

U.S. APPLICATION SOLUTIONS MARKET

1990 - 1995

INPUT

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INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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1990-1995

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Marketing Analysis Program (MAP)

U.S. Application Solutions Market, 1990-1995

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Abstract

This annual report provides analysis and five-year forecast of the U.S. application solutions market for the period 1990-1995. The forecasts contained in this report divide the market into the applications software products and VAR/turnkey systems markets and their corresponding submodes.

The five-year forecast period, using the base year of 1989, covers 16 industry-specific and seven cross-industry sectors for each of the market segments. The report discusses issues and trends and provides recommendations on how vendors can take advantage of the forces driving these markets.

The report contains 125 pages and 48 exhibits.

U.S. Application MATKY
Solutions MARKET 1991
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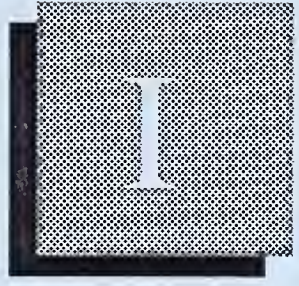
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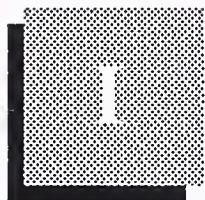
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Introduction





Introduction

This report is part of a series of market analysis reports written each year by INPUT on the key sectors (delivery modes) of the United States information services market. The delivery modes analyzed during 1990 are:

1. Applications Software Products
2. Turnkey Systems
3. Processing Services
4. Systems Software Products
5. Network Services
6. Professional Services
7. Systems Integration
8. Systems Operations

The first six delivery modes are covered in reports included as part of INPUT's Market Analysis Program, a planning service for information services vendors. The other two delivery modes are covered in market analysis reports included in INPUT's Systems Integration and Systems Operations Programs.

A

Purpose and Organization of the Report

1. Purpose

This report, *U.S. Application Solutions Market, 1990-1995*, analyzes the applications software products and turnkey systems sectors (delivery modes) of the U.S. information services market. The report assesses trends and events within the U.S. economy, the U.S. information services market, and the applications software and turnkey systems delivery modes to provide the reader with a comprehensive foundation for understanding these market sectors and anticipating future directions.

The report includes five-year forecasts, assessment of market drivers, analysis of competitive trends, and identification of leading vendors.

The report provides readers with insights and information that will help them:

- Review the forces shaping the market
- Develop internal corporate financial projections
- Identify new markets and product and services opportunities
- Assess the competitive trends
- Determine potential market directions
- Assist in prioritizing investments

Note that in prior years INPUT analyzed the applications software products sector in a report entitled *U.S. Software Products Market*, which included the systems software products sector, while the turnkey sector was in a separate report. Applications software products and turnkey systems have been combined in the 1990-1995 report as they are both markets that provide users with application solutions. Each sector is analyzed and forecasted individually, whereas the common trends and issues are addressed as they impact both delivery modes. Systems software products are analyzed in a separate report, *U.S. Systems Software Products Market, 1990-1995*.

2. Report Organization

This report is organized as follows:

- Chapter II, Executive Overview, provides a summary of the research analysis, conclusions and recommendations of the report.
- Chapter III, General Business Climate, provides an overview of the business climate within the U.S. information services market and the applications software and turnkey systems delivery modes.
- Chapter IV, Market Forecast, provides a comprehensive look at the specific delivery modes and submodes, the five-year 1990-1995 forecasts, and an assessment of the forces driving the market sectors. Where appropriate, the forecasts are presented by vertical and cross-industry markets.
- Chapter V, Issues and Trends, discusses the issues and trends that are most critical to the applications software products and turnkey systems markets immediately and in the long term.
- Chapter VI, Competition, identifies the leading vendors and assesses the key competitive trends within applications software products and turnkey systems. Profiles of vendors that exemplify the competitive trends are also provided.

- Chapter VII, Conclusions and Recommendations, provides conclusions and recommendations and identifies opportunities for information services vendors active in or considering entering the applications software or turnkey systems delivery modes.
- Appendix A, Definitions, defines the terms used throughout INPUT's market analysis work.
- Appendix B, Forecast Data Base, summarizes the forecast for this market sector and reconciles the current forecast with the 1989-1990 forecast.

B

Scope and Methodology

1. Scope

This report addresses the U.S. information services market for the applications software products and turnkey systems sectors. It includes user expenditures that are noncaptive (generally available to vendors). Many large organizations have portions of their information services requirements satisfied by internal divisions. The resulting expenditure is not available for competitive bid by the general vendor community and is not included in INPUT's projections. The noncaptive distinction is important and is addressed in more detail in Appendix A.

a. Information Services Industry Structure

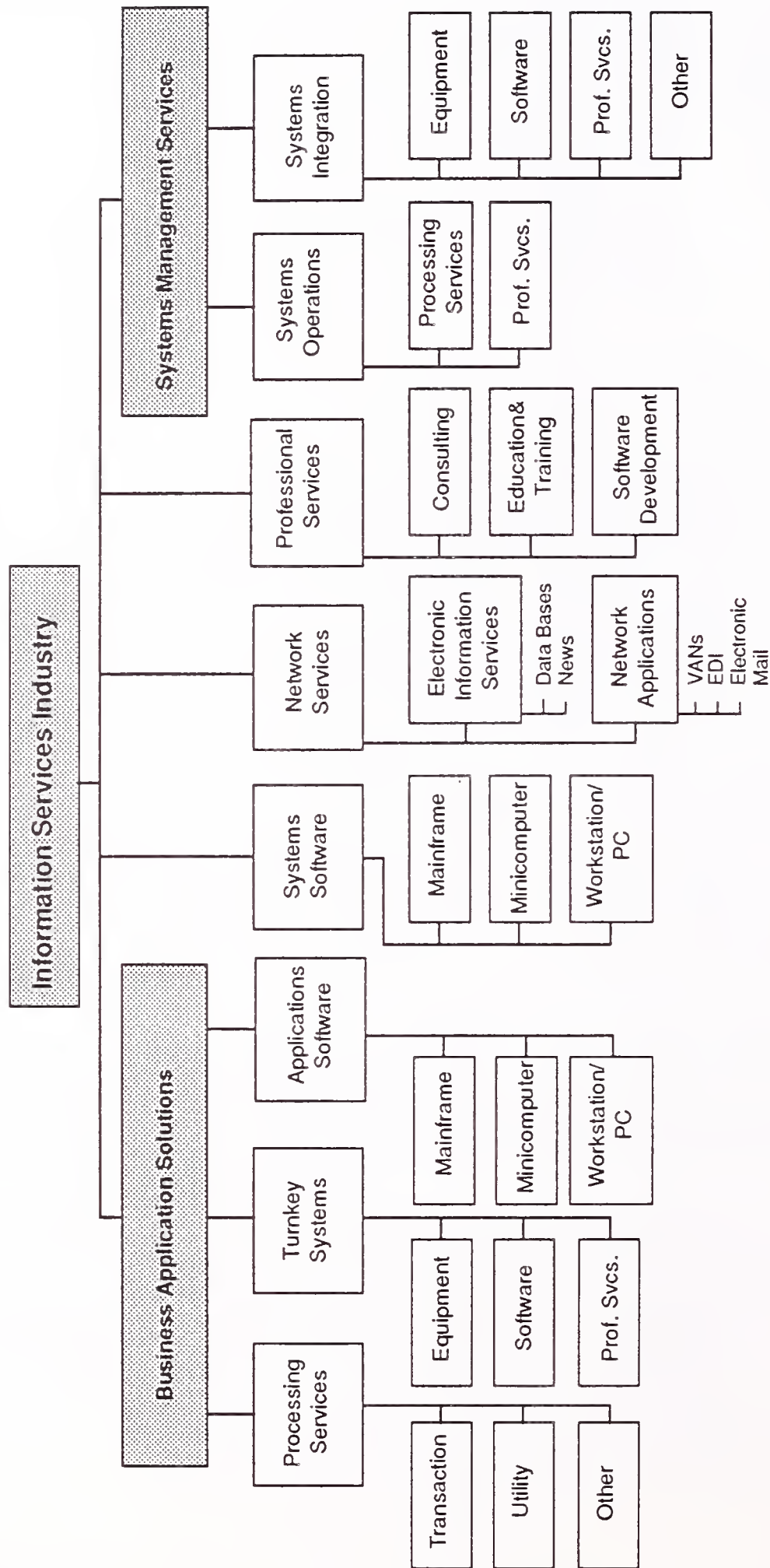
Exhibit I-1 defines the structure of the information services industry as used by INPUT in its market analyses and forecasts. The market consists of eight delivery modes, each of which contains a number of submodes.

- INPUT develops a five-year forecast for each of the submodes listed.
- The following delivery modes are forecasted on a vertical industry and cross-industry basis—applications software products, turnkey systems, processing services, professional services, systems integration and systems operations.
- The systems software products and network services delivery modes are forecasted for the U.S. market as a whole.

For a more complete discussion of INPUT's information services industry structure and terminology, please refer to Appendix A, Definitions.

EXHIBIT I-1

Information Services Industry Structure—1990



Source: INPUT

b. Delivery Mode Description

Application solutions are prepackaged or standard solutions to common business applications. These applications can be either industry-specific (e.g., a turnkey system for a law office) or cross-industry (e.g., human resources software). In general, application solutions services involve minimal customization by the vendor, and allow the user to handle a specific business application without having to develop or acquire a custom system or system resources. Exhibit I-2 is a diagram of the market structure for application solutions, including applications software products and turnkey systems.

Although application solutions include three delivery modes—applications software products, turnkey systems, and processing services—only the first two are included in this report. INPUT has combined these two delivery modes into one report this year because of their similarities and the trend towards unbundling turnkey systems so that hardware, applications software and services are sold separately. In this report, the term application solutions refers to applications software products and turnkey systems. Processing services is the subject of a separate INPUT Market Analysis Program report.

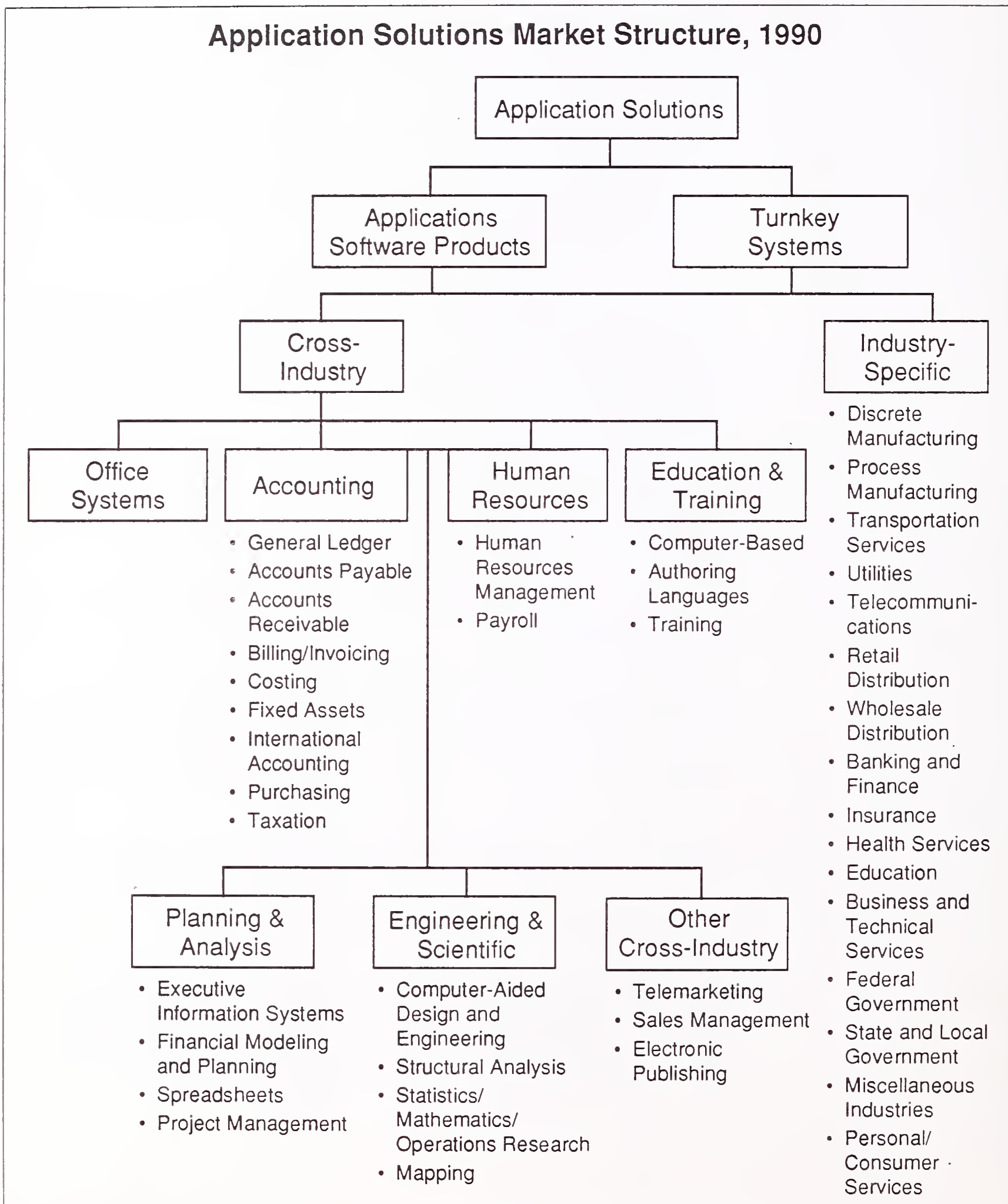
i. Applications Software Products

Applications software is packaged software purchased for in-house computer systems.

