note: Import denotes trade into any EC country, export denotes trade from any EC country.



There is a trend towards concentration and partnering between all sizes of operators. Despite economic recession across the region, greater mobility of people and goods is producing an increasingly competitive environment for operators.

The operators that are setting the pace in terms of winning market share are those known as integrators. The integrators (for example Danzas, HAPAG Lloyd, Nedlloyd, Panalpina and Bilspedition in Europe, and TNT, DHL, FedEx and UPS globally) have primarily been successful in establishing express services by using their own road and air transport. The success of these integrators has encouraged more co-operation between potential rivals, and the integrators are now making inroads into more traditional freight services.

Passenger transport remains dominated by the private car, in which Spain and Portugal have seen the highest increases during the 1980s due to their economic growth in that period.

Road freight traffic dominates the movement of goods, which is encouraged by a steady fall in rail goods traffic even though there has been a strong rise of air freight over the decade.

B

Rail Transport—International Co-Operation Needed

Europe's railways are primarily large national companies that are mainly heavily subsidised by government funding. In some countries, there are small companies operating a restricted set of routes and lines.

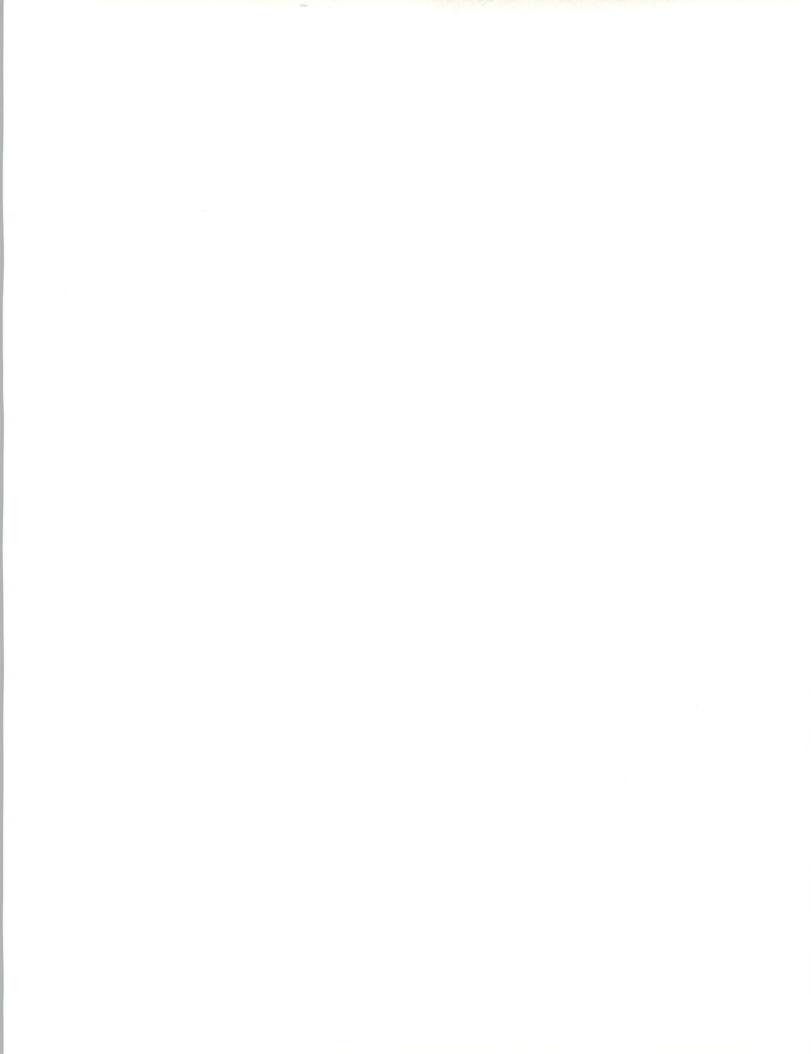
The expected development of a pan-European high speed network, and its extension towards Eastern Europe, hold some promise for growth in rail traffic over the next decade.

Air and road traffic congestion will favour investment in the movement of heavy goods and passengers by rail, but this investment will be on top of a past heavy investment in most countries during the 1980s.

The restructuring of the railway transportation sector in order to form a European network will require growing co-operation and co-ordination between national railways, for example, to form efficient networks of "freight villages" or goods switching hubs.

Innovative use of combined forms of transport e.g., "bimodals", is expected to win some business back from the congested road network.

Staffing levels in the railways fell steadily during the 1980s and will continue to reduce as the operators seek greater productivity targets that optimise resources and introducing new technology.



Railway goods traffic fell to a low of 760 million tonnes in 1987 from 910 in 1980, but has slowly risen since then. Even with the rail link to France, the insular U.K. railway will find it technically and commercially difficult to participate in any benefits from a European high-speed network

C

Road Transport—Growth in International Freight

The EC deregulation process and the removal of restrictions on cabotage are creating a very competitive environment for road freight operators. There is optimism about future growth reflected in continued investment in new technology with improvements in logistics management and service quality.

Levels of freight traffic are similar for Germany, France, Italy and the U.K. at around 140,000 million tonnes-km each in 1989, together accounting for 70% of the 12-nation EC traffic.

Traffic between EC member countries rose at an average of 10% per year through the 1980s, compared to only 6% per year for internal (national) traffic. This resulted in intra-community traffic representing 20% of the total in the EC by 1989. The continuation of this trend, encouraged by the single European market, is expected to create a further boost to investment within the industry, but recession and price wars are still barriers to revenue growth.

Exhibit III-3 lists the leading countries in terms of their share of international European community traffic (rather than domestic internal traffic). Of particular note are the high penetrations of the Dutch and Belgian industries in this subsector. In both cases, they did more international than national business in 1989.

Local passenger transport in the form of buses and trams experienced no growth between 1980 and 1989.

The environmental pressures to shift transport planning from a car focus to a people focus should increase demand for urban transport services. If a trend to urban services is to be established and change the current modal split between different forms of road transport, it would require governments to impose higher costs on private motoring.

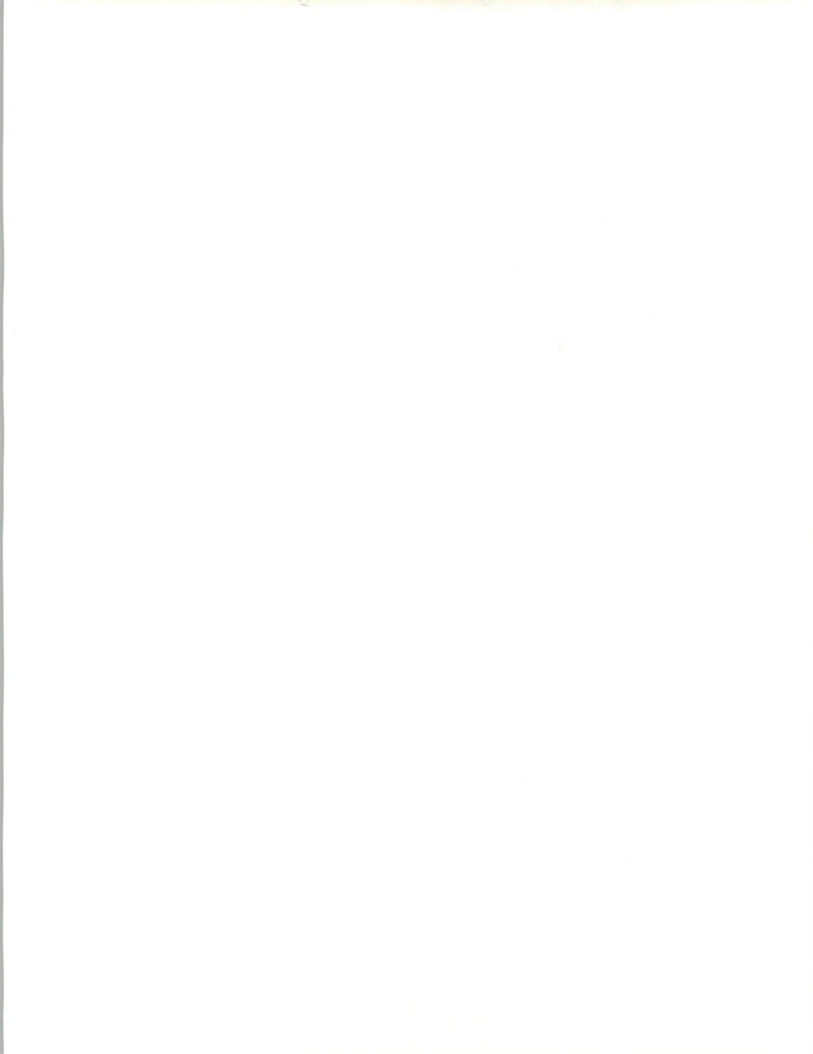


EXHIBIT III-3

International EC Road Freight Traffic, Market Shares by Leading Member Country, 1989

Country	1000 Million tonne-km	Percent
Netherlands	28.1	18
France	27.4	17
Germany	22.6	14
Italy	19.9	13
Belgium	19.7	13
U.K.	8.5	5
Others	30.4	20
Total Intra-EC	156.6	100

De-regulation of these services, as implemented in the U.K., still shows no sign of bringing benefits to consumers in terms of price or levels of service.

D

Water Transport—No Real Growth Prospects

The tendency to register ships under third country flags of convenience is likely to continue. As a result, the shipping sector is also likely to remain static or fall with the effects of inflation and growth in the use of air transportation.

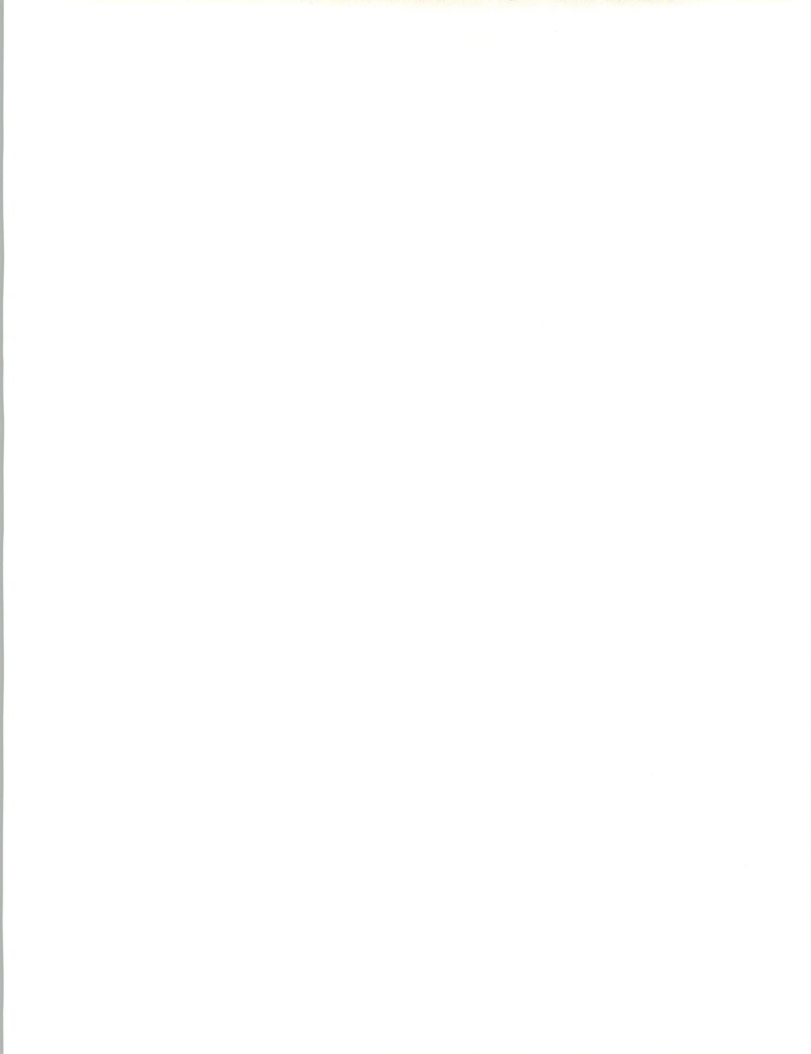
Inland water transport of freight is largely confined to Benelux, Germany and France. The Netherlands leads Germany in terms of gross tonnage volumes on the inland waterways with 56% of the traffic.