- Industry-specific applications software products perform functions related to fulfilling business or organizational needs unique to a specific vertical market and sold to that market only. Examples include demand deposit accounting, MRPII, medical record keeping, and automobile dealer parts inventory.
- Cross-industry applications software products perform a specific function that is applicable to a wide range of industry sectors. Applications include payroll and human resource systems, accounting systems, word processing and graphics systems.

User expenditure forecasts include lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the users' sites. Vendor-provided training or support in operation and use of the package, if bundled in the software pricing, is also included.

EXHIBIT I-2



Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself.

User expenditures on applications software products purchased for resale by other delivery modes—namely, turnkey systems vendors and VARs (value-added resellers), and systems integrators—are excluded from applications software forecasts. However, where turnkey systems vendors have unbundled their products, and sell applications software separately from the hardware, the applications software expenditures are included in applications software forecasts. Applications software products sold through other channels, however, such as through computer retailers, are included in the user expenditure forecasts.

ii. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged or custom applications software into a single system developed to meet a specific set of user requirements. The turnkey vendor adds value in software and support services, often providing the applications software and customizing services. Most CAD/CAM systems and many small business systems are turnkey systems.

Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

The distinction between a turnkey system vendor and a value-added reseller (VAR) has become fuzzy, and the two terms are used interchangeably. IBM invented the term “value-added reseller” in the mid-1980s when it introduced its first workstation. It wanted to emphasize the value-added aspect of this distribution channel rather than sell its workstations through original equipment manufacturers (OEMs) who do bring to mind added value in the sense of customization and services.

Turnkey systems vendors/VARs may also provide systems integration, acquiring software products as well as equipment from other vendors.

As with applications software products, turnkey systems are divided into two categories—industry-specific systems and cross-industry systems.

2. Methodology

INPUT's methodology for market analysis and forecasting is summarized in Exhibit I-3. As in past years, INPUT has continued the process of surveying information services vendors to determine their U.S. information services revenues; surveying information systems organizations to determine their expenditure and outside services acquisition plans; and interviewing vendors a second time to understand their views of the market opportunities over the short and long terms.

INPUT's annual forecasting process is broken into two major parts: base-year expenditure calculations and market forecasts. Each is briefly described below.

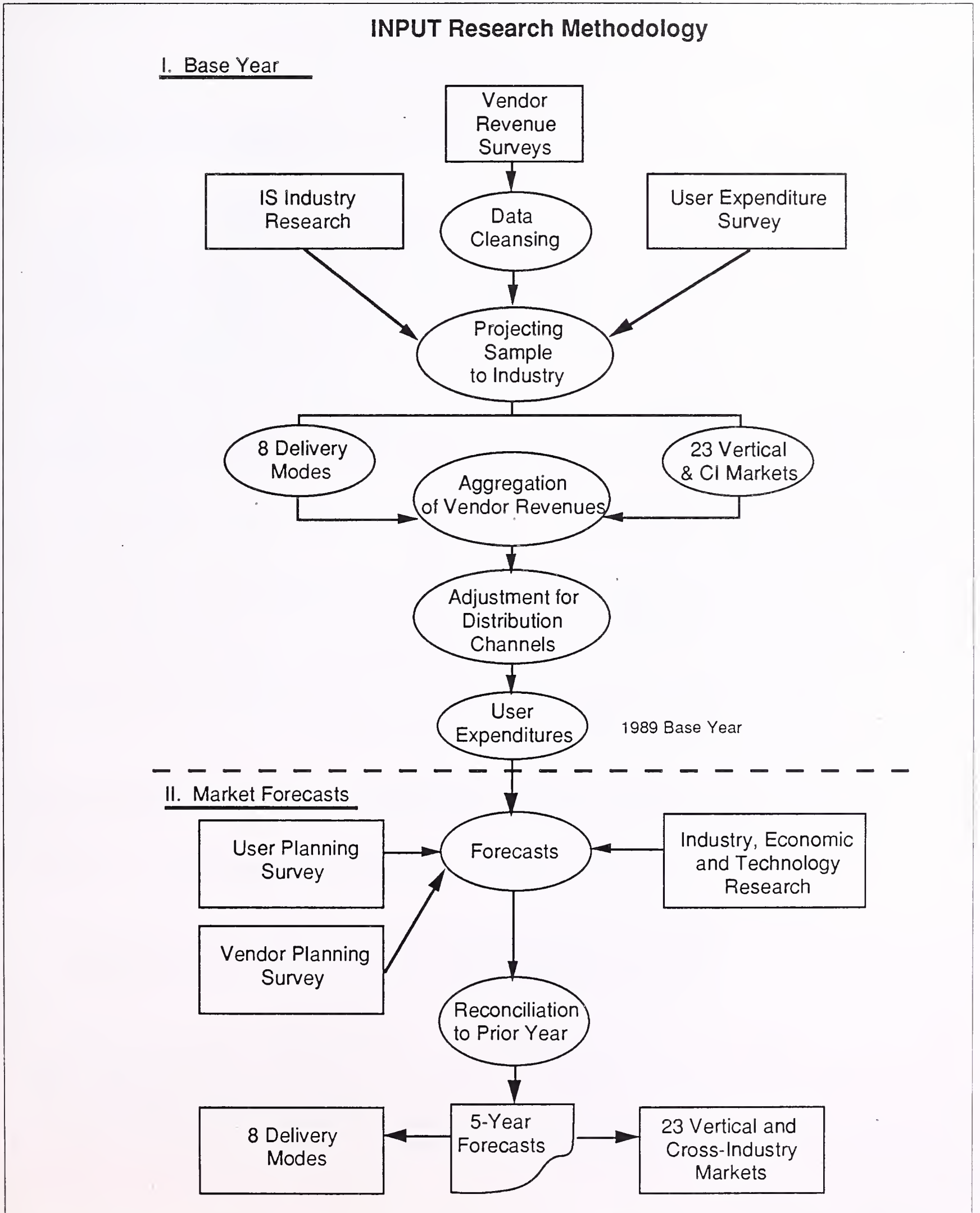
a. Base-Year Expenditure Calculations

- INPUT determines previous-year information services revenues for the eight delivery modes and 23 vertical and cross-industry sectors for hundreds of vendors. This is accomplished through interviews, use of public data and INPUT estimates.
- The initial data is projected to represent the entire information services market.
- Adjustments are made to eliminate duplications due to distribution channel overlap and to assure that captive information services expenditures are not included.
- The end result is a base year (in this case, 1989) user expenditure for each of the 23 vertical and cross-industry sectors and the eight delivery modes.

b. Market Forecasts

- In the forecasting step, INPUT surveys information systems executives to determine their projected expenditure levels, in aggregate and for each of the outside information services categories.
- In addition, a second set of vendor interviews is conducted later in the year to obtain an understanding of how key vendors view the market and its opportunities.
- The end result is a five-year forecast for each of the 23 vertical and cross-industry sectors and the eight delivery modes.

EXHIBIT I-3



To complete the process, INPUT reconciles its new forecasts with those from the previous year. Differences due to market restructuring and other causes are explained, giving users of these projections the ability to track INPUT's forecasts from year to year.

C

Economic Assumptions

Forecasts are presented in current dollars (i.e., 1995 market sizes are in 1995 dollars). In developing the five-year forecasts, INPUT has incorporated the following economic assumptions regarding the outlook for the U.S. economy as a whole.

The GNP and GNP Deflator growth rates used in INPUT's market projections for 1990 are from the CONSENSUS™ forecast of the Blue Chip Economic Indicators of Sedona, Arizona. The Blue Chip CONSENSUS forecast is derived from a panel of economists representing leading financial, industrial, and research firms across the U.S. and has a 13-year track record of balanced and accurate projections.

Exhibit I-4 provides the economic assumptions used by INPUT in its 1989-1994 market analysis reports and those being used for the 1990-1995 reports. The 1990-1995 assumptions compared to those used for 1989-1994 indicate:

- Significantly lower Real GNP growth for 1990 and 1991
- Stronger Real GNP growth for 1992 and beyond
- Inflation at somewhat lower levels using the 1990-1995 assumptions

The resulting Nominal GNP growth used by INPUT indicates much lower growth in 1990 (5.4% versus the projected 7.7% in the 1989 reports) and in 1991 (5.4% versus 7.8%).

- For 1992 and beyond, the Nominal GNP growth rates are comparable to those given in the 1989-1994 report.
- For the five-year period 1989-1994, the Nominal GNP is 6.2% versus the previous 7.1%.

In summary, the economic assumptions used by INPUT reflect significantly reduced growth in the near term, followed by modest, steady growth through 1995.

It should be noted that the U.S. economic environment has worsened since this CONSENSUS forecast was published in October, 1990. There are stronger signs of a recession in the first two to three quarters of 1991. The impact of a recession on the 1991 information services market is discussed in Chapters III and IV.

EXHIBIT I-4

GNP and Inflation Growth Rate Assumptions, 1989-1995

1989 Report Assumptions

Overall Economy	1989E	1990E	1991E	1992E	1993E	1994E	1995E	CAGR 89-94 (%)	CAGR 90-95 (%)
Nominal GNP	7.6	7.7	7.8	7.0	6.5	6.5	6.5	7.1	--
GNP Deflator	4.8	5.2	5.5	5.0	4.5	4.5	4.5	4.9	--
Real GNP	2.8	2.5	2.3	2.0	2.0	2.0	2.0	2.2	--

1990 Assumptions (Preliminary Estimate)

Overall Economy	1989A	1990E	1991E	1992E	1993E	1994E	1995E	CAGR 89-94 (%)	CAGR 90-95 (%)
Nominal GNP	6.7	5.4	5.4	6.8	6.8	6.8	6.5	6.2	6.5
GNP Deflator	4.1	4.4	4.6	4.1	4.0	4.0	3.9	4.2	4.1
Real GNP	2.5	1.0	0.8	2.6	2.7	2.7	2.5	1.8	2.2

Note: 1989A based on final figures reported by U.S. Commerce Department

1990 onward from CONSENSUS™ economic forecast reported by Blue Chip Economic Indicators, Sedona, AZ (Vol. 15, No. 10, October 10, 1990)

D

Related INPUT Reports

Related INPUT reports of possible interest to the reader include:

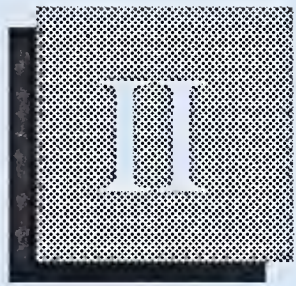
1. U.S. Markets

- *U.S. Processing Services Market, 1990-1995*
- *U.S. Professional Services Market, 1990-1995*
- *U.S. Systems Integration Market, 1990-1995*
- *U.S. Systems Operations Market, 1990-1995*
- *U.S. Network Services Market, 1990-1995*
- *U.S. Systems Software Products Market, 1990-1995*
- *U.S. Industry Sector Markets, 1990-1995* (16 reports on all major industry sectors—e.g., Insurance)
- *U.S. Cross-Industry Sector Markets, 1990-1995* (7 reports on information services markets that serve all vertical industry sectors—e.g., Accounting)

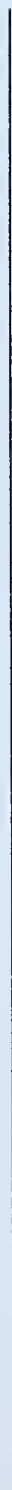
2. European Markets

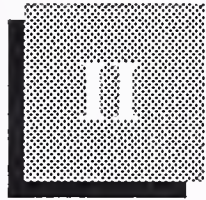
- *The Western European Market for Computer Software and Services, 1990-1995*
- *Western European Systems Software Products, 1990-1995*
- *Trends in Processing Services—Western Europe, 1990-1995*
- *Western European Systems Integration Market, 1990-1995*
- *Western European Systems Operations Market, 1990-1995*
- *Western European Network Services Market, 1990-1995*

The European markets are also analyzed on a vertical basis for discrete and process manufacturing, insurance, banking and finance, and retail and wholesale distribution.



Executive Overview





Executive Overview

Applications software products and turnkey systems are still in the early stages of a transition to application solutions that are:

- Integrated
- Easily customizable
- RDBMS-based
- Client-server-based
- Standards-based

These changes are being brought about not only by technology advances at the hardware and systems software levels, but also by user demands for information systems that provide data and information quickly and easily and at lower costs.

Application solutions include two delivery modes—applications software products and turnkey systems. Turnkey systems vendors are also moving from providing a fully bundled solution of hardware, software and services to providing applications software products and services only, with emphasis on value-added services such as systems integration and consulting. This transition is brought about by the continuing standardization of platforms, decreasing profit margins on hardware, and customers' desire to have multiple sources for hardware from which to choose.

Due to similarities between various vendors' hardware and software platforms, it is clearly application solutions, followed closely by related services, that has become the preeminent factor in the overall information systems purchase decision.

A**Information Services Market**

The information services market consists of eight delivery modes: turnkey systems, applications software, systems software, processing services, network services, professional services, systems operations, and systems integration.

In general, the market for information services does not involve providing equipment to users. The exception is where the equipment is bundled as part of an overall service offering such as a turnkey system, a systems operations contract, or a systems integration project.

The U.S. information services market totaled \$89.8 billion in 1989, up 17% from 1988 user expenditures. Overall user expenditures reached \$100.4 billion in 1990, up 12% from 1989. The modest growth rate of the U.S. information services market will continue, with a projected five-year (1990-1995) compound annual growth rate of 13%.

As INPUT publishes its first set of forecasts for the 1990s, the U.S. information services industry faces a different set of business conditions from those experienced since the early 1980s.

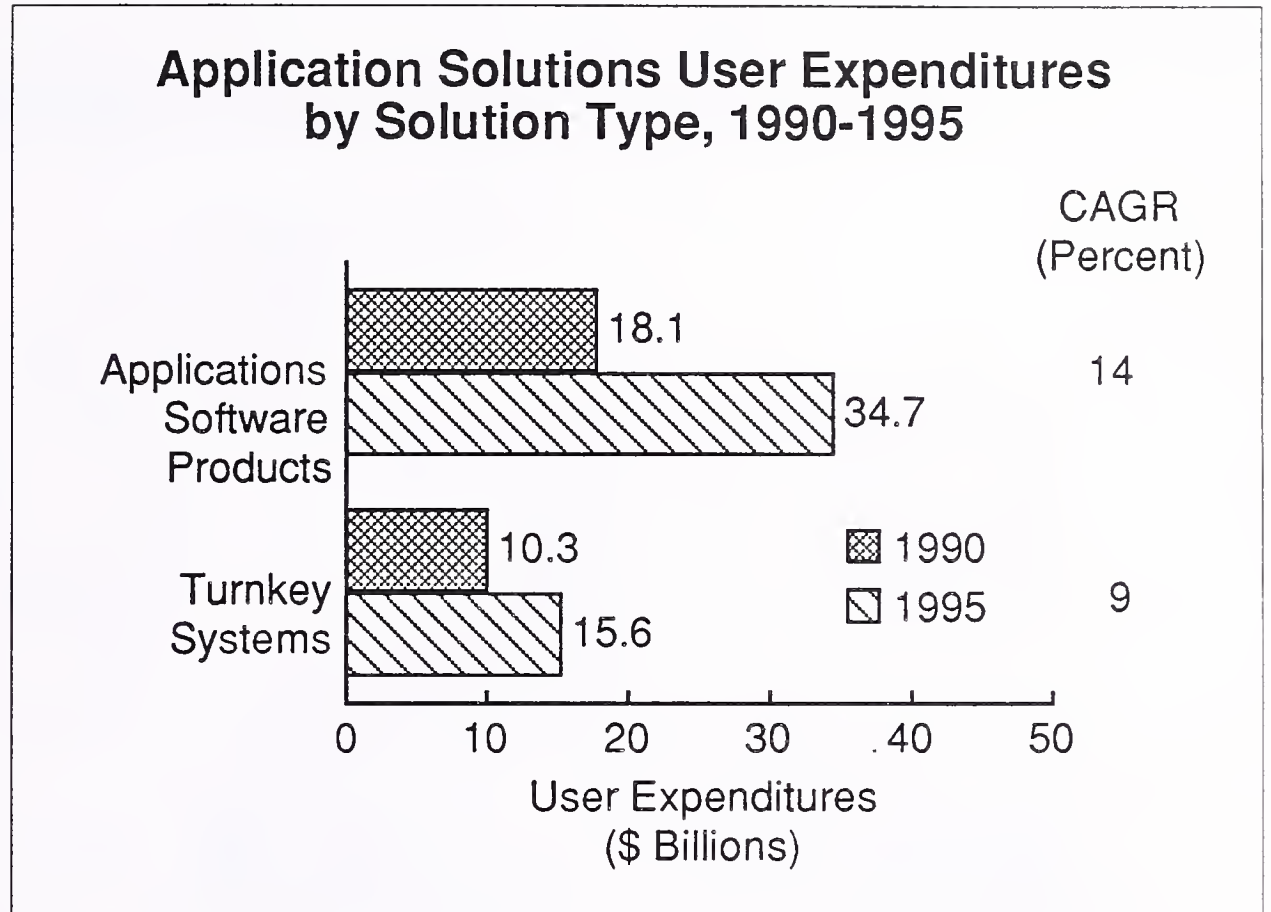
The 1980s were marked by continuing strong growth following the formation of the information services industry in the late 1960s and early 1970s. Except for slowed growth during the economic downturn that started in 1982, the information services market grew about 20% each year and routinely outperformed the economy as a whole. This overall growth has moderated in the past couple of years. In terms of development, the industry is maturing; in some segments it has reached the top of the "S" curve.

B**Application Solutions Market**

The applications software products market will closely parallel the growth of the information services industry as a whole; it will expand from \$18.1 billion in 1990 user expenditures to \$34.7 billion by 1995, a CAGR of 14%. Growth for turnkey systems, on the other hand, will be markedly lower, expanding from \$10.3 billion to \$15.6 billion in 1995, a CAGR of 9%. These figures are shown in Exhibit II-1.

The applications software products market has felt few if any effects of a slowed economy. The fact that hardware sales will slow further in the short term due to the economy is offset by pressure on profits at end-user organizations; expensive in-house development projects are put on hold, thus enhancing the possibility for additional external purchases of applications software products. Turnkey systems vendors, on the other hand, are experiencing moderately adverse effects from the slowed economy, principally because of slower hardware sales but also because a significant part of their customer base—manufacturing industry sectors and small companies—is feeling adverse effects from the slowdown.

EXHIBIT II-1

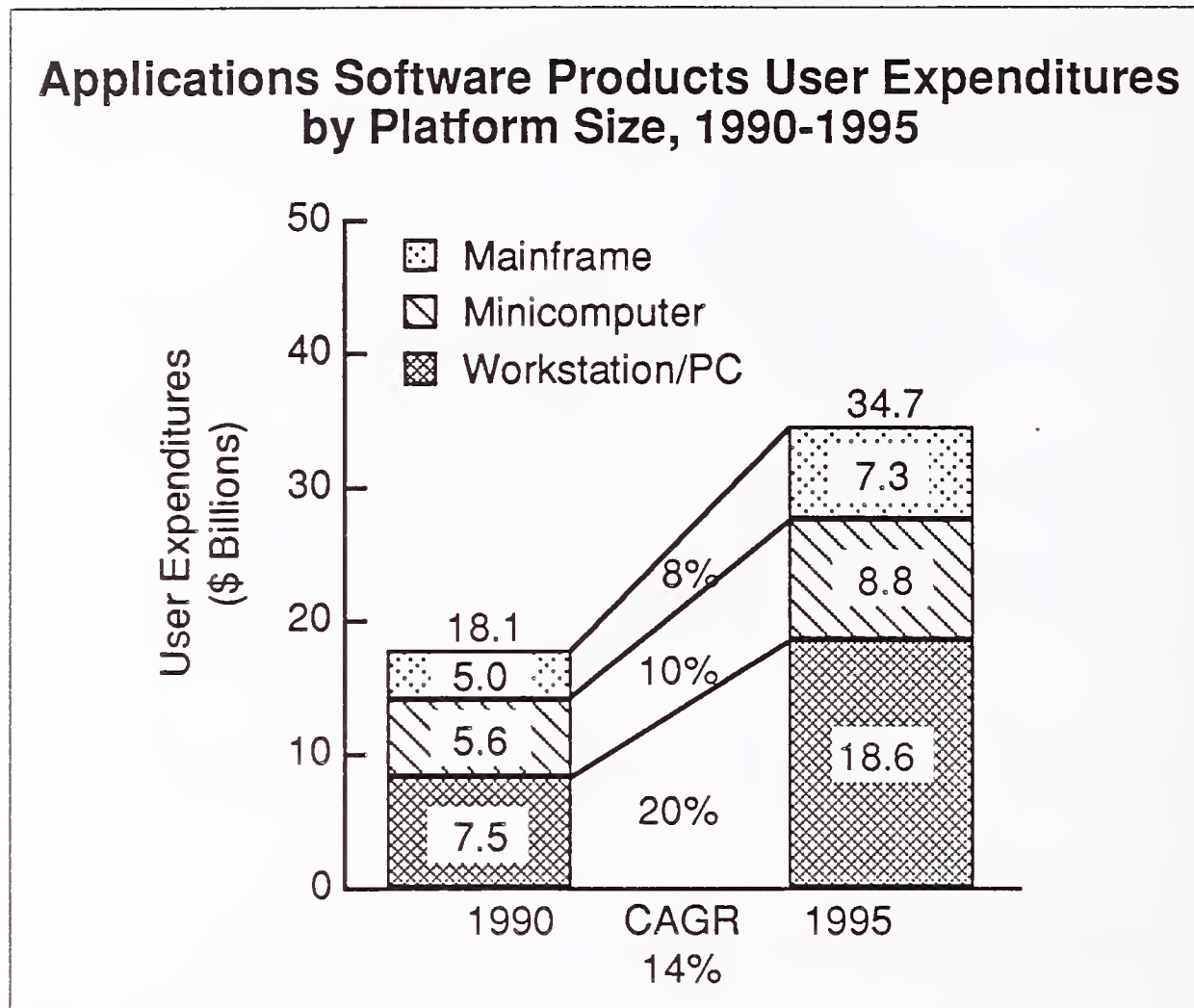


In addition to the economy, other forces impacting growth in application solutions markets include:

- Growth in computer shipments, which will continue to fuel application solutions growth—albeit at a slower rate—over the next five years.
- A trend towards standards-compliant applications software. Even though an aggressive effort towards standards on the part of the large computer systems and software vendors will drive the market, in the short term standards will be a growth inhibitor for application solutions. Porting application solutions over to standards is expensive and time consuming.
- The product transition to client-server architectures will also be a growth inhibitor in the short term. Client-server products will represent a strong growth opportunity beginning in 1993 for both applications software and turnkey vendors/VARs.
- Increasing availability and use of application development tools not only enhance application solutions vendors' internal development efforts but also provide new products for resale to end users.

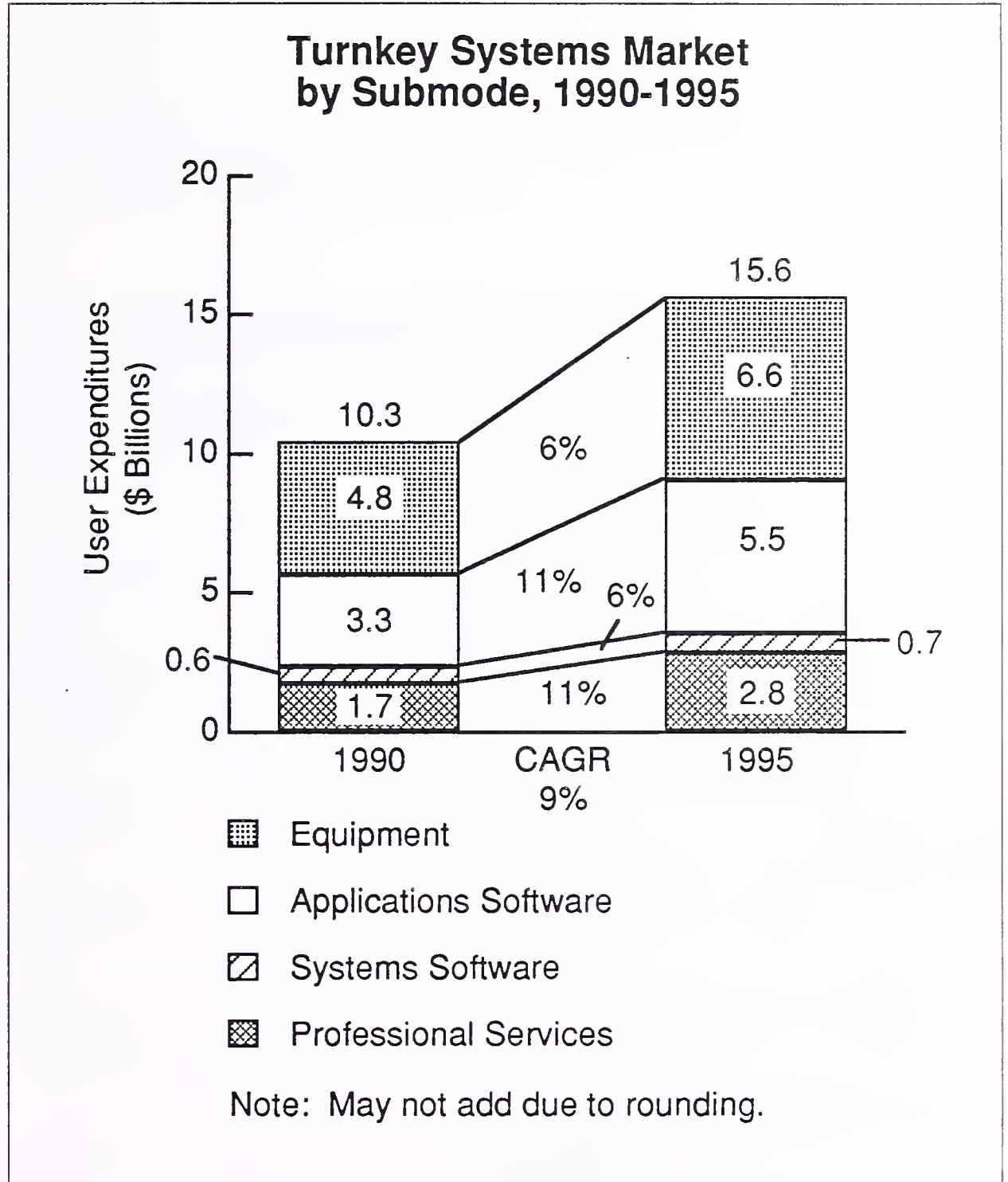
The greatest growth for applications software products will be at the workstation/PC level, as shown in Exhibit II-2. By 1995, user expenditures on applications software products for workstations and personal computers will reach \$18.6 billion, more than the combined total for mainframe and minicomputer-based applications software products.

EXHIBIT II-2



INPUT divides turnkey systems into four submodes. These are equipment, applications software products, systems software, and professional services. As shown in Exhibit II-3, user expenditure on equipment is increasing slowly, and hardware will continue to decline as a portion of overall turnkey systems expenditures; applications software products and professional services are growing as a percentage of the total turnkey market.

EXHIBIT II-3



The fastest growing industry-specific (vertical) market for both applications software products and turnkey systems is telecommunications, as shown in Exhibits II-4 and II-5. Telecommunications applications have traditionally been developed internally. Since deregulation, however, telecommunications companies are looking increasingly to outside providers. The slowest growing industry-specific markets for applications software are miscellaneous industries (agriculture and construction), transportation, and education. For turnkey systems, the slowest growing markets are medical, federal government, and insurance. As shown in Exhibits II-6 and II-7, the fastest growing cross-industry (multi-industry or horizontal) market for both delivery modes is education and training.