The opening of the canal linking the Rhine and Danube into Eastern Europe promises a slow, but steady increase in traffic.

E

Air Transport—De-Regulation Will Spur Local Investment

The airlines in Europe have slowly recovered from the effects of the Gulf War on international passenger traffic—traffic dropped over 20% in early in 1991. Growth of 3% to 5% per year to the year 2000 is forecast for the industry.



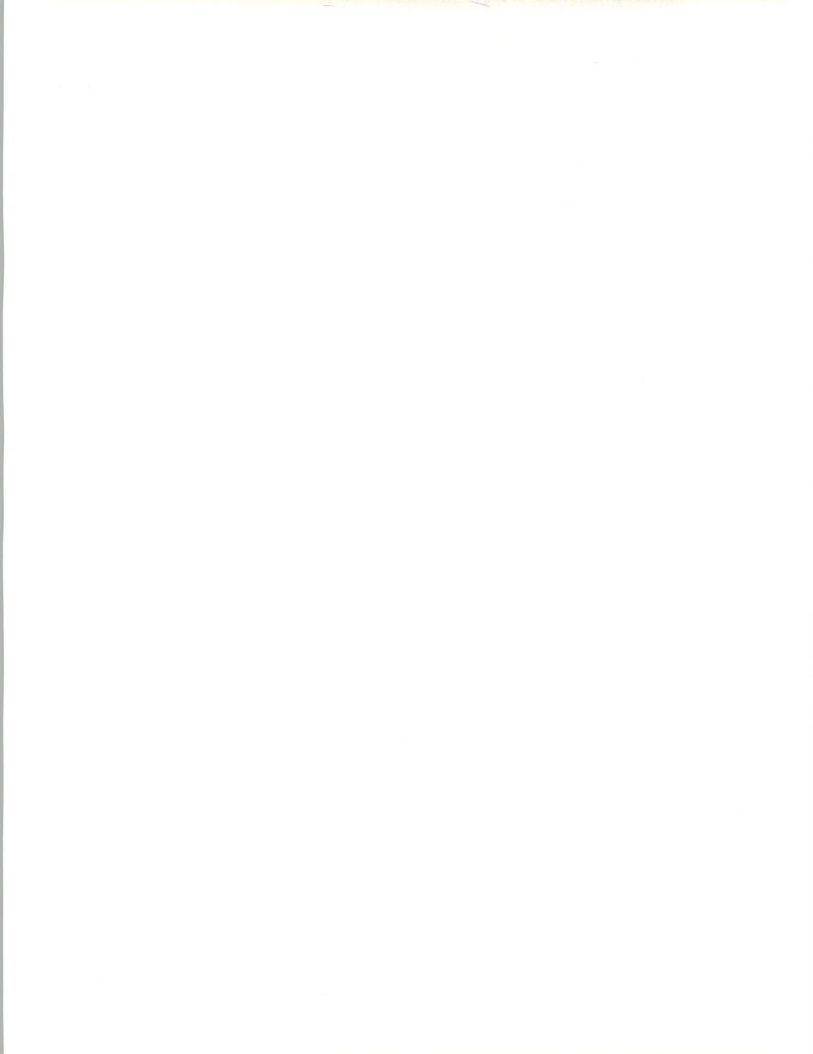
As the EC moves to allow foreign airlines to operate internal routes within member nations, air freight is expected to become more diverse and prices should continue to fall further.

The air traffic control systems across Europe are one of the few examples of very good pan-European co-ordination. Similar interdependence is well established in the certification and quality assurance for the European airlines, with over 25 countries all accepting a common set of test criteria and results. This type of co-operation is still very rare in other industries.

Smaller airports are expected to benefit most from the changing structure of the market. Airport hub capacity is increasing as companies establish European distribution centres. Some airlines are even planning to establish private dedicated airports just for freight re-routing. New generations of smaller aircraft will start to operate away from the main airports, providing more cost-effective local routes to compete with road and rail links.

Air freight experienced rapid growth during the 1980s largely due to the development of quieter engines, which allow higher utilisation of aircraft with night flying. Recession has eliminated further growth in the short term, but the advent of de-regulation should boost the market again, with growth in the second-tier rather than in the major trunk routes.

Frankfurt is by far the largest freight handling airport in Europe, followed by London, Paris and Amsterdam. Together, they accounted for about 50% of all EC air freight in 1990.



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IV

Software and Services Market

A

The IS Challenge—Offer EDI at Zero Cost to the Client

Two key business success factors are being sought from IT departments in the transportation sector: link up the supply chain with EDI, but reduce IT costs overall and support the integration of different transportation services (intermodal) to provide more trackability, flexibility and speed at a lower overall operating cost.

IT management in transportation is working in a sector suffering severe competitive pressure and an IT environment that won't stop moving. The main challenges for IT departments felt by those IT managers interviewed by INPUT in 1992 are shown in priority order:

- Fierce competitive pressure means management needs to keep down operating costs.
- Introduction of EDI is essential to the business according to senior management.
- The standards related to EDI are not yet frozen, giving rise to additional unknown implementation costs.
- The IT technology is still changing very rapidly, making decisions difficult.

Software and services specific to the transportation sector amounted to nearly \$3 billion in 1992. As a sector strongly impacted by the single Europe initiatives, growth is expected to rise slightly from 12% in 1992 to an average of 13% per year in the period 1992 to 1997. Exhibit IV-1 illustrates the market sizes across this period.

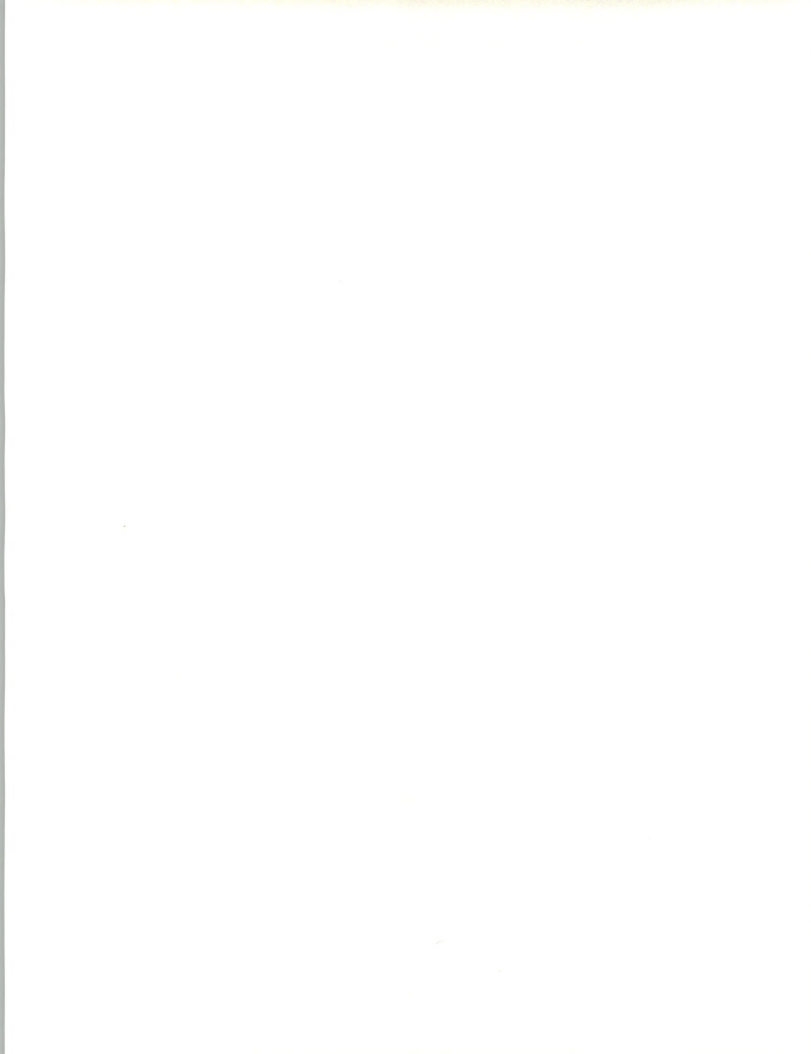
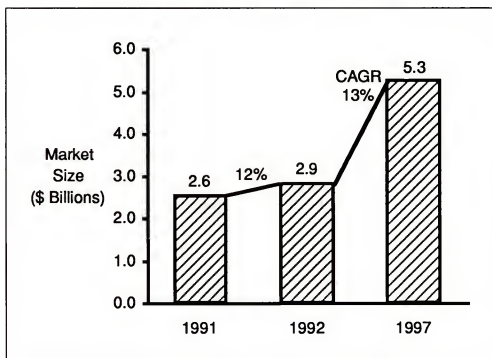


EXHIBIT IV-1

**Software and Services Market Growth,
Transportation, Europe, 1991-1997**

The following sections expand on the changes occurring in each subsector and within each major country/region.

B**European Delivery Mode Forecasts—Impact of EDI**

INPUT analyses the market for software and services across a set of market sectors referred to as delivery modes. These reflect the various types of product or services offered by vendors and are used to segment the market across some thirty different categories. Exhibit IV-2 identifies the main delivery modes applicable to a vertical industry sector. This shows clearly the relative sizes of each sector and the comparative average growth rates predicted for the next five years.

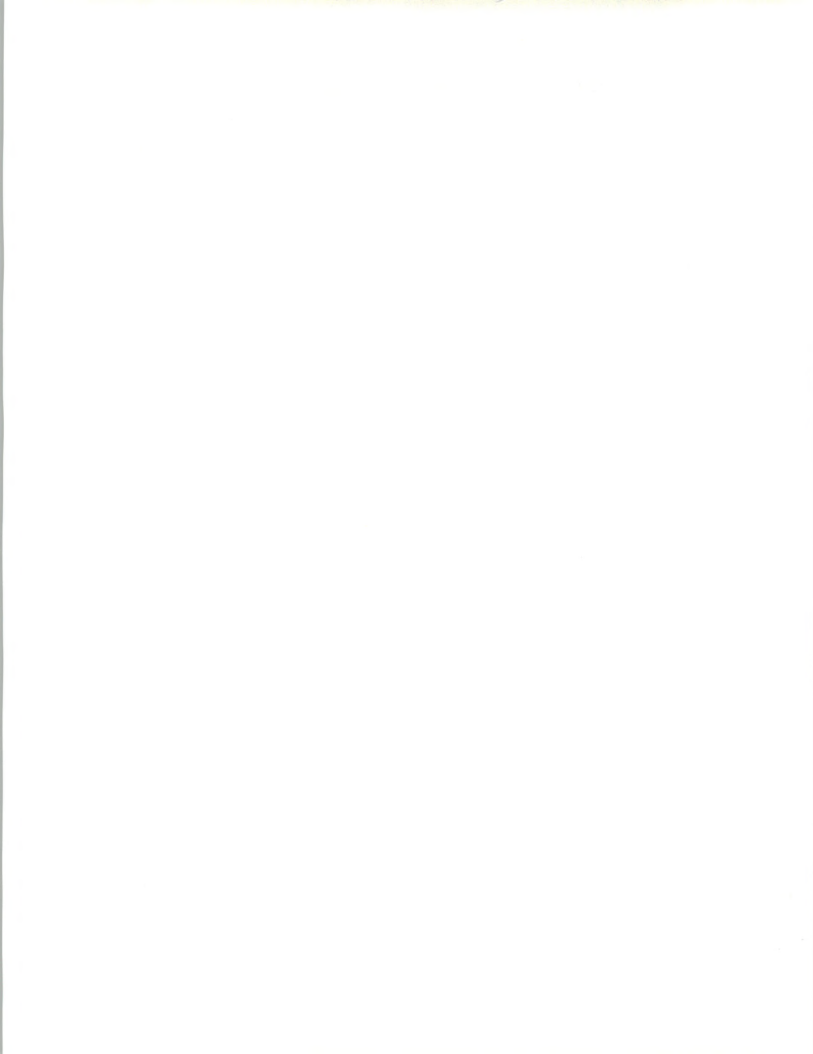
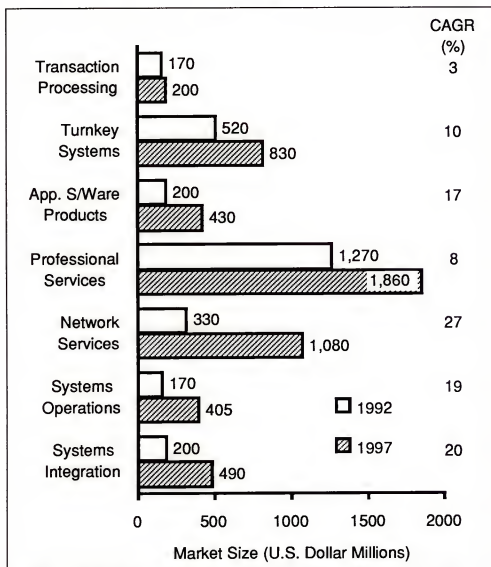


EXHIBIT IV-2

Delivery Mode Forecast, Transportation, Europe, 1992-1997



Note: All forecasts are for industry specific delivery modes only. Systems software and elements of processing services, network services and turnkey systems are excluded.

Of particular note are the high-growth sectors of network services (which includes EDI) outsourced systems operations, systems integration and application software products. Exhibit IV-3 is a table that gives INPUT's estimates of the actual market size in 1991 and the growth expected during 1992.

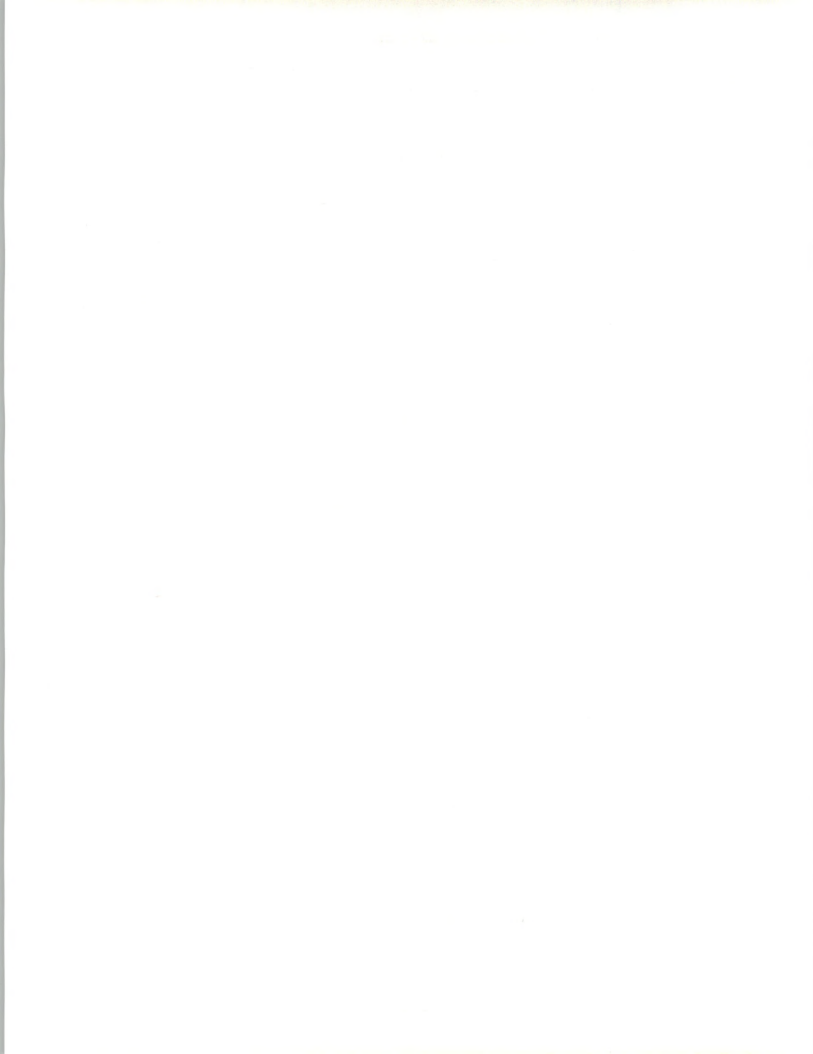


EXHIBIT IV-3

Software and Services Market, Transportation, Europe

Delivery Mode	\$ Millions				
	1991	'91-'92 (%)	1992	'92-'97 CAGR (%)	1997
Transaction Processing	170	0	170	3	200
Turnkey Systems	460	13	520	10	830
Application Software Products	180	11	200	17	430
Professional Services	1,180	8	1,270	8	1,860
Network Services	270	22	330	27	1,080
Systems Operations	140	21	170	19	405
Systems Integration	165	21	200	20	490
Industry Sector Total	2,550	12	2,850	13	5,300

Note: All forecasts are for industry specific delivery modes only. Systems software and elements of processing services, network services and turnkey systems are excluded.

Exhibit IV-4 summarises the market predictions for each major country and the rest of Europe. The detail for each country is expanded in the latter sections of this report.



EXHIBIT IV-4

Software and Services Market by Country, Transportation, Europe

Country	Currency	1991	'91-'92 (%)	1992	'92-'97 CAGR (%)	1997
France	FFM	3,370	12	3,780	14	7,270
Germany	DMM	595	14	680	17	1,495
U.K.	PSM	235	9	255	13	465
Italy	ILM	330	12	370	13	680
Rest of Europe	\$M	785	10	865	10	1,425
Total Europe	\$M	2,550	12	2,850	13	5,300

Note: All forecasts are for industry specific delivery modes only. Systems software and elements of processing services, network services and turnkey systems are excluded.

Exhibit IV-5 shows the relative market sizes for major countries and the rest of Europe, of which the Netherlands and Belgium account for a much larger share in the transportation sector than would be attributed across the whole European software and services market.

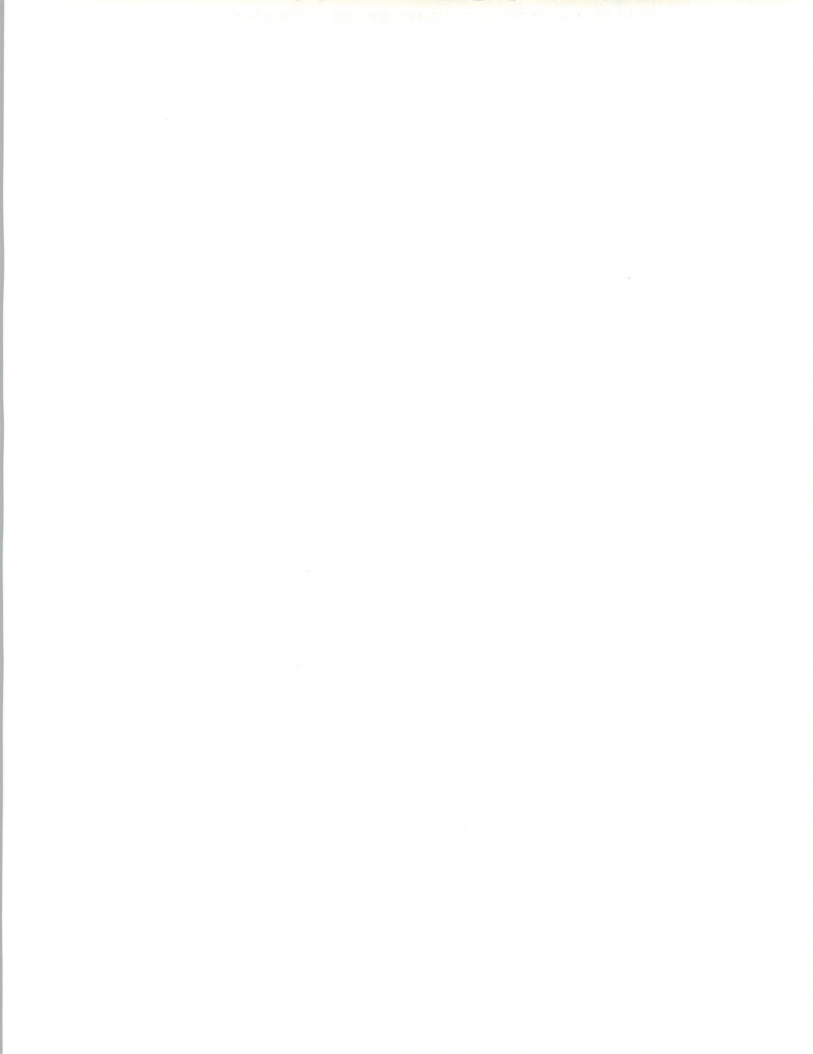
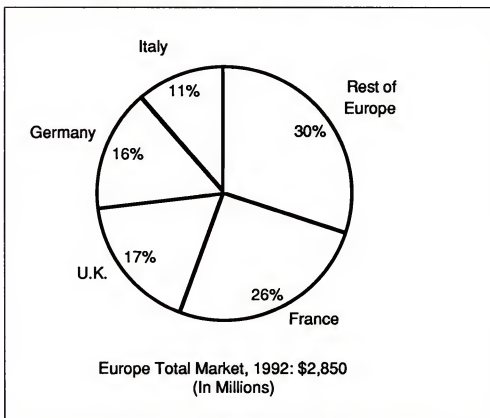