EXHIBIT II-4

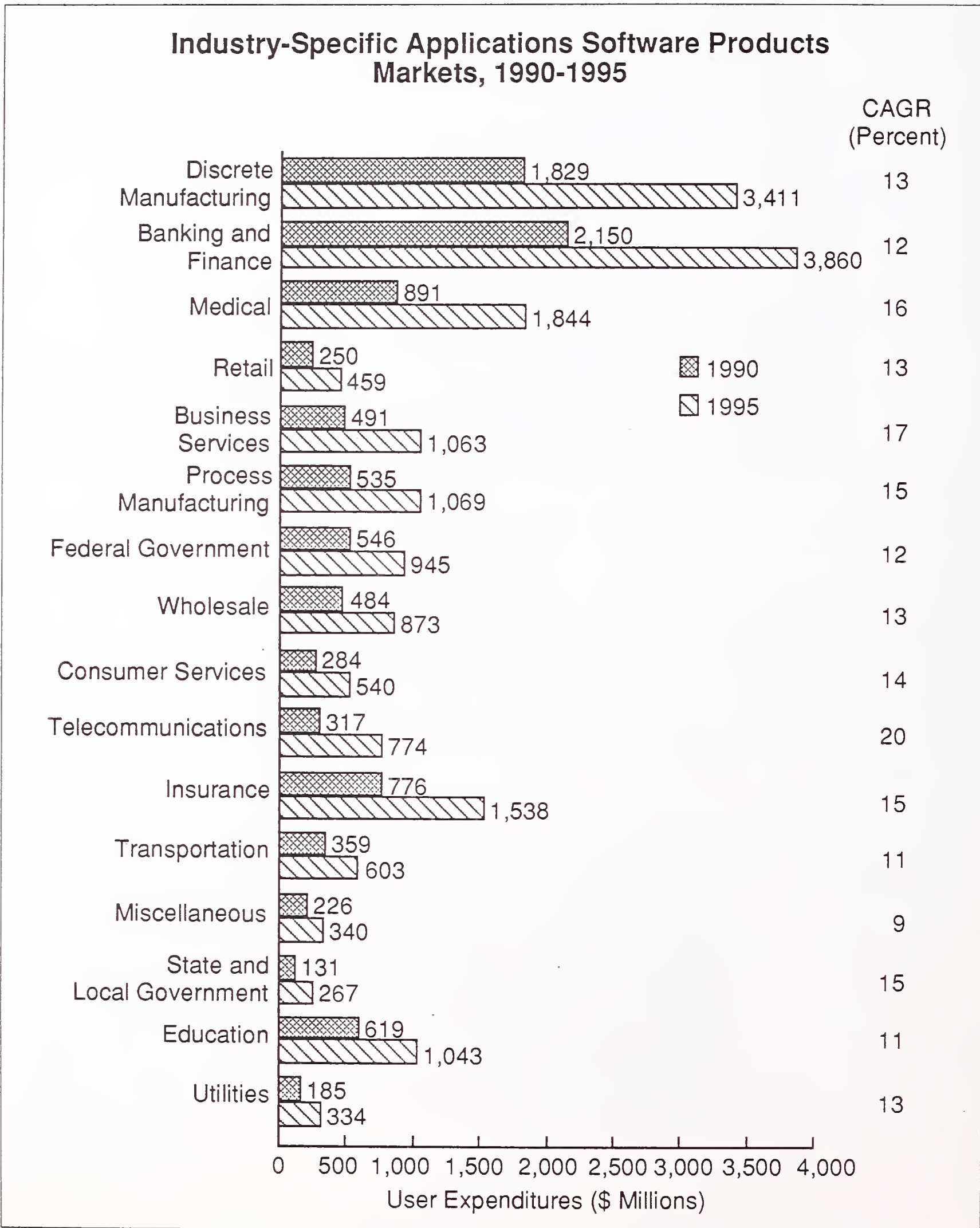


EXHIBIT II-5

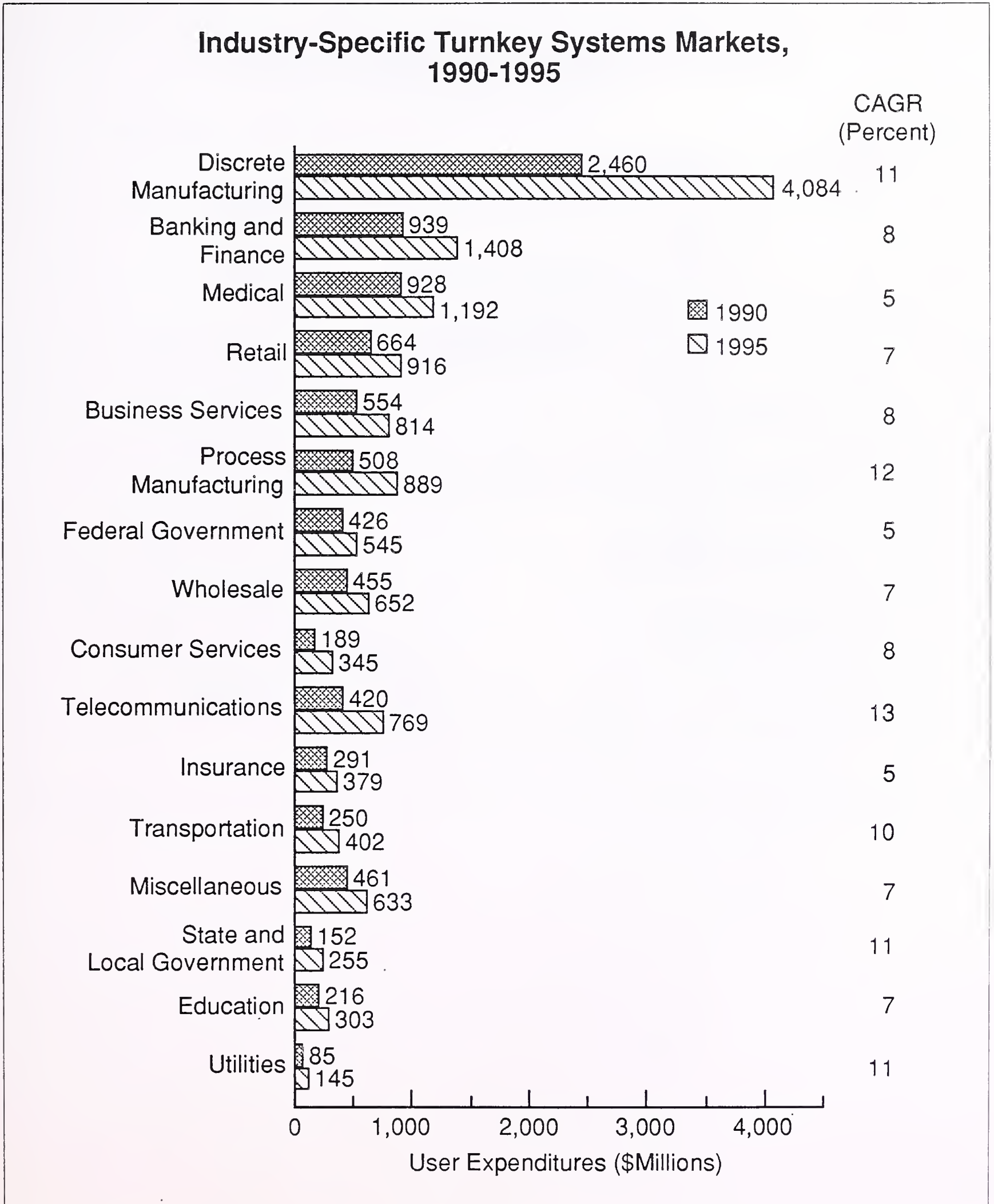


EXHIBIT II-6

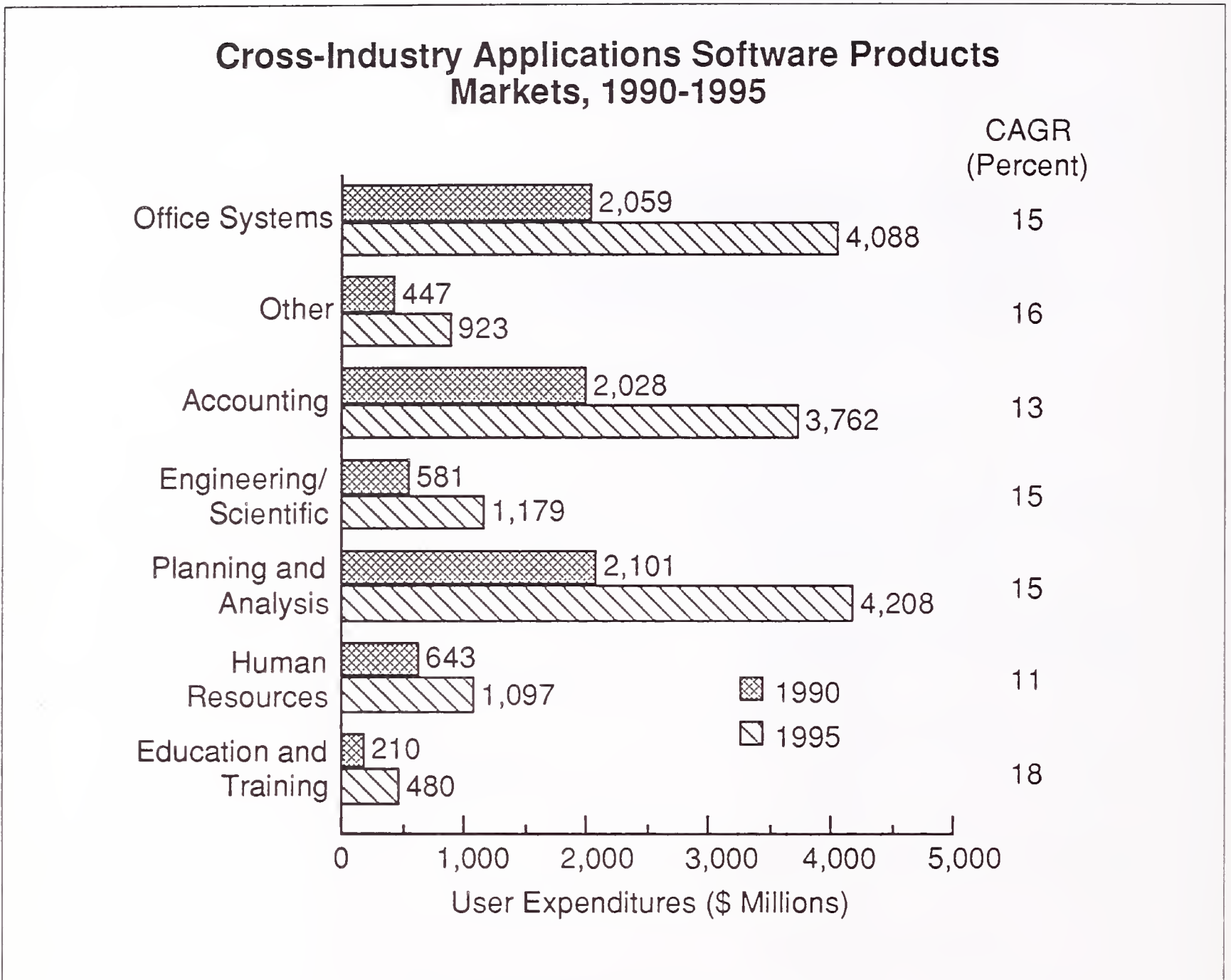
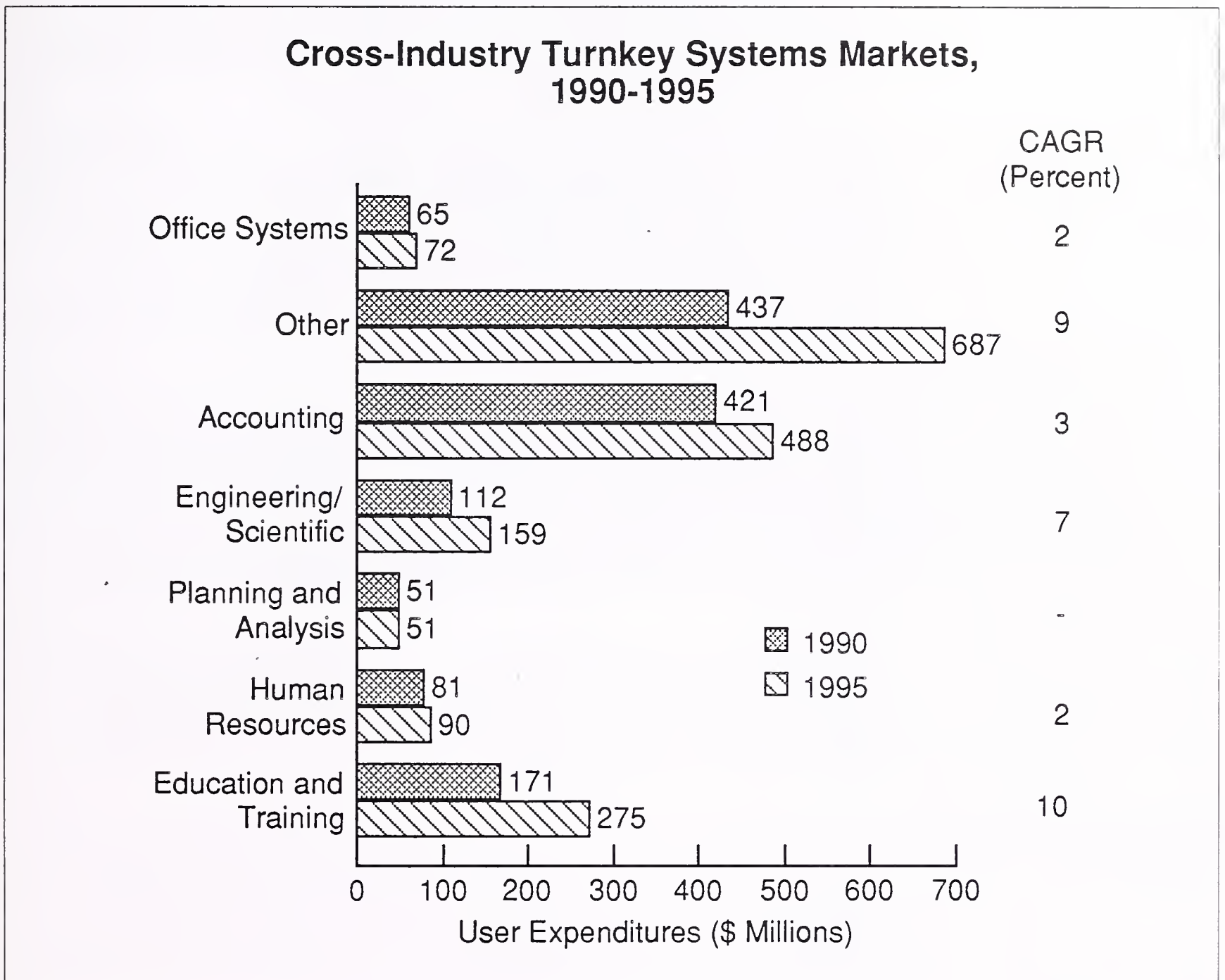


EXHIBIT II-7



C

Key Issues and Trends Because the complexity of software development is increasing and development backlogs are also increasing, there is a growing inclination for user organizations to purchase at least part of the application solution rather than develop it from scratch. A fundamental issue remains whether the application solution can be easily modified to meet specific needs. Hence the interest on the part of application solution vendors to incorporate and sell application development tools.