EXHIBIT IV-5

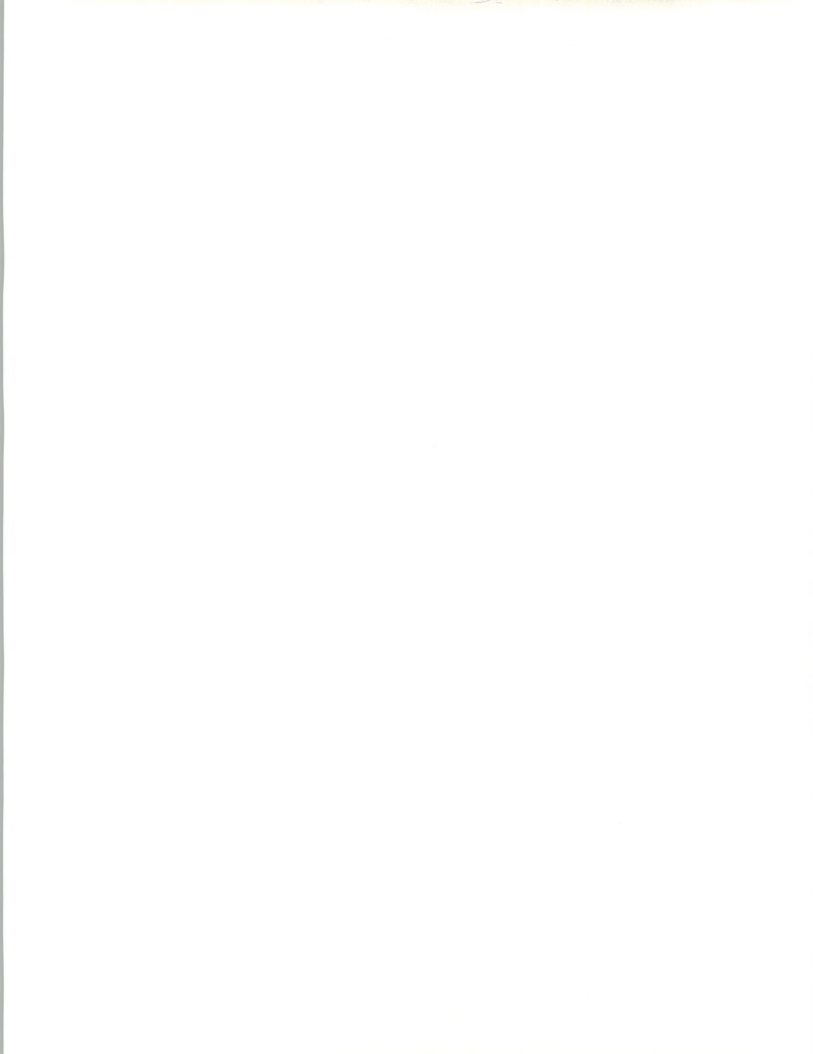
**Major Country Market Comparison,
Transportation, Europe, 1992-1997**

The following paragraphs provide a commentary on each delivery mode.

1. Transaction Processing Services

User expenditures for the transportation sector on transaction processing services will be static in real terms over the next five years. All of INPUT's growth forecasts include an assumption for inflation—currently around 3% for Europe as a whole.

The leading application in this delivery mode used to be computer reservation systems, but this has been transferred to the consumer services industry sector. The sector does still include some use for cargo reservation systems, but the most popular application is payroll services. Information databases and electronic transfers are counted in the network services sector.



2. Turnkey Systems

The large population of small firms in the transportation sector generates a large market for turnkey systems—standard solutions including application packages and hardware on which to run them.

Growth of 10% in this sector reflects the price and competitive nature of the small business market and the trend for large companies to buy hardware separately from software, putting that business in the application software products delivery mode.

Applications in this sector typically include the following:

- Control and tracking of transportation equipment
- Satellite tracking and navigation systems
- Fleet management systems
- Driver data and mobile systems
- Vehicle maintenance and efficiency systems

3. Application Software Products

Packaged solutions, application software products and turnkey systems represent 25% of the total amount spent on software and services in the transportation sector.

Demand for application software packages is growing strongly in the transportation sector with INPUT forecasting a CAGR of 17% to 1997. The main growth comes from the distributed PC and minicomputer end of the market. This reflects the trend to distributed processing among larger operators and the fact that much future growth is expected from initial computerisation among smaller companies, especially in the trucking industry and bus services.

The IT management that was surveyed in the transport sector is expected to increase their use of application software products significantly (more than 50% over the next three years), though they were planning to reduce overall spending on implementing new applications. This contrasts with the more usual IT management opinion in Europe, which believes in-house development and use of application packages will remain at the current balance as they improve the productivity of in-house development teams.

The range of application products is very diverse. Some of the major product areas include:

- Integrated accounting
- Yield management
- Maintenance management
- Sales analysis



- Crew management
- Scheduling
- Logistics control
- EDI
- Simplified rating
- Exception reporting

4. Professional Services

Professional services includes IT consulting, education and training, custom software development and contract staffing services. It is the largest delivery mode in Europe, in comparison to the U.S., where it is similar in size to the turnkey sector. INPUT forecasts lower than average growth for professional services in the transportation sector at 8% CAGR to 1997.

The popularity of custom developed solutions is giving way to the use of more application software products and systems integration projects for in-house IT and for external contracts. The driving force behind this change is the simple economic and time scale benefits of ready-made, but tailorable solutions on low-cost platforms compared to the growth and maintenance expenses of custom developments.

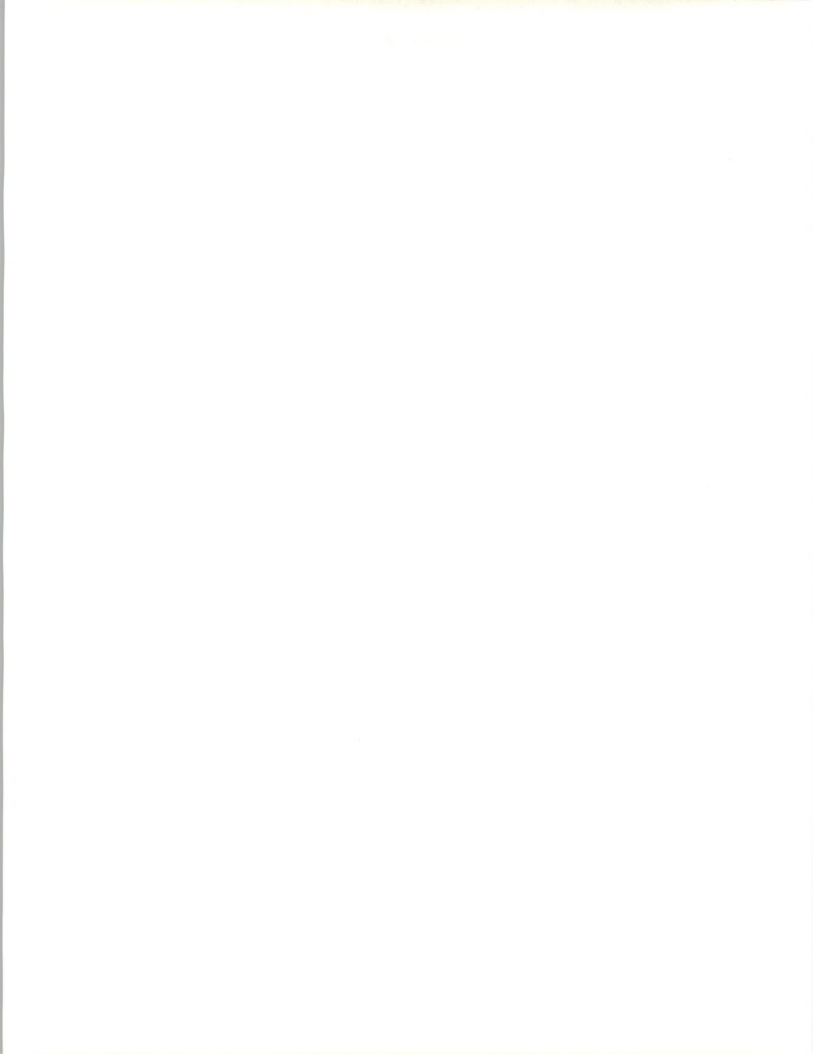
The market for consulting services during the current European recession has stopped growing, but is expected to pick-up again as the recession eases. Those consultancies, such as Andersen Consulting, which can provide management consulting and IT systems implementation seem to be winning market share from professional services vendors that provide the more traditional IT-only skills and services.

The education and training market across Europe is growing very slowly due to:

- Recession forcing cut-backs, in which the training budget is the easiest to cut with least immediate operational impact
- Very low staff turn over, which reduces the need for constant training of new recruits
- Technology and ease-of-use improvements, which lowers the cost of training and the need for attendance on expensive off-site courses

Significant custom application developments include logistics and transportation planning services and operational systems for major ports, airports and airlines.

Many contracts that would previously have been included in this sector are now attributed to systems integration and systems operations delivery modes.



5. Network Services and EDI

INPUT is forecasting substantial growth—a CAGR of 27% per year from 1992 to 1997—in network service for the transportation sector primarily from applications such as EDI rather than from information services such as on-line databases.

As the main players in the industry move toward more costs-effective intermodal or multimodal transportation services, those which involve co-ordination of more than one mode of transport in achieving a final delivery, so the use of communications and network services become the critical success factors for each operator in the chain.

EDI emerged in INPUT's research as the most important transportation application development area in IT management's plans across Europe.

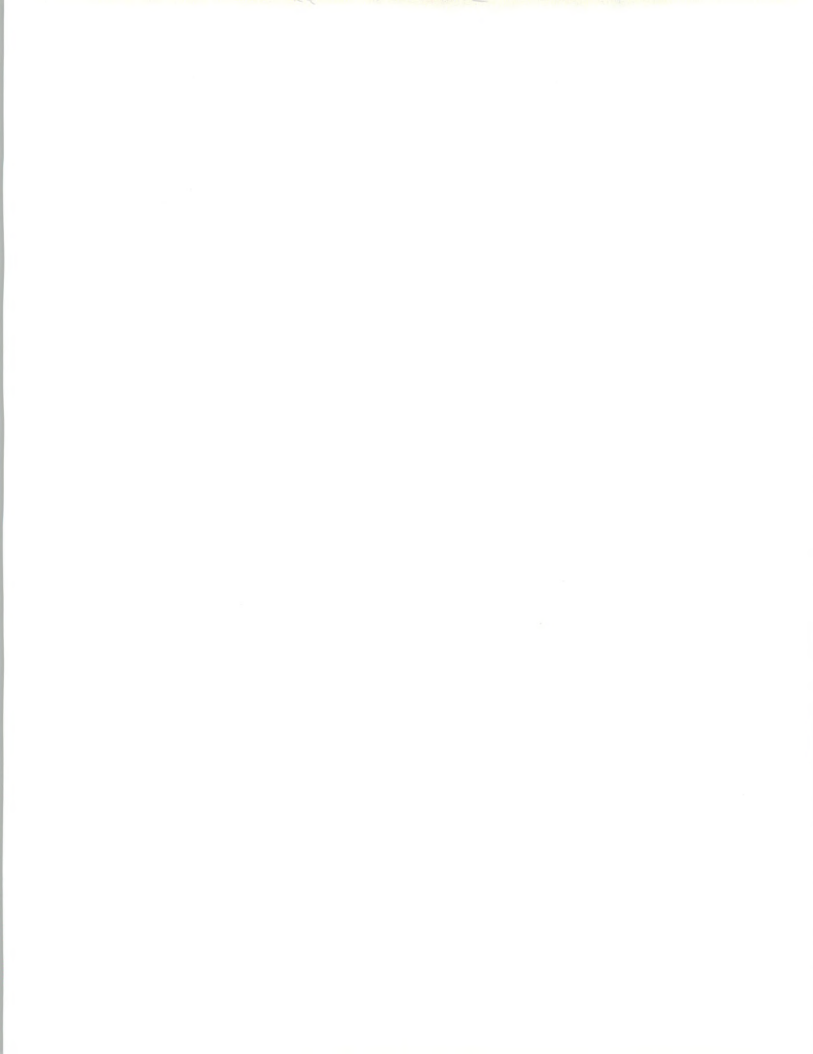
INPUT analysed valid responses from 21 transportation respondents in 1992. In priority order, the most mentioned reasons for implementing EDI were:

- Pressure from customers to use EDI
- Pressure from the industry to meet standards requirements
- The need to match up to the competitors' capabilities
- Incentive to speed up business operations and responsiveness to customers
- To support re-organisation that would reduce costs

Only 30% of respondents achieved a measurable benefit from their use of EDI. The most benefits reported by those users are ordered in priority:

- Faster reaction times have been achieved in responding to customers and staff
- Product/order tracking has been made easier
- More business has been generated as a direct result

One user was concerned that the imposition of EDI, caused by their group holding company, was costing him an additional \$100,000 dollars per year without any measurable financial benefit. This highlights the main difficulty facing those implementing EDI during the current economic climate—the need to invest in EDI for competitive edge while at the same time trying to reduce overall IT costs. This is worsened by an apparent lack of



understanding of EDI's full implications by many business managers who are deciding that EDI should be implemented.

The cost of adding new customers to an EDI network is considered by some users to be an investment that meets future demand because it is difficult for such a cost not to be considered a direct financial loss. The investment is more than the direct gain. This is a major barrier to progress.

For the smaller businesses, the big cost barrier is the need to connect to a number of EDI networks that all use different standards. The integrated use of FAX may reduce the cost of adding small users to a network and allow small businesses to connect to a variety of EDI networks cost effectively, which is a necessity if they trade with more than one major company.

Exhibit IV-6 illustrates the expectations of the 30% of respondents who had measured the benefits of their EDI implementations. The exhibit shows the mix of transaction by volume for EDI, facsimile and other modes. Other includes transactions originating from field sales representatives, showroom orders, phone conversations, mailed purchase orders/invoices, interactive voice response and on-line order-entry.

Expectations of EDI are very high among those already successful in their implementation (with business volumes via EDI to double over the next five years). In addition, there are many companies that will join the community of users during this period.

EDI is still not well established as a value-added service for road hauliers, particularly at the pan-European level. Transponet is an initiative with links to national operators like Transpac in France, GSI in Germany and INTIS in the Netherlands. Making EDI a cost-effective service for small and medium-sized enterprises is the challenge in the road transportation sector.

Most of the use and plans for EDI for rail freight are related to connections with ports. The UIC (Union Internationale des Chemins de Fer) has initiated a European initiative (known as DOCIMEL) to link trading rail partners, which will include Intercontainer—the company that controls container rail movement across Europe. Once again, the main problem with EDI is, "who should pay for it"? In fact, it has to pay for itself in new, more cost-effective business practices—a key factor for successful exploitation of EDI.

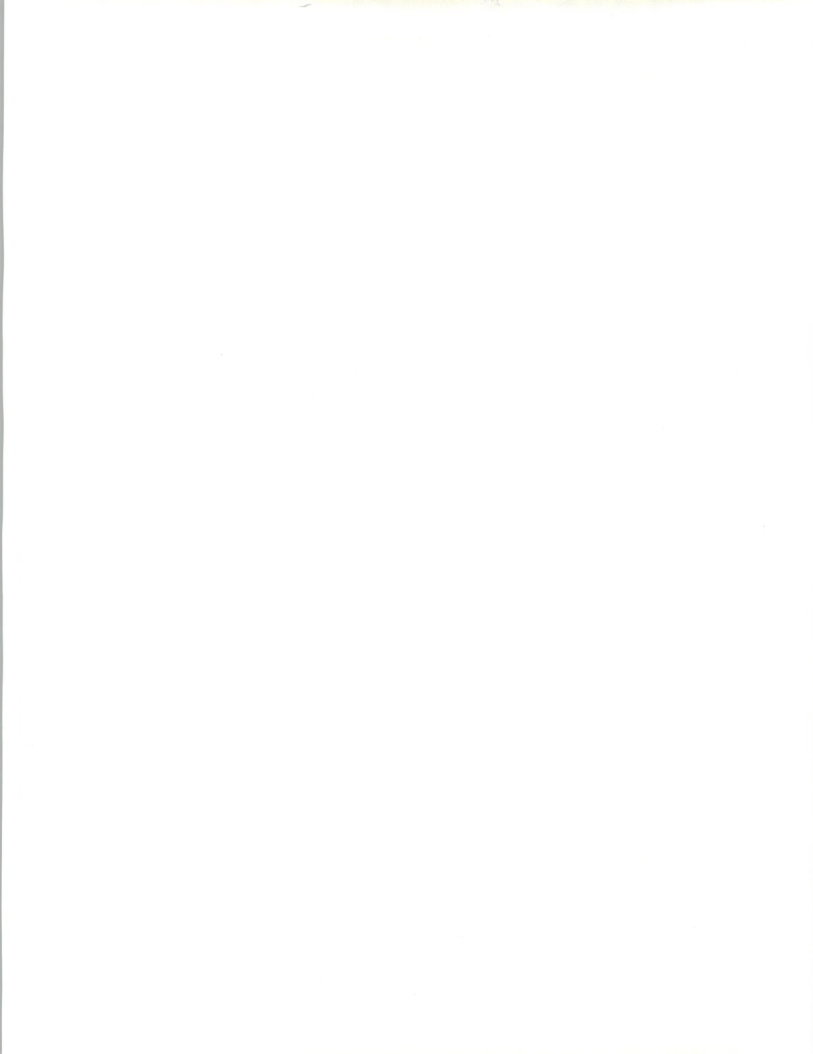
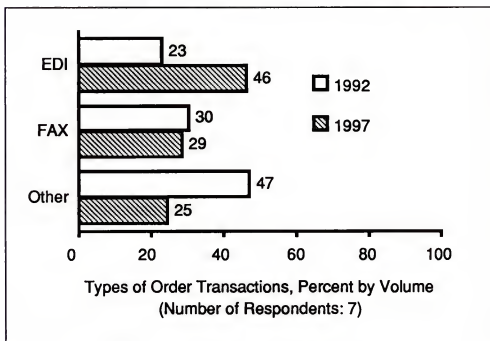


EXHIBIT IV-6

Expected Growth of EDI by IT Users in Transportation, Europe**6. Systems Operations**

Systems operations for the transportation sector, forecast to grow at a CAGR of 19% to 1997, primarily follows the European pattern of established growth in France and the U.K. As of yet, there is little activity elsewhere.

As large mainframe users begin to downsize many of their applications onto open systems platforms, there has been growth in the demand for transition management services, including the management of older (legacy) applications during the move to lower cost and distributed platforms.

Pressure to bring IT costs down and make them more predictable has also led to greater outsourcing of mainframe system operations. As the population of PC networks builds up in some of the larger European operators, INPUT expects to see a growing need for outsourcing desktop services—supporting the management and operation of large networks of PC users.

7. Systems Integration

Integration is a key word for the whole transportation sector because it describes the emergence of newer highly competitive forms of transportation service (the integrators) as well as describing the primary requirement for system development in such a business environment. Systems integration involves a vendor taking prime contract responsibility for implementing a large multivendor systems solution of hardware, software and professional services.

Transportation is one of the most active and fast-growing sectors of the systems integration market in Europe. INPUT predicts a CAGR of 20% per year to 1997 in this sector.

The complexity of today's technology and the industry's accelerating pace of change make it increasingly difficult for the user to manage large projects with a combination of in-house and outside resources. As a result, many firms are transferring the risk and responsibility for projects to SI firms. Together, the growth of SI, application software and professional services reflects a major shift away from in-house development.

8. Leading Vendors

Exhibit IV-7 identifies the leading vendors of software and services in the transportation sector across Europe. It shows the revenues for each vendor, which can be attributed to this sector and the resulting market share for each of the top ten.

Half the vendors are of French origin, giving France a dominant share of the European market. Together, these vendors only represent approximately 15% of the market, which conveys the fragmented nature of the sector with large numbers of vendors participating throughout Europe (mostly only national in their activity).

Four of the top ten are equipment vendors, illustrating that this type of vendor can achieve a significant market share in software and services, even though their primary business is selling hardware. Systems software revenues are excluded from this analysis as for they are not considered to be industry specific.

GSI is the only vendor in the list that specialises in the distribution and transportation sector almost exclusively. All these vendors operate on a pan-European basis in this sector.