Integration has become a key application solution requirement. Because integration involves multiple operating units, various users and operating executives now become involved in application solution expenditure decisions. Thus the sales cycle is longer. Vendors are beginning to create strategies and organizations to assist in customers' integration efforts and to change the sales approach from a tactical to a more strategic one.

Due to increasing complexity and levels of integration, customers seek a single point of contact with vendors. This single point of contact could be a systems integrator, a systems operations company, an applications software products company, a hardware vendor, a turnkey systems vendor/VAR, or a professional services firm. Thus, needless to say, the competitive environment and distribution channels are complex and interwoven.

Alliances are extremely important for a successful customer interface. Alliances are necessary not only due to complexity and integration aspects, but also to support applications software development and to obtain greater marketing exposure.

D**Competition**

The shift in emphasis to integration, overall lack of funds for development and expansion, the migration to standards, and the need in the marketplace to eliminate redundancies are the fundamental reasons a broadscale industrywide consolidation will continue during the forecast period.

Until recently, a key way for vendors to expand was to develop or purchase additional platform offerings. Companies that have expanded by acquiring other firms that support other platforms, or by expanding their own development efforts into other platforms are limited in what they can develop for each platform. They have had to grapple with the question of which is more important—breadth or depth. This question will become less strategic as standards set in. Thus, the reasons for acquiring are changing.

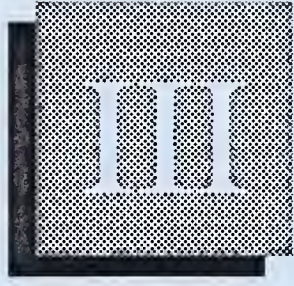
The top four applications software vendors combined have only an 11% share of this highly fragmented market, and the top six turnkey systems vendors have a 17% share of the turnkey market. Both markets consist of thousands of vendors, with only a modest number having annual revenues over \$10 million.

E

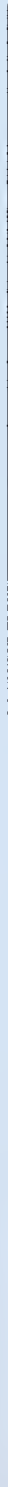
Conclusions

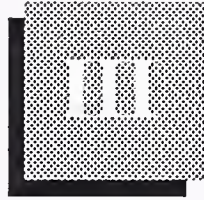
The growth rate of user expenditures on applications software products was 23% for the period 1985-1989, and the growth rate for turnkey systems for the same period was 11%. The next five-year period (1990-1995) will witness a slower growth rate for both delivery modes—14% for applications software products and 9% for turnkey systems.

This slowed growth is due in large part to the transition to standards, open systems, and client-server architectures, as applications solutions begin to be developed that run on these new platforms. Of concern to vendors is how quickly the market will adopt the new technologies and therefore the new solutions upon which they are built. New buying patterns are developing and more people are involved in the decision-making process. In the meantime, the forecast period will be one of a difficult selling environment until the new technologies are more entrenched.



General Business Climate





General Business Climate

In this chapter, INPUT positions the markets for applications software products and turnkey systems within the overall information services industry. The chapter first characterizes the general business climate, then the issues and climate of the information services industry as a whole. In the last section, it positions applications software products and turnkey systems within the overall business climate for information services.

The reader will find this chapter quite similar to Chapter III in the following market analysis reports.

- *U.S. Systems Software Products Market, 1990-1995*
- *U.S. Processing Services Market, 1990-1995*
- *U.S. Professional Services Market, 1990-1995*
- *U.S. Network Services Market, 1990-1995*

A

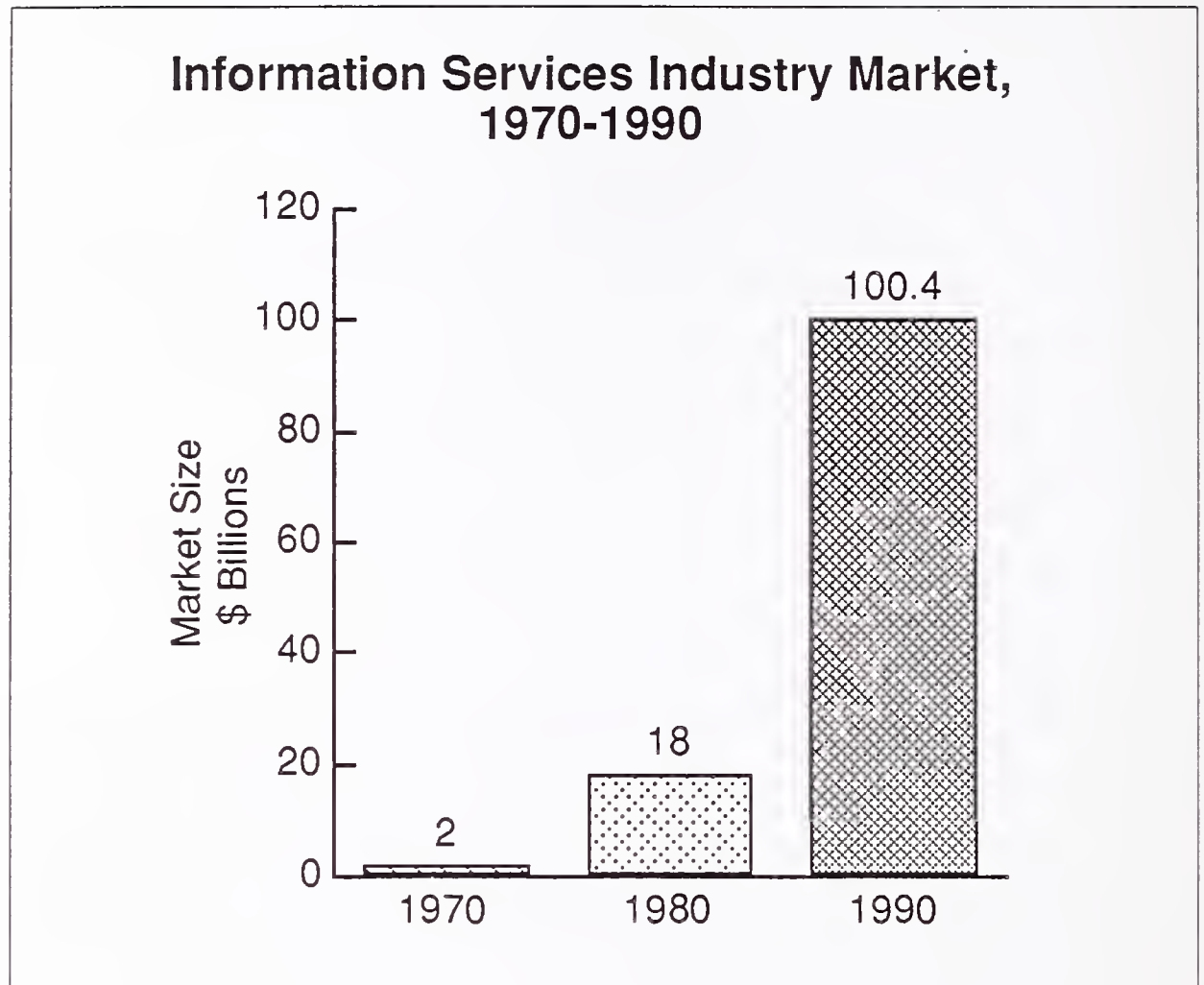
General Economic Climate

1. A Look at the 1980s

As INPUT publishes its first set of forecasts for the 1990s, the general U.S. economy and the U.S. information services industry face a new set of business conditions, different from those experienced since early in the 1980s when the last downturn in the economy occurred. As shown in Exhibit III-1, in 1980 the U.S. information services market was less than 20% of its size 10 years later. Today, that market represents approximately \$100 billion in user expenditures each year.

The 1980s were marked by continuing strong growth following the formation of the information services industry in the late 1960s and early 1970s. Except for slowed growth during the downturn that started in 1982, the information services market grew at about 20% each year and routinely outperformed the economy as a whole.

EXHIBIT III-1



This overall growth has become more moderate in the past couple of years, with the U.S. information services industry growing about 12% in 1990 as the impacts of the downturn begin to be felt. In terms of development, the industry is maturing; in some segments, it has reached the top of the "S" curve. Thus, declining growth rates are to be expected, in particular as the market size continues to increase.

The decade ended with much lower growth rates in mainframe and minicomputer shipments and the first signs of some maturity in personal computer and workstation sales. Although all of the delivery modes included in INPUT's definition of the information services industry continue to have growth rates above that of hardware, the trends for hardware certainly impact each delivery mode.

Thus we enter the 1990s with a maturing market for the products and services of information systems and services companies. Yet it remains a market that can and does outgrow the economy and continues to offer new business opportunities, in particular those containing a high degree of professional service content.

2. Near-Term Impacts

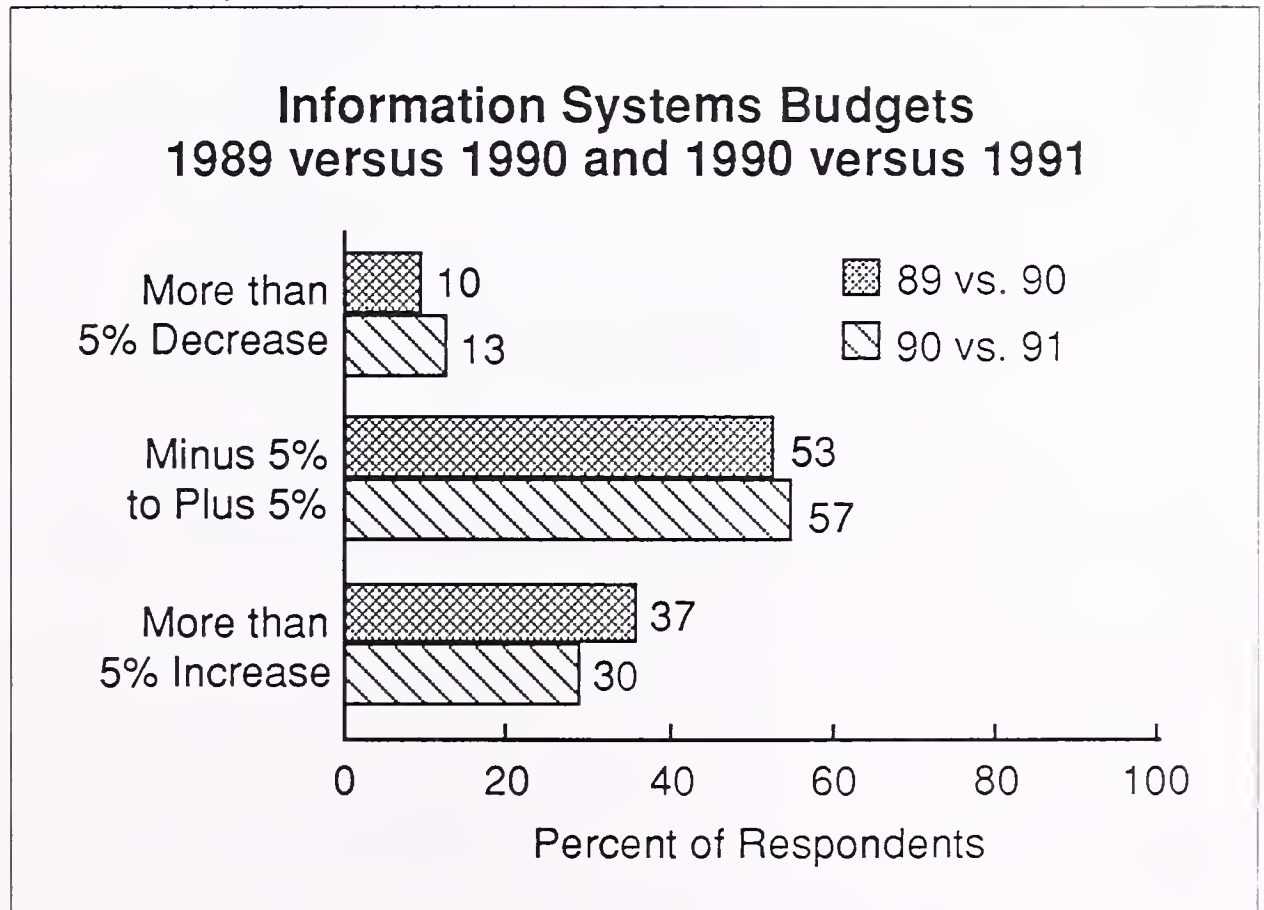
As noted in Chapter I, the U.S. economy is in or close to entering a recessionary period. Though expected to be modest, a recession will directly impact many sectors of the economy, which in turn will impact expenditures for information services. Real growth in the overall U.S. economy will be very small in 1990 and could drop to zero in 1991.