EXHIBIT IV-7

Leading Software and Services Vendors, Transportation, Europe, 1991

Rank	Vendor	Country of Origin	Estimated Sector Revenues (\$ Millions)	Market Share (Percent)
1=	GSI	France	60	2.4
1=	Bull	France	60	2.4
3	Sema Group	France	55	2.2
4=	IBM	U.S.	40	1.6
4=	Digital	U.S.	40	1.6
6	Olivetti	Italy	35	1.4
7	Groupe Concept	France	30	1.2
8=	Siemens-Nixdorf	Germany	25	1.0
8=	Cap Gemini Sogeti	France	25	1.0
10	Andersen Consulting	U.S.	20	0.8
	Total Listed		390	15.3
	Total Market		2,550	100.0

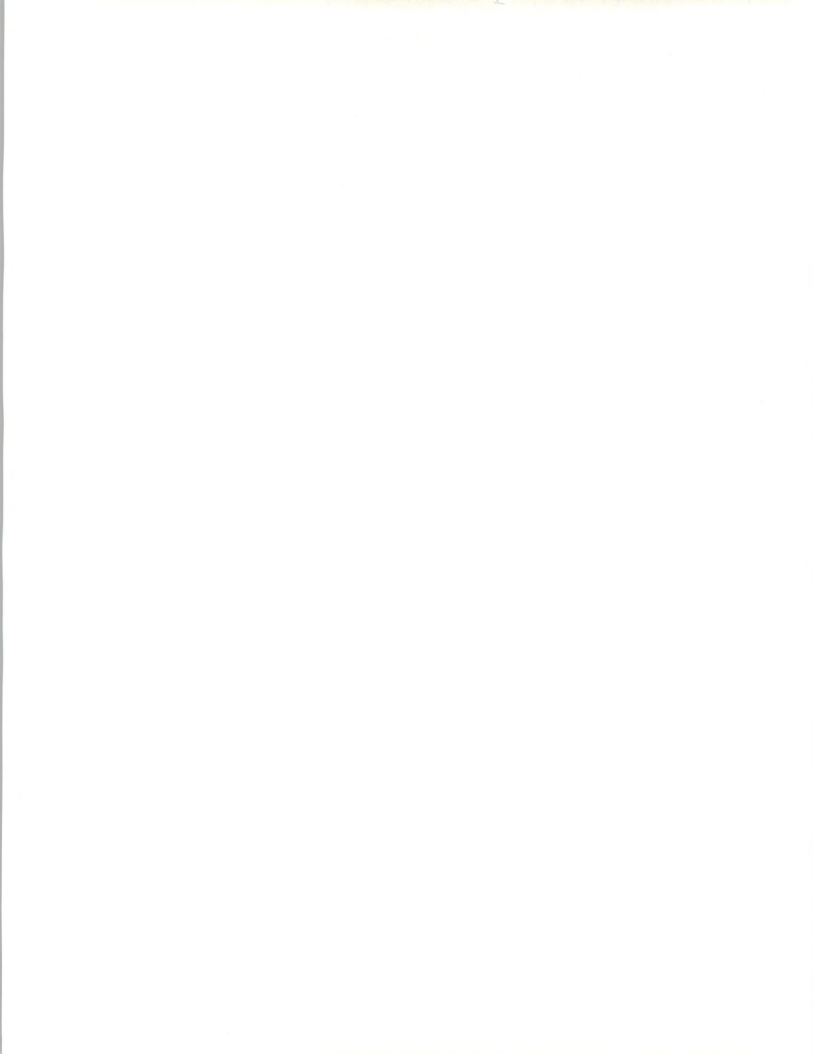
C

France

France lies very central to the flow of goods across Europe. It also boasts the largest and most developed software and services market in Europe. As a result, it represents 26% of the total European market in the transportation sector.

Exhibit IV-8 shows the pattern of delivery modes and their predicted growth rates. Overall, the market in France is predicted to grow at a CAGR of 14% between 1992 and 1997.

Network services and professional services are the largest delivery modes by far in France. Companies like SNCF, the French railway service, make extensive use of professional services vendors such as Sema Group, with a variety of projects such as application re-engineering as they move to a wide use of distributed systems connected to their central mainframes. SNCF is also a pioneer of EDI with the EDIFRET, an information service for



shippers (even though the company is faced with the problem of how to charge for such a service in order to cover costs).

EXHIBIT IV-8

Delivery Mode Forecast, Transportation, France, 1992-1997

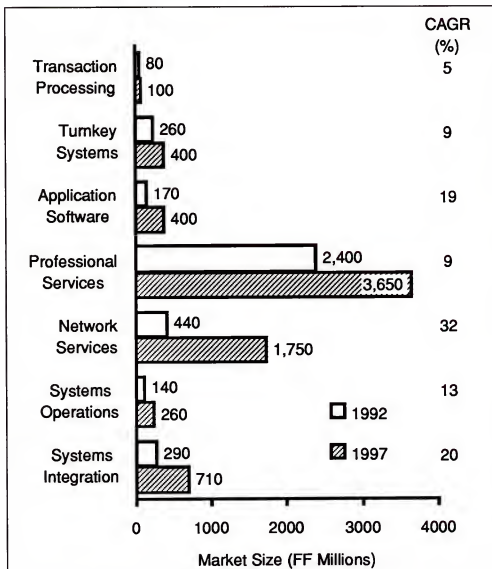


Exhibit IV-9 tables the estimates of the transportation sector market size for 1991 and the predicted sizes for 1992 and 1997 for each delivery mode in France. The major vendors in the transportation sector are ranked in order with INPUT's estimates of market shares.



EXHIBIT IV-9

Software and Services Market, Transportation, France

Delivery Mode	FF Millions				
	1991	'91-'92 (%)	1992	'92-'97 CAGR (%)	1997
Transaction Processing	80	0	80	5	100
Turnkey Systems	240	8	260	9	400
Application Software Products	150	13	170	19	400
Professional Services	2,190	10	2,400	9	3,650
Network Services	350	26	440	32	1,750
Systems Operations	120	17	140	13	260
Systems Integration	240	21	290	20	710
Industry Sector Total	3,350	12	3,780	14	7,270

EXHIBIT IV-10

Leading Software and Services Vendors, Transportation, France, 1991

Rank	Vendor	Country of Origin	Estimated Sector Revenues (FF Millions)	Market Share (Percent)
1	GSI	France	220	6.6
2	Bull	France	160	4.8
3	Groupe Concept	France	150	4.5
4	Sema Group	France	120	3.6
5	Axime	France	65	1.9
6	Cap Gemini Sogeti	France	60	1.8
7	Cegid	France	50	1.5
8	Télésystèmes	France	40	1.2
9=	CGI	France	35	1.0
9=	IBM	U.S.	35	1.0
Total Listed			935	27.9
Total Market			3,350	100.0



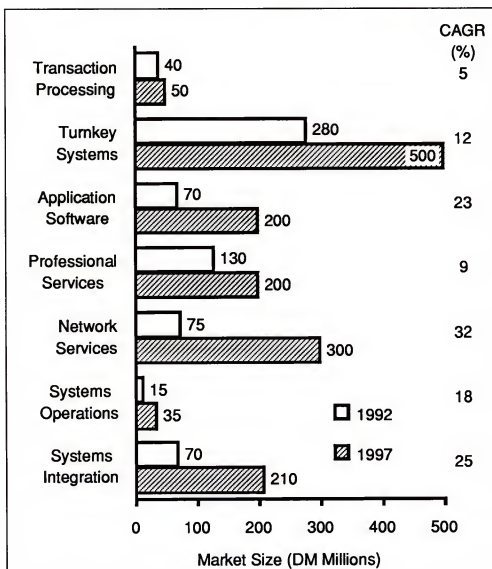
D

Germany

Only about half the size of the French market, the German transportation sector is expected to grow the most rapidly, in spite of the threat of recession, at a forecast 17% CAGR to 1997. Exhibit IV-11 illustrates the mix of delivery mode business in Germany.

EXHIBIT IV-11

Delivery Mode Forecast, Transportation, Germany, 1992-1997





Here, the clearly dominant mode is turnkey systems—a common characteristic throughout the German software and services market—indicating the traditional preference for packaged solutions by German users.

The fastest growing delivery mode is network services, a large element of this growth is expected to be EDI services. The EDI market benefits to an extent from late development. Compared to the U.K., for example, it does not suffer from early adoption of a variety of EDI standards and should be better placed to implement EDIFACT.

The estimated market sizes for each delivery in Germany for 1991, 1992 and 1997 are shown in Exhibit IV-12 with the predicted growth rates. The following exhibit ranks the leading vendors—those with the highest revenues for software and services (excluding system software) attributed to the transportation sector in Germany.

EXHIBIT IV-12

Software and Services Market, Transportation, Germany

Delivery Mode	DM Millions				
	1991	'91-'92 (%)	1992	'92-'97 CAGR (%)	1997
Transaction Processing	40	0	40	5	50
Turnkey Systems	250	12	280	12	500
Application Software Products	60	17	70	23	200
Professional Services	120	8	130	9	200
Network Services	60	25	75	32	300
Systems Operations	10	50	15	18	35
Systems Integration	55	27	70	25	210
Industry Sector Total	595	14	680	17	1,495



EXHIBIT IV-13

Leading Software and Services Vendors, Transportation, Germany, 1991

Rank	Vendor	Country of Origin	Estimated Sector Revenues (DM Millions)	Market Share (Percent)
1=	ESG-FEG	Germany	25	4.2
1=	Siemens-Nixdorf	Germany	25	4.2
3=	SAP	Germany	15	2.5
3=	IBM	U.S.	15	2.5
5	Digital	U.S.	11	1.8
6	GSI	France	10	1.7
7=	Bull	France	8	1.3
7=	Softlab	Germany	8	1.3
9=	Sema Group	France	7	1.2
9=	Computer Associates	U.S.	7	1.2
	Total Listed		131	21.8
	Total Market		595	100.0

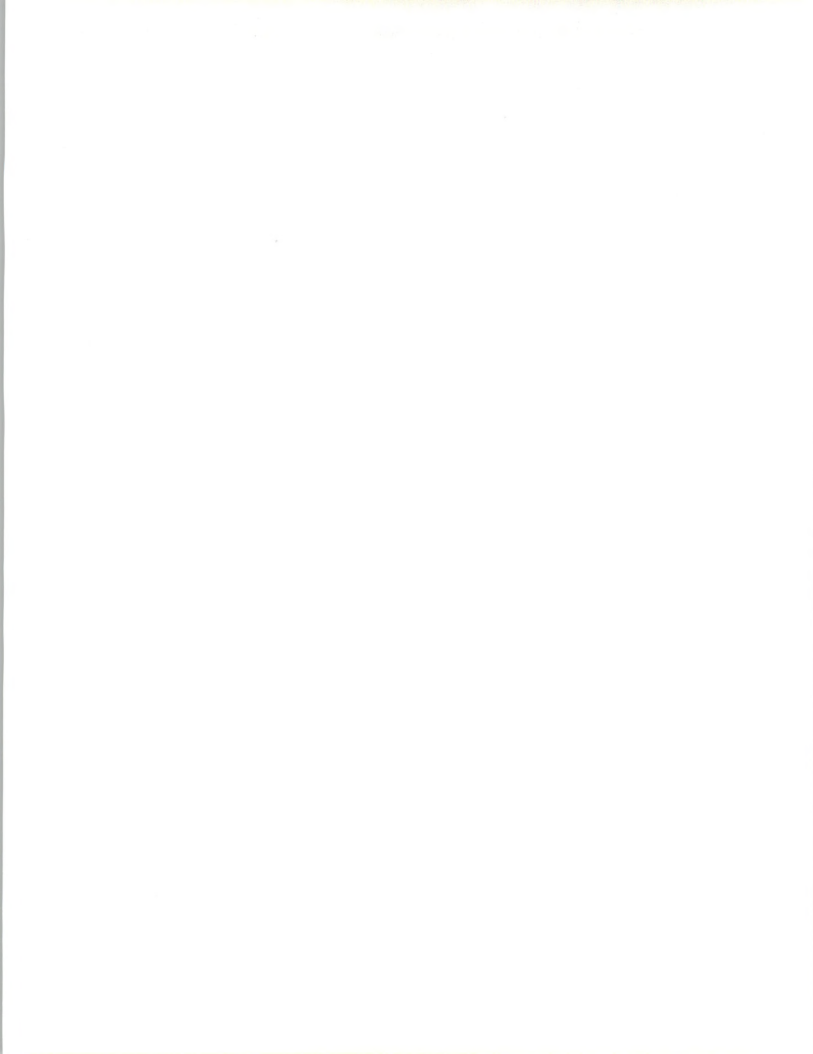
E

United Kingdom

The software and services market within the transportation sector in the U.K. is valued at about 17% of the total for Europe, and forecast to grow at a CAGR of 13% from 1992 to 1997.