- For the past few years the information systems budget has reflected tightening spending patterns, with increases averaging less than 10% overall. Many organizations indicate essentially no change from year to year, and individual organizations are undergoing year-to-year reductions of greater than 10%.
- During this period, growth in expenditures for information services has exceeded the overall growth in information systems budgets. The hardware and internal staff budgets have absorbed much of the impact of tighter budgets.

a. Information Systems User Impacts

Exhibit III-2 gives an assessment of information systems budget plans for 1989 through 1991. The research for this assessment was done in November, 1990.

EXHIBIT III-2

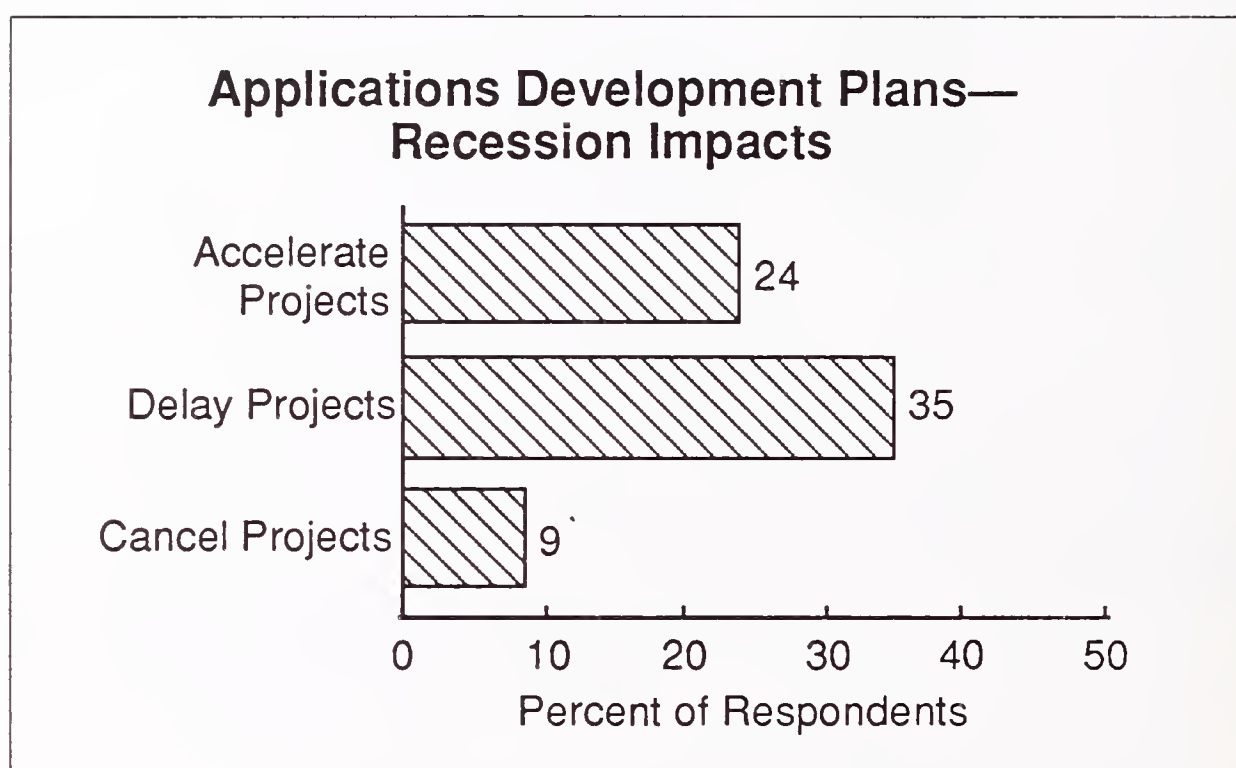


- The findings indicate that in 1990 only about one in three information systems budgets grew by over 5% over 1989 levels, and the percentage planning to grow more than 5% in 1991 is even less—three out of ten.
- At the same time, the research found that drastic cuts are not planned, as might have been expected in a fully recessionary environment.

Many respondents indicated that after a number of years of tightening budgets, 1991 would just be another year of the same. For most organizations, major strategic projects would not be measurably impacted, given current general business projections.

Exhibit III-3 shows information that supports that belief. INPUT found a number of organizations that would actually accelerate some projects in a recessionary economy, and very few that would cancel projects.

EXHIBIT III-3



- Projects that would be accelerated were typically of key value to business operations.
- Projects that would be possibly delayed or cancelled were typically administrative, and often were replacements for existing systems.

INPUT found that the current economy will impact information systems spending in the near term (through 1991 at least), but not to a significant degree. However, the trend is toward slowing growth in overall information services expenditures over the next 12 to 18 months, which may in turn create pent-up demand for 1992 and beyond. The depth and length of the downturn will be a deciding factor in how much demand is delayed until 1992.

For a complete review of INPUT's recent research into the impact of the current economy on information systems, see INPUT's report, *The 1990 to 1991 U.S. Economic Slowdown—Impacts on Information Systems Budgets and Spending*.

b. Information Services Vendor Impacts

In corresponding research with information services vendors to assess the near-term impacts on information services vendors, INPUT found definite signs of caution. The near-term effects of a recession on the information services industry are summarized in Exhibit III-4.

EXHIBIT III-4

Information Services Industry Near-Term Economic Impacts

- General belief that recession started
- Near-term growth will be impacted
 - Professional services first to be impacted
 - Processing services and systems operations—limited impact
 - Network services to see slower growth
- Some new opportunities exist
 - Project acceleration
 - Processing capacity requirements
 - Systems operations

- There was a general belief, in particular in the professional, processing and network services firms, that a recession had started as early as the third quarter. A number of vendors indicated that they were applying or considering applying internal budgetary constraints.
- Projections for near-term growth (1991) are more modest, reflecting 1990 experience.
 - Professional services will be the first sector impacted, with growth expectations dropping to perhaps 10%. Information systems will try to protect internal staff, given the reductions experienced over the past few years.

- Processing services and systems operations tend to be long-term decisions. Business levels of processing services are tied to client usage agreements and will not experience significant cutbacks. And an opportunity exists in the sale of incremental capacity to companies wishing to delay hardware expenditures.
- Network services has been a strong growth area, with forecasted growth at or about 20% per year. Some slowing is expected in the near term, but this sector will still outgrow the information services market as a whole.
- The downturn offers opportunities to aggressive vendors. To find them it is necessary to stay very close to the current clients and to know secondary buyers within the prospects.
 - Critical operational systems may get accelerated, creating opportunities for professional services and software products vendors. Buying a suitable application software solution may become favored over developing a custom solution.
 - As noted above, the solution to capacity needs may be a processing services vendor instead of hardware purchases.
 - Systems operation will become more attractive to companies looking for capital to invest in newer, more strategic application systems.

The next twelve to eighteen months will be characterized by the unexpected—delayed decisions and unique opportunities. Solid growth is possible to the alert vendor.

c. The Mid-1990s

Beyond the 1990 to mid-1992 period, there is a general belief that the economy will return to modest growth like that of the late 1980s. Modest real growth rates, combined with inflation and the ability for information services to continue to outgrow the economy as a whole, suggest that annual average growth rates in the low to mid teens will continue throughout the forecast period. Growth after 1992 will be stronger than that prior to 1992.

3. Other General Business Trends

Large manufacturing and services companies are becoming more international in scope. The slowing growth in demand for goods and services in the U.S. will fuel the need for U.S. companies, including information services companies, to look to global markets for opportunities as the decade progresses.

Over the last several years, consolidation of mid-sized to large firms has taken place in almost all industry sectors. Mergers or acquisitions are means of expanding and developing needed skills, especially with regard to expansion abroad. More than 3,000 deals, collectively valued at more than \$2.3 trillion, were made during the 1980s. Mergers and acquisitions were at the forefront of globalization as well, with an upsurge in foreign acquisitions of U.S. companies. Consolidation is expected to continue through the 1990s. With consolidation come increasingly complex information services needs and the requirement for integration services in particular.

A transition is underway in the U.S.—from an industrial to a service-oriented economy. Reasons for this trend are:

- Big businesses are increasingly using outside services in order to contain costs and maintain flexibility.
- The number of small companies is growing; small companies do not have a full spectrum of internal resources or know-how.
- More expertise—that companies do not need on a full-time basis—is required as the world becomes more complex.

This transition bodes well for the services aspect of information services, including systems operations, systems integration and professional services.

As organizations assume flatter structures, executives and managers need to deal with a lower level of information and a broader information base. At the same time, senior executives have more responsibilities because there are fewer middle managers. This process encourages the use of, and is enabled by, many of the information services.

As the 1990s begin, the fast pace of change with regard to technologies, products and markets, the competitive environment, organizational structures and entire industries creates a business environment where companies and individuals need to work effectively with chaos and adjust directions quickly. To adjust quickly, decisions need to be made quickly.

These developments, outlined in Exhibit III-5, will drive the need for efficiency in the use of information services resources.

EXHIBIT III-5

Other Key Business Trends

- Globalization
- Consolidation
- Trend toward a service economy
- Flatter organizational structures
- Quickening pace of change

B

Information Services Industry Issues and Climate

1. Overview

The information services industry ended the decade much differently than it began the decade. Exhibit III-6 lists some of the major differences and the related implications for the early 1990s.

EXHIBIT III-6

Information Services Industry 1980 versus 1990

Difference	Implication
Five times as big	Slowing growth
Many large vendors	Consolidation and dominance
Stronger vendors	Greater reliance by user
Greater variety of services	Changing distribution channels
Many, many small vendors	Need alliances to succeed
More technological alternatives	Slower user implementation

- Markets do not grow at 20% forever. On average, information services did so for the entire 1980 decade. Overall slower growth is predictable for the 1990s.
- In 1980 there may not have been an independent software supplier that had \$100 million in revenues worldwide; in 1990, there are many, with \$1 billion a near-term goal for the largest. The same can be said for professional services firms.
 - For some, growth is being fueled through mergers and acquisitions.
 - For others, diversification and a strong element of professional services is driving growth.
- The leading information services vendors are much stronger than they were in the early 1980s. They are large, have financial strength, and have management that is prepared to take long-term risks. The result is new market opportunities and a different perspective for the user.
- The end of the 1980s was marked by some significant shifts in the structure of the information services industry. Systems integration emerged as a viable business in the commercial market and the concept of facilities management (systems operations) took on new importance. These changes mark a change in the economy of scale in offering information services and, as a result, a change in the fundamental channels of distribution. The user can now turn to a single vendor for a complete solution, and the vendors offering these services become customers (distributors) of other information services vendors.
- The information services industry has been one in which the initial cost of entry has been modest, in many of the subsectors. Software companies show up overnight, professional services firms were started with a few experts joining together, and most processing services firms started by large organizations selling surplus time. Low cost of entry remains a characteristic; however, the cost of gaining market recognition and presence has changed. Success in the 1990s for the start-up will come through alliances with larger firms, whether systems integrators, professional services or software firms.
- Information systems' greatest challenge today, after maintaining the current systems, is to choose from the breadth of information technology now available. The alternatives are numerous and the implications of some are significant. The result is often delayed decisions and implementation. Relational DBMS technology is about ten years old, but much of the implementation effort is still ahead for information systems. Object-oriented data base technology is already available. The result is greater professional services opportunities.

2. Information Services Trends

Exhibit III-7 identifies four fundamental trends that will affect the information services industry over the next five to ten years. The overall goal of account/client control will become paramount in the 1990s. It is the primary driving force behind these trends.

EXHIBIT III-7

Information Services Industry Key Trends for the 1990s

- Full-service vendors
- Decreasing differentiation
- Longer vendor/account relationships
- Changing buyer

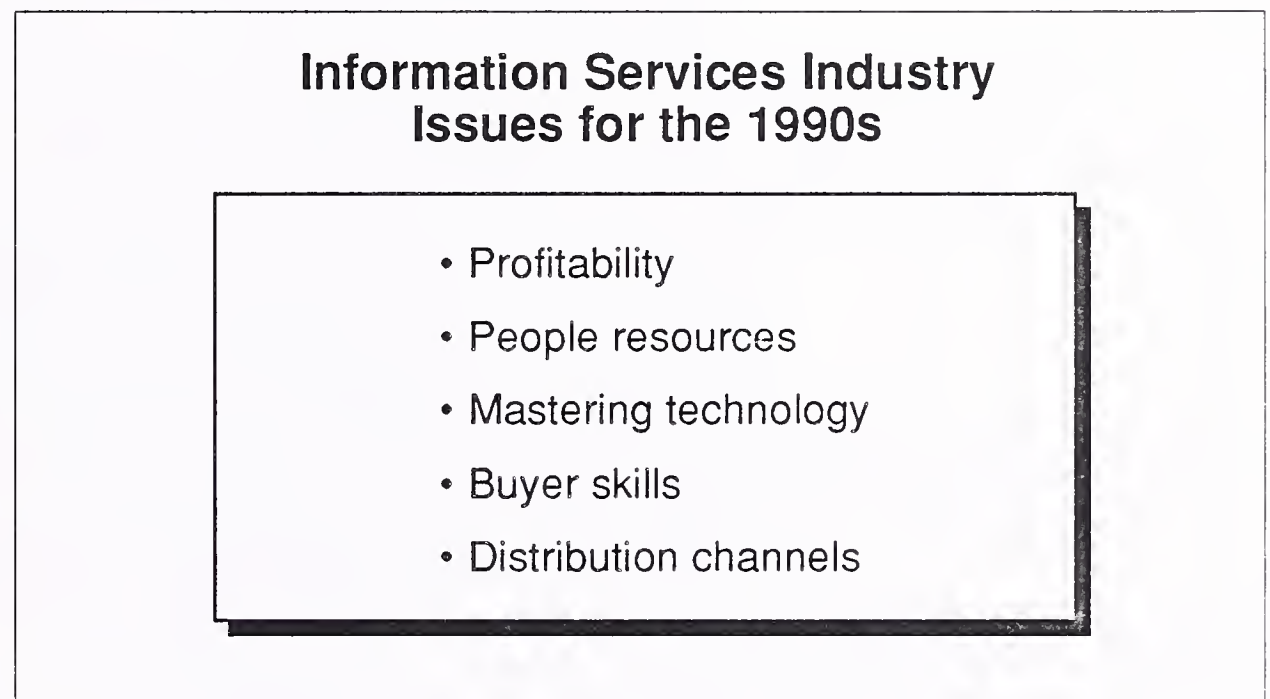
- Full-service vendors will increase their dominance of the information services market. They will achieve increased account control and will become the channel of distribution for many of the specialized products firms. They will do this to a significant degree through consolidation. A maturing market typically results in fewer and larger vendors that serve all aspects of the market.
- Decreasing differentiation - Professional services is now a factor in each of the delivery modes, whether software products, systems operations, systems integration, or even processing and network services. That importance will continue to increase throughout the next five years. The end result will be decreasing differentiation of the leading vendors.
- Longer vendor/account relationships - The relationships formed in systems integration and systems operations agreements are multiyear in their orientation and once made, these become the vendors of choice for the next requirement. Applications software products vendors have enjoyed long relationships as well. As many organizations shift to relational-based application products, that relationship will be extended for another ten-year period.
- Changing buyer - The buyer is now commonly a partnership between information systems and an operating executive—certainly for major projects. The result is two buyers to be serviced and the opportunity for the vendor to build relationships in multiple parts of the client. This will also lead to increased client control and longer relationships.