During that period, as shown in Exhibit IV-14, the network services sector is expected to become dominant, followed by the systems operations delivery mode. The U.K. users have been European leaders in adopting EDI based on the U.S. model. The momentum of EDI adoption is expected to continue as users prepare to reduce supply chain costs and more flexible intermodal operations.

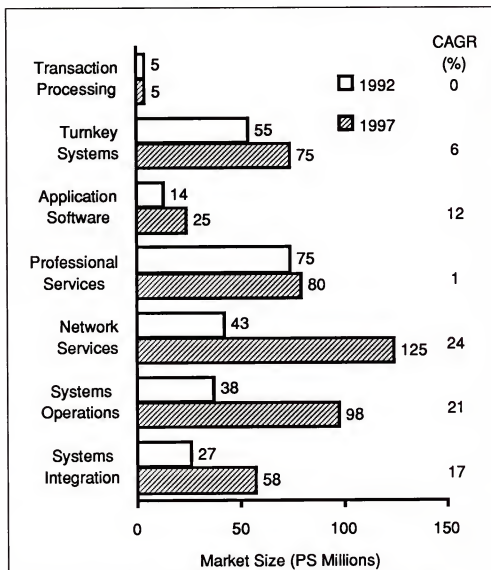
Similarly, the U.K. market is the most mature in adopting systems operations (or computer facilities management) and the pace of change in the transport sector combines with severe economic pressure from the recession to stimulate outsourcing of computer system operations.



Professional services are forecast to decline in real terms, with 17% growth in systems integration providing some compensation for professional service vendors that are willing to adopt popular applications into integrated solutions.

EXHIBIT IV-14

Delivery Mode Forecast, Transportation, United Kingdom, 1992-1997



The table in Exhibit IV-15 shows the market estimates for 1991 and forecasts for 1992 and 1997 by delivery mode. It is followed by a ranking of the leading vendors in the U.K. by market share of the transportation sector revenues for industry specific software and services during 1991.

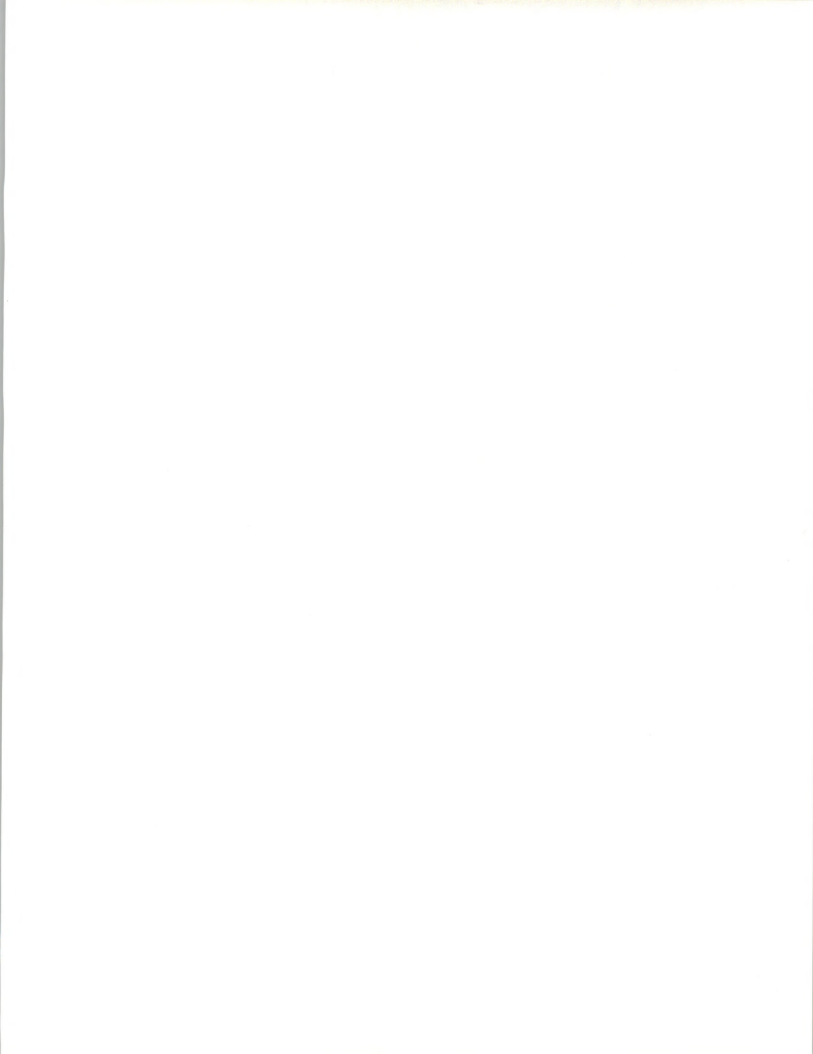


EXHIBIT IV-15

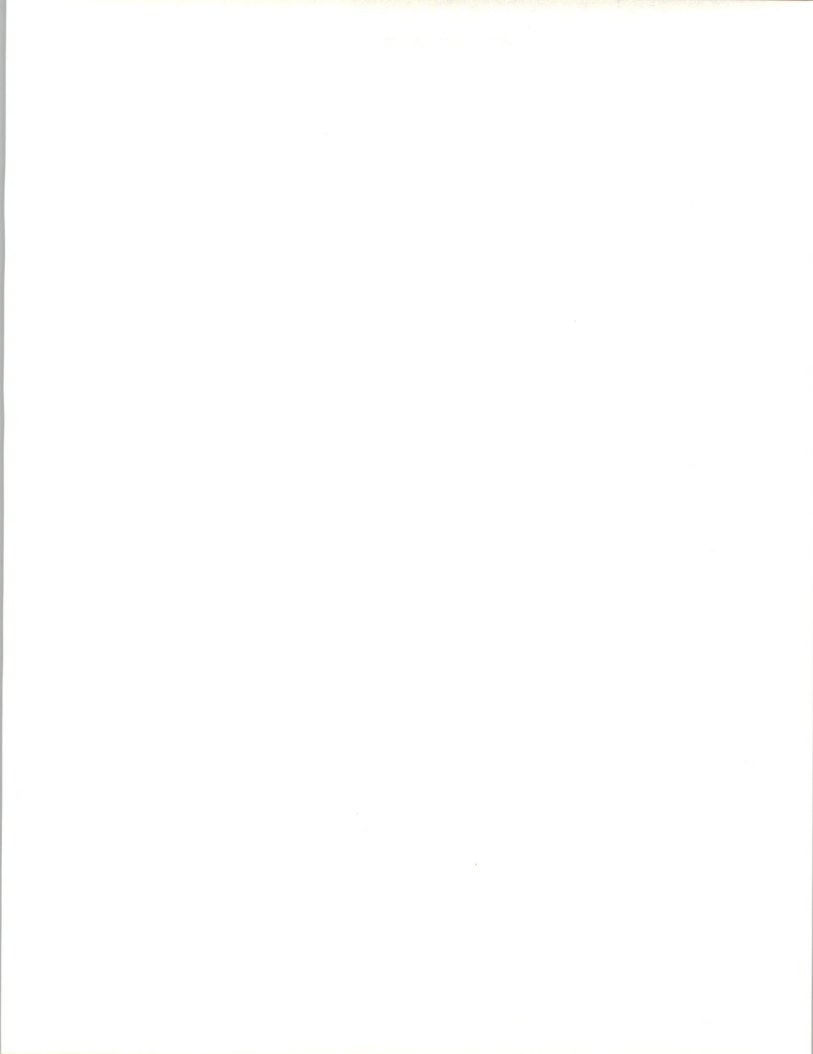
Software and Services Market, Transportation, United Kingdom

Delivery Mode	PS Millions				
	1991	'91-'92 (%)	1992	'92-'97 CAGR (%)	1997
Transaction Processing	5	0	5	0	5
Turnkey Systems	50	10	55	6	75
Application Software Products	13	8	14	12	25
Professional Services	75	0	75	1	80
Network Services	36	19	43	24	125
Systems Operations	31	23	38	21	98
Systems Integration	24	13	27	17	58
Industry Sector Total	235	9	255	13	465

EXHIBIT IV-16

Leading Software and Services Vendors, Transportation, United Kingdom, 1991

Rank	Vendor	Country of Origin	Estimated Sector Revenues (PS Millions)	Market Share (Percent)
1	Sema Group	France	11	4.7
2	BT	U.K.	10	4.3
3	Digital	U.S.	6	2.6
4	Logica	U.K.	4	1.7
5	BIS	U.S.	4	1.7
6	PE-International	U.K.	4	1.7
7=	Bull	France	3	1.3
7=	Hoskyns (CGS)	U.K. (France)	3	1.3
7=	IBM	U.S.	3	1.3
7=	Misys	U.K.	3	1.3
	Total Listed		51	21.7
	Total Market		235	100.0



F

Italy

Although Italy is the largest country in Europe for road freight transportation, just ahead of the U.K., the market for software and services in Italy lies well behind France, Germany and the U.K. at only 11% of the total European market. INPUT forecasts a growth of 13% per year for the period 1992 to 1997. The growth rates for each delivery mode are illustrated in Exhibit IV-17.

This exhibit shows a similar display to that of France with professional services as the dominant delivery mode.

Application software and network services are expected to show healthy growth. The use of EDI is still minimal due to the unsettled state of the standards in the past. Competitive pressures will stimulate rapid growth in network services, higher than implied by the 29% growth rate, because this includes some much slower growing electronic information services.

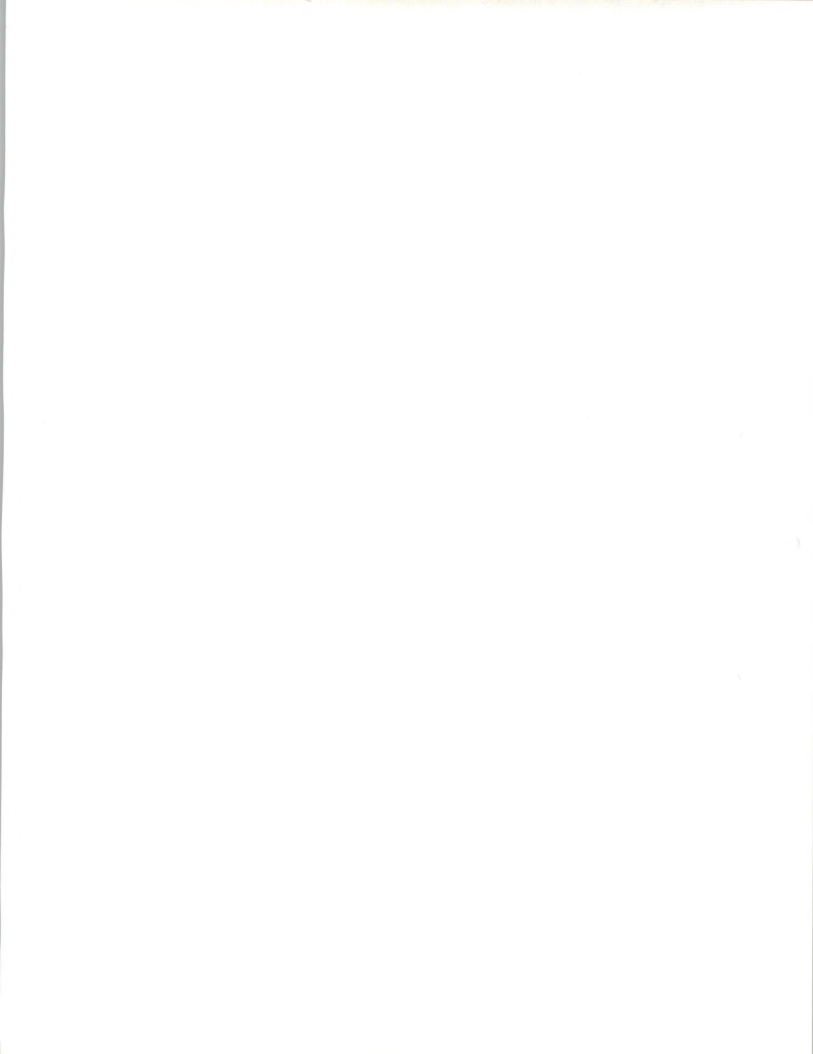


EXHIBIT IV-17

Delivery Mode Forecast, Transportation, Italy, 1992-1997

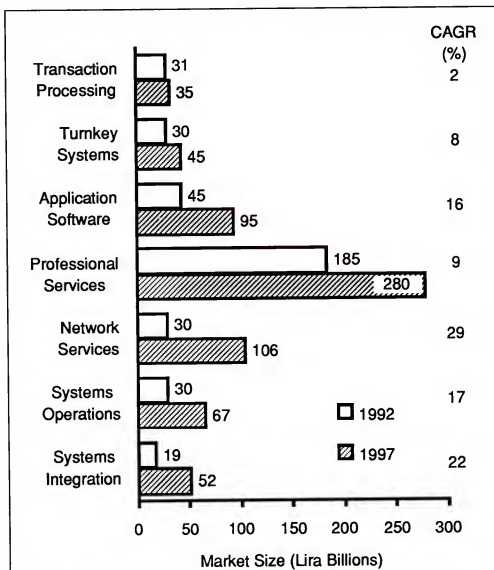


Exhibit IV-18 tables the market estimates and forecasts for Italy over the next five years, from which the chart above was drawn. There follows an exhibit of the top ten vendors of software and services within the transportation sector in Italy during 1991.

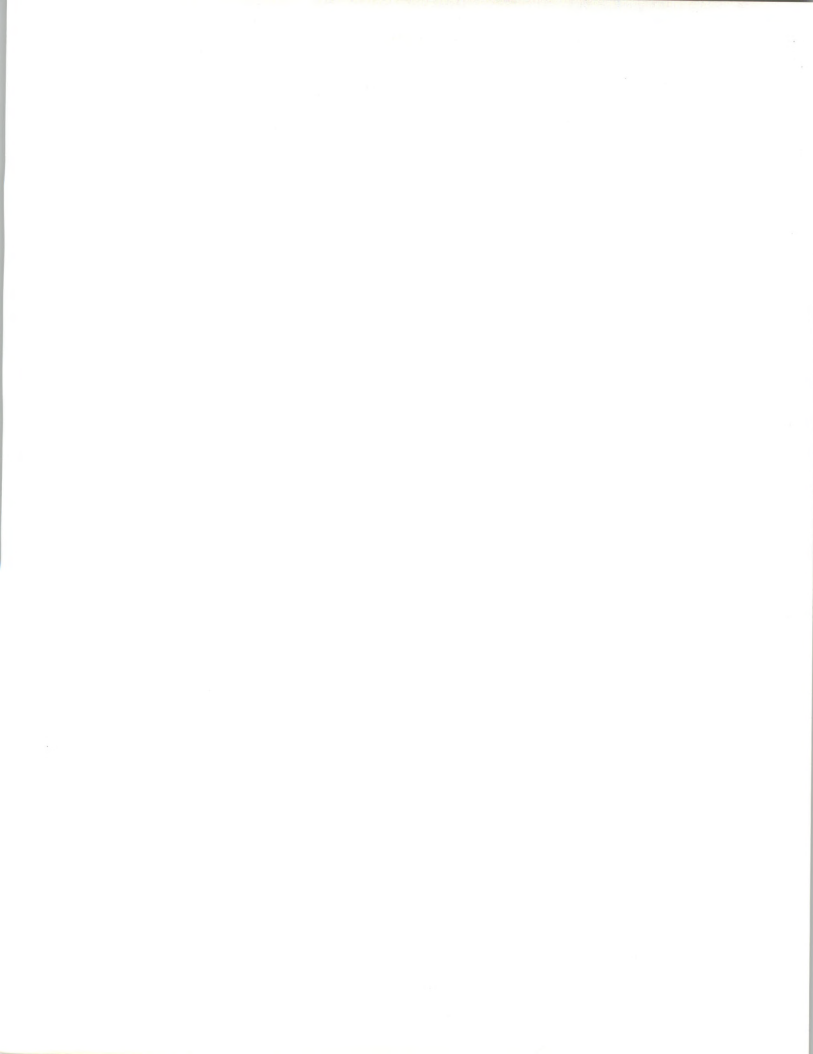


EXHIBIT IV-18

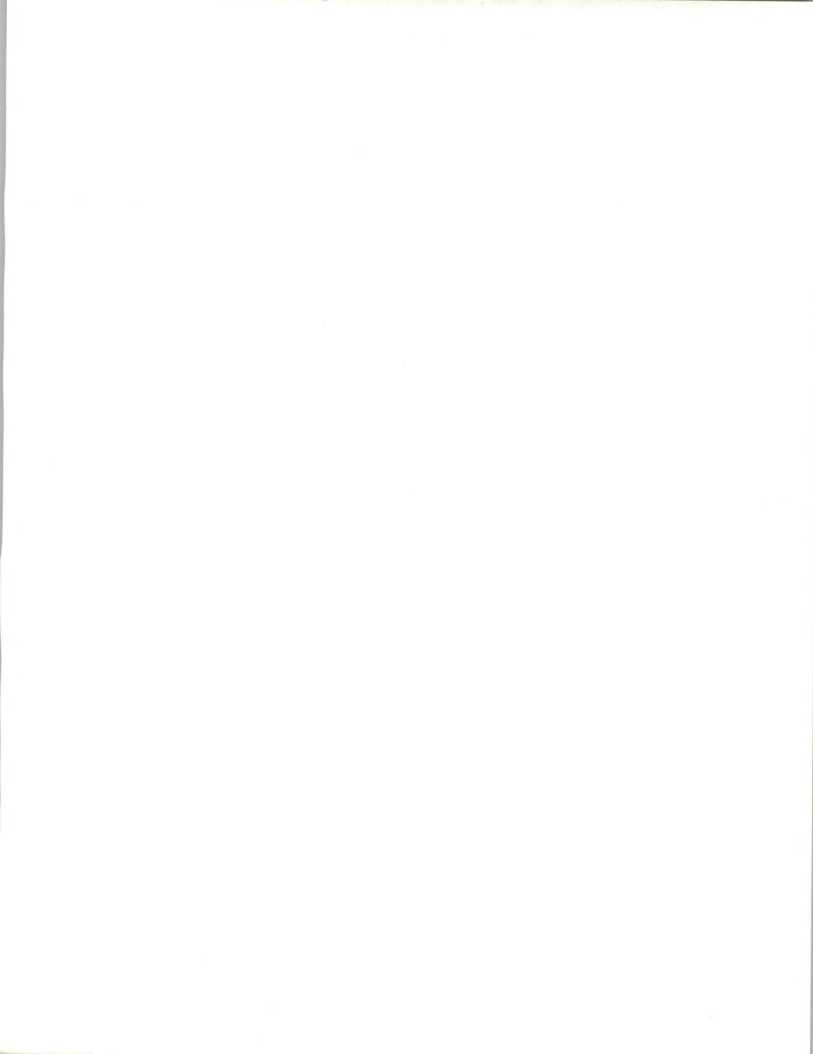
Software and Services Market, Transportation, Italy

Delivery Mode	Lira Billions				
	1991	'91-'92 (%)	1992	'92-'97 CAGR (%)	1997
Transaction Processing	30	3	31	2	35
Turnkey Systems	25	20	30	8	45
Application Software Products	40	13	45	16	95
Professional Services	170	9	185	9	280
Network Services	24	25	30	29	106
Systems Operations	25	20	30	17	67
Systems Integration	16	19	19	22	52
Industry Sector Total	330	12	370	13	680

EXHIBIT IV-19

Leading Software and Services Vendors, Transportation, Italy, 1991

Rank	Vendor	Country of Origin	Estimated Sector Revenues (Lira Billions)	Market Share (Percent)
1	Olivetti	Italy	25	7.6
2	Finsiel	Italy	20	6.1
3	Bull	France	10	3.0
4	IBM	U.S.	7	2.1
5	Cerved	Italy	5	1.5
6	Database Informatica	Italy	5	1.5
7	INTESA	Italy	5	1.5
8	S&M Group	Italy	4	1.2
9	Digital	U.S.	3	0.9
10	Andersen Consulting	U.S.	3	0.9
	Total Listed		87	26.4
	Total Market		330	100.0



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