In the 1990s, the major vendors have the opportunity to tie up major portions of the market for multiyear periods. This brings up a number of new issues, but means there is improved predictability of revenue in a service industry.

3. Issues for The 1990s

The critical issues for information services vendors in the 1990s are summarized in Exhibit III-8. Many of these issues derive from the current emphasis on account control by the leading vendors.

EXHIBIT III-8



- **Profitability** - The shift to long-term relationships with multiyear agreements and the assumption of risk by the vendor increases the exposure for the vendor. There are already some concerns about the impacts of commercial systems integration on the profitability of larger information services firms. And with the push to gain market share in the systems operations area, this concern could grow. Profitability over the next two years will be a key indicator of probable growth in the mid-1990s as the economy improves.
- **People Resources** - The increasing importance of professional services increases the pressure on vendors to find and train the professional staffs. Companies such as Andersen Consulting and EDS have been and will be growing quickly.
 - Many of these professionals are being acquired by hiring the staffs of the companies served under systems integration and systems operations agreements. The need to reorient these people from internal to vendor perspectives will be a major test over the next few years.

- The vendor staffing challenge will also be taxed by the training requirements of new technologies and the decline in college enrollment in computer science. The cost burden for training information systems professionals is shifting from the user to the vendor.
- Mastering Technology - The developers of information technology continue to provide new solutions faster than the problems can be attacked or recognized. This is one of the forces behind the growth in the systems integration and professional services delivery modes.
 - The vendor takes on the task of learning the technology and bringing it into the client's environment, and perhaps even operating and maintaining it for some period.
 - Like the general training issues, the cost of technological problems cannot always be directly recovered by the vendor.
- Buyer Skills - The influence of the buyer, at the senior management level, will continue to increase into the 1990s. Information systems will continue to be used for internal consulting. At the same time, buyer skills will be increasing at the lower levels as buyers move to integrated, cooperative/LAN-based environments.
 - The vendor must become astute at assessing the skills of the buyer at all levels—for it is the users' skills, not the skills of information systems, that will control success.
 - Vendors are now exposing themselves to the pitfalls that information systems suffered during the 1970s and 1980s.
- Distribution Channels - The larger vendors are going to gain even more control of the user expenditure process, while smaller, specialized vendors serve as vendors to the larger vendors.
 - The behavior of the larger vendors and their multiple, often overlapping strategic alliances may control the success of many of the smaller vendors.

C

Applications Software Products and Turnkey Systems—Business Issues and Trends

In this section the applications software products and turnkey systems sectors are positioned against the economic and environmental conditions described above. This sets the stage for INPUT's 1990-1995 forecast for applications software products and turnkey systems presented in Chapter IV.

Three fundamental forces drive the applications software products and turnkey systems markets: the economy and its impacts on information systems spending, shipments of computer hardware, and the application development technology that is used to create application solutions.

1. The Economy

The current economic slowdown will develop countervailing forces on applications software products and turnkey systems vendors. On one hand, information systems expenditures will be under increased pressure, but at the same time, the pressure to meet systems requirements may increase.

Increased pressure to meet needs will be a positive force; as users struggle to meet needs, their willingness to turn to outside sources will increase. Applications software and turnkey solutions become excellent alternatives when response time is reduced and internal resources are constrained.

2. Hardware Shipments

The declining growth in mainframe and minicomputer shipments and slowing growth in PC/workstation shipments are slowing the market for applications software products and, in particular, turnkey systems.

A greater impact may prove to be the shift from mainframe and minicomputer computing to PC/workstation computing. The result is a shift in the underlying technology used to develop and operate application solutions. As the preference shifts, there is a requirement for the applications software product developer to re-engineer the products to operate on a new type of computer. The re-engineering process just for the platform is a significant investment and growth inhibitor.

3. Application Development Technology

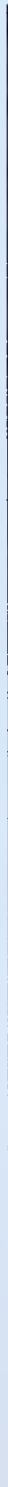
As with the shift in hardware platforms, a shift in the application development technology in use is also affecting growth of the application solutions markets. Systems software vendors have convinced users that CASE, graphical user interfaces, relational data base management and standards are all required in the application systems of the 1990s. The result is significant pressure on the vendors of such products to re-engineer, while the user tends to defer purchase decisions and continues to use the current older technology systems.

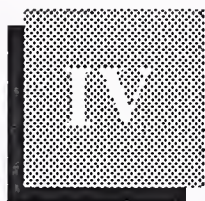
The applications software products and turnkey systems markets will begin to benefit from the re-engineering effort just before the middle of the 1990-1995 period.

In spite of these general business issues, which are explored in greater detail in other sections of this report (as Chapter IV shows), the applications software products and turnkey systems sectors will follow the information services market in general. Growth will be reasonably strong, perhaps slightly higher than for the industry as a whole.



Market Forecast





Market Forecast

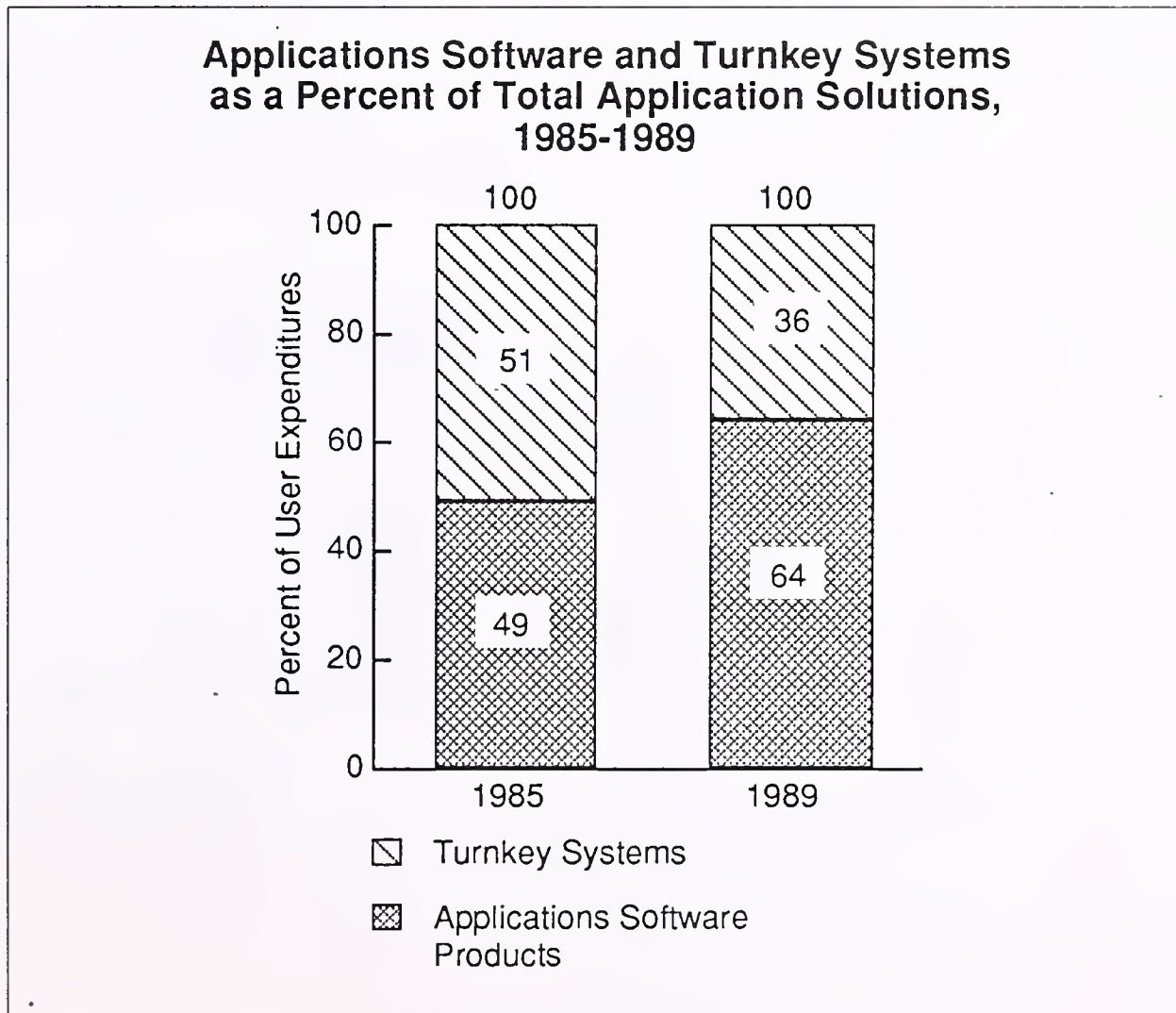
A

Market Overview

1. Historical Perspective

User expenditures on applications software products reached \$16.2 billion in 1989 (a five-year CAGR of 23%) and user expenditures on turnkey systems reached \$9.5 billion in 1989. As shown in Exhibit IV-1, though turnkey systems once accounted for over half of total user expenditures for these two delivery modes, turnkey systems' share had declined to 37% by 1989. The two key reasons for turnkey systems' decline are decreasing hardware prices and the exit of turnkey vendors from the hardware business altogether as they become vendors of applications software only.

EXHIBIT IV-1



2. Forecasts

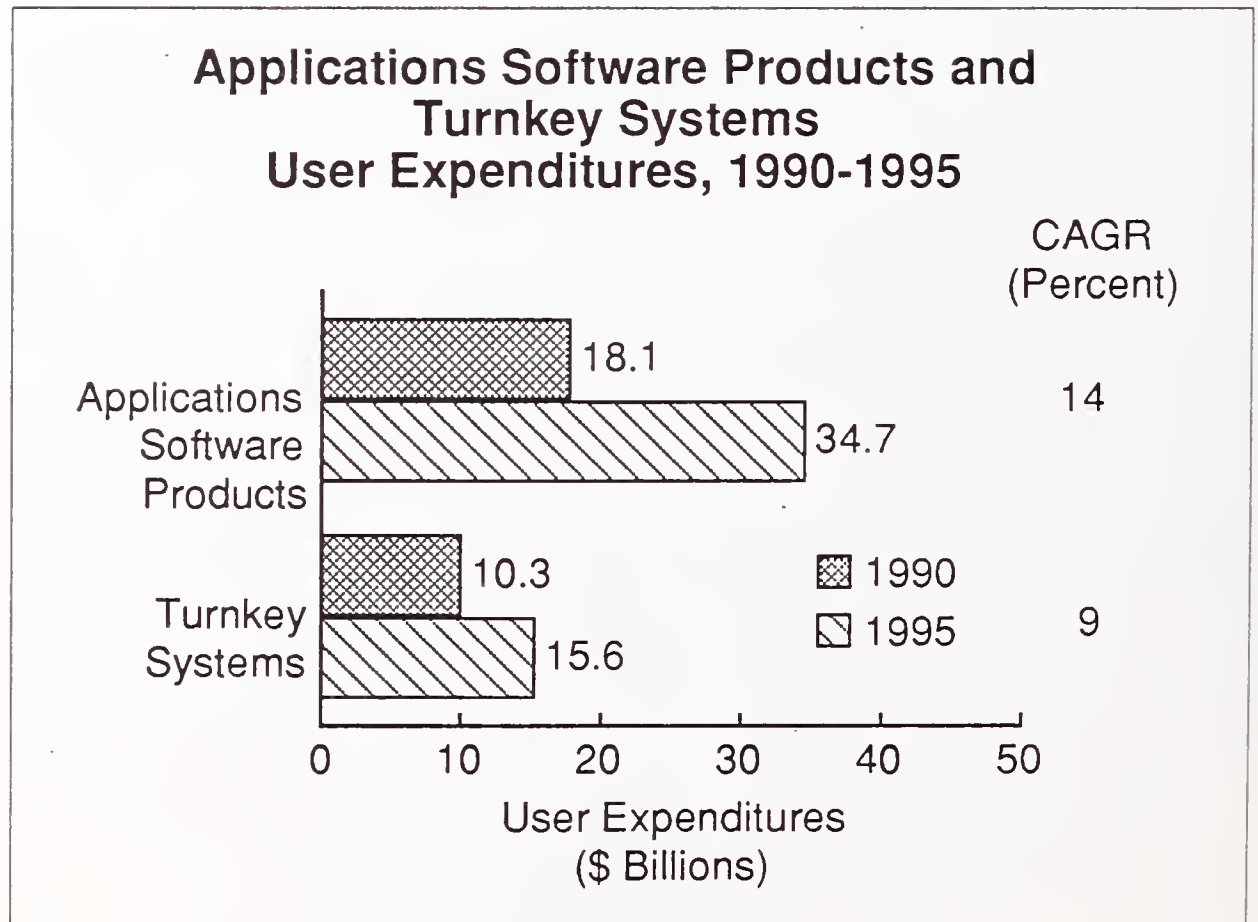
User expenditures for applications software products will reach \$34.7 billion by 1995, as shown in Exhibit IV-2. Although this is a large dollar number, the 1990-1995 CAGR will be only 14%, compared to the previous five-year CAGR of 23%. In 1990, the applications software products market will have grown 12%, compared to 24% in 1985. This lower growth rate is due primarily to the impacts of trends in hardware and systems software.

New technologies are becoming well known to users; however, applications software products are just beginning to appear. Due to the widespread awareness that new products will be forthcoming, users are delaying major expenditures. The key driving forces are described throughout the rest of the report.

User expenditures for applications software products will increase 12% from 1989 to 1990, reflecting a "wait and see" attitude; the annual growth rate will gradually increase to 15% by 1995 as new applications software products are introduced that conform to the new hardware and systems software products that precede them.

The turnkey systems market is forecast to reach \$15.6 billion by 1995. The CAGR for turnkey systems will be slightly slower, 9%, for 1990-1995 than the 1984-1989 growth rate of 11%. This growth will remain relatively constant through the forecast period.

EXHIBIT IV-2



3. Public Vendor Growth

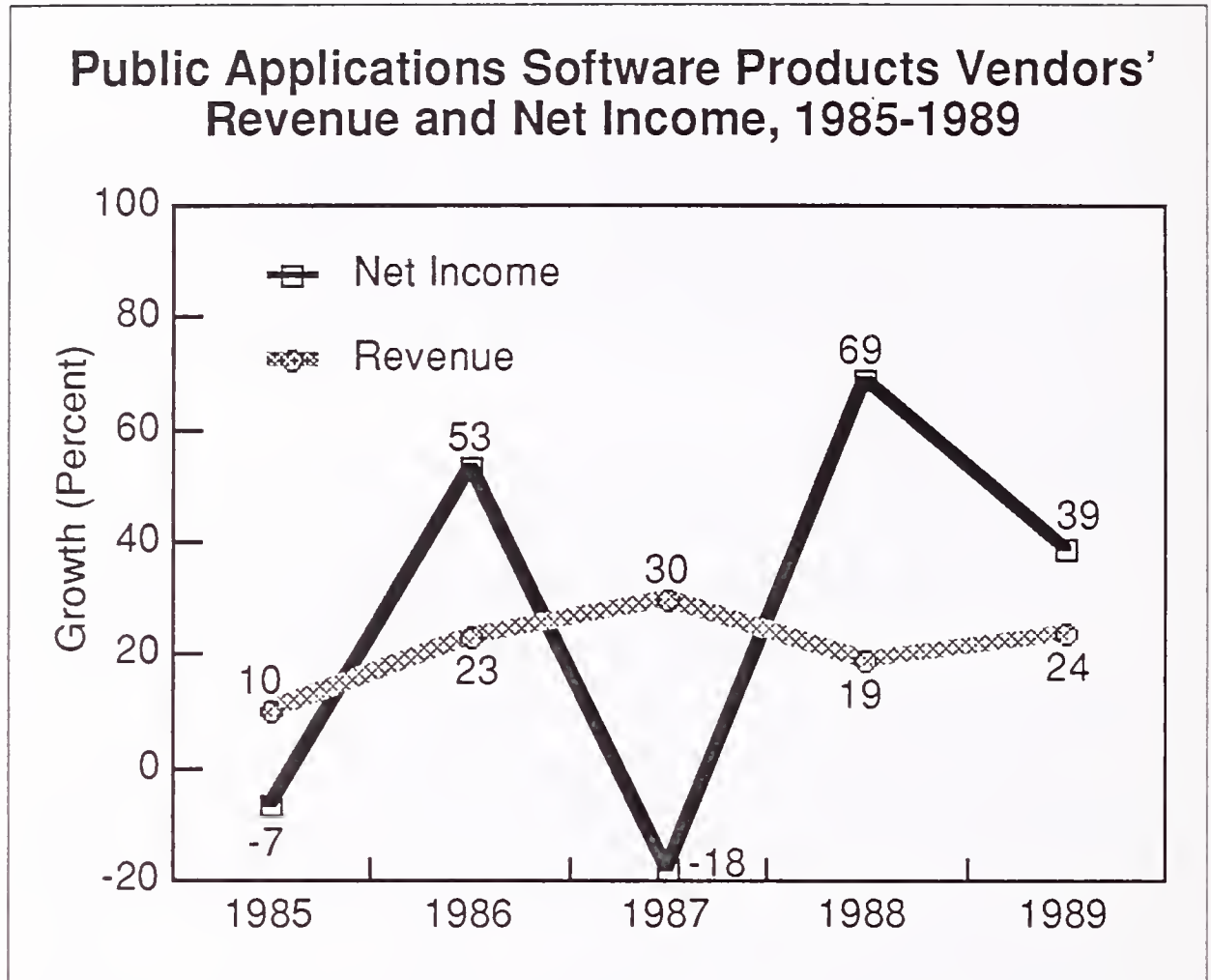
Public applications software products vendors have grown steadily during the past few years, as Exhibit IV-3 illustrates. In 1989, revenues for the group grew 24% over the previous year. During the past five years, growth in earnings has fluctuated continuously from year to year, as shown in Exhibit IV-4.

EXHIBIT IV-3

Public Applications Software Products Vendors' Revenue and Net Income, 1988 and 1989

Company Name	Revenue			Net Income		
	1988 (\$ Millions)	1989 (\$ Millions)	Percent Change	1988 (\$ Millions)	1989 (\$ Millions)	Percent Change
AMERICAN SOFTWARE	64.2	86.3	34	13.8	17.2	25
AUTODESK	117.3	178.6	52	32.7	46.4	42
CADENCE DESIGN	78.6	142.8	82	15.9	27.8	75
COMSHARE	82.9	94.6	14	3.6	6.3	75
CYBERTEK	20.9	24.0	15	-0.2	1.8	1,000
FDP	14.0	14.7	5	0.9	-0.1	-111
GENESEE	1.3	1.7	31	0.1	0.2	100
HOGAN SYSTEMS	48.1	46.8	-3	-0.3	3.3	1,389
INFO SCIENCE	13.0	13.8	6	-0.2	-0.4	-100
LOTUS DEVELOP	468.6	556.0	19	58.9	68.0	15
MACNEAL SCHWEND.	40.0	45.0	13	8.9	9.8	10
POLICY MGMT.	216.9	265.6	22	20.5	26.8	31
SCIENTIFIC S/W	23.6	20.9	11	-2.2	0.5	123
SILVAR-LISCO	19.3	13.6	-30	-3.3	-6.1	
SOFTWARE PUB.	82.3	110.4	34	14.8	18.8	27
S/W SVC AMER.	7.4	3.2	-57	0.0	-0.7	-6,900
STOCKHOLDER SYS.	20.9	23.6	13	3.5	3.2	-9
SYSTEM SOFT	70.6	98.6	40	7.2	12.1	68
TIMBERLINE S/W	9.0	10.7	19	0.4	0.8	103
WORDSTAR	41.9	41.9	0	-7.7	-3.3	57
Total	1,440.8	1,792.8	24	167.3	232.4	39

EXHIBIT IV-4



Growth for the public turnkey systems vendors was only 5% in 1989, compared to 11% in 1988 and 16% in 1987. See Exhibits IV-5 and IV-6.

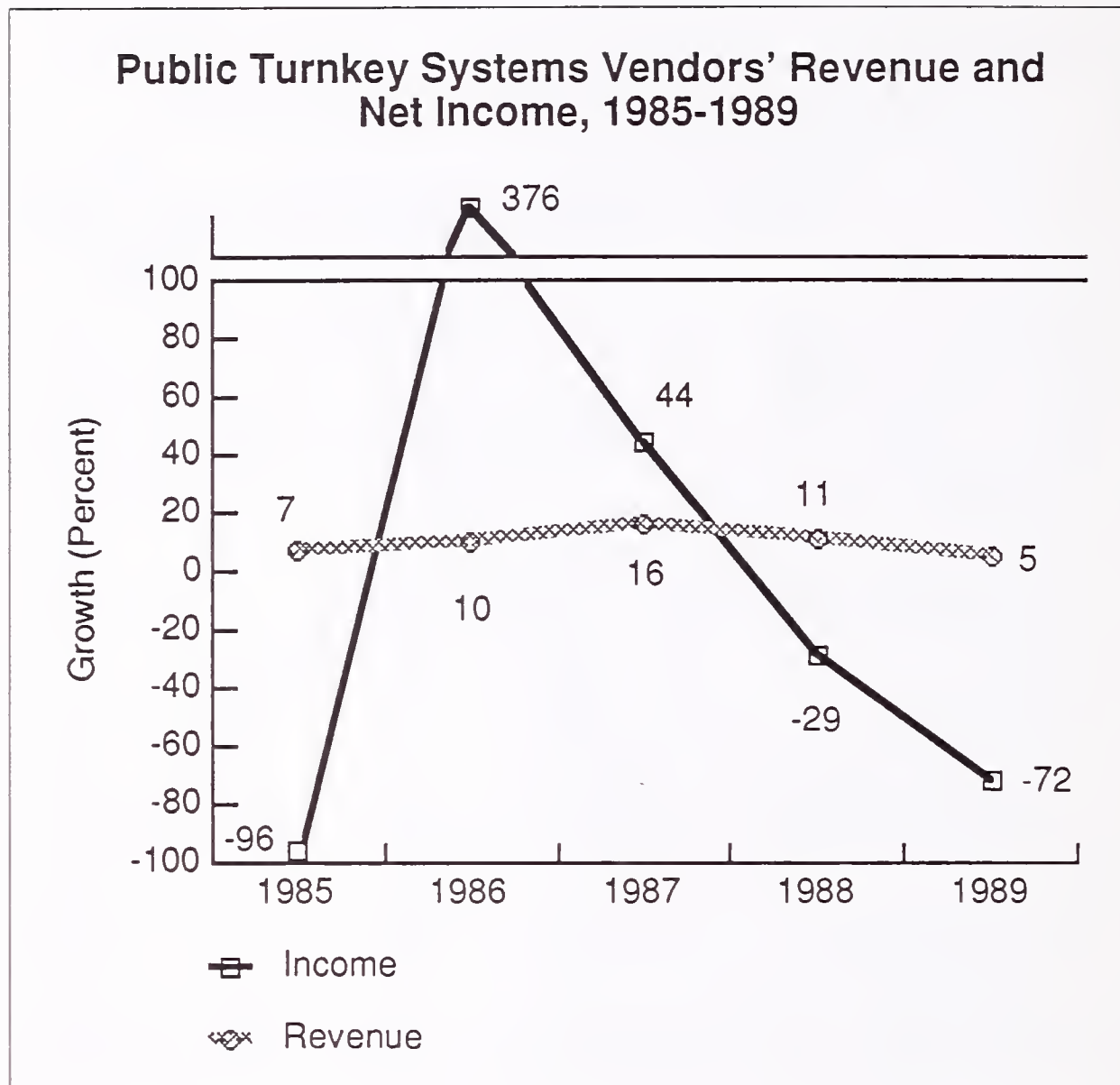
Earnings growth for the turnkey systems group has been volatile during the past five years. In 1989, profitability for the turnkey systems group ran below the average for information services vendors overall. The group earned 1.2% on the revenues it generated.

EXHIBIT IV-5

**Public Turnkey Systems Vendors' Revenue and
Net Income, 1988 and 1989**

Company Name	Revenue			Net Income		
	1988 (\$ Millions)	1989 (\$ Millions)	Percent Change	1988 (\$ Millions)	1989 (\$ Millions)	Percent Change
ASA INTERNATIONAL	19.3	23.8	23	-0.5	0.5	200
ASK COMPUTER SYS.	168.3	189.6	13	12.2	9.3	-24
AUTO-TROL TECH.	74.3	76.9	3	1.5	-4.4	-393
BARRISTER INFO.	33.5	31.0	-7	-4.6	-7.1	-54
C3	70.8	57.6	-19	1.6	-19.3	-1,309
CERNER	40.9	56.7	39	3.5	3.6	3
COMPTEK RESEARCH	50.9	47.4	-7	0.4	1.2	200
COMPUTRAC	12.3	13.4	9	1.9	1.8	-5
DAISY SYSTEMS	121.4	113.3	-7	-61.7	-93.3	-51
GERBER SCIENTIFIC	288.4	306.1	6	31.7	33.2	5
HBO	187.4	203.6	9	12.5	15.5	24
INTERGRAPH	800.2	860.1	7	88.0	79.5	-10
INTERLEAF	74.9	114.8	53	2.7	-15.6	-678
REYNOLDS & REYN.	612.2	591.9	-3	21.9	26.3	20
TERRANO	3.7	4.9	32	0.3	0.4	33
TRIAD SYSTEMS	136.3	148.9	9	10.2	2.7	-74
Total	2,694.8	2,840.0	5	121.6	34.3	-72

EXHIBIT IV-6



B

Driving Forces

The seven key driving forces in the application solutions market are listed in Exhibit IV-7 and described in this section.

EXHIBIT IV-7

Applications Software and Turnkey Systems—Driving Forces

- The economy
- Hardware
- Customization and integration
- Applications development technology
- Architectures and standards
- Customer indigestion
- Globalization

1. The Economy

Applications software products markets have felt few if any of the effects of a slowed economy. The fact that hardware sales will slow further in the short term due to the economy is offset by pressure on profits at end-user organizations; expensive in-house development projects are put on hold, thus enhancing possibilities for additional external purchases of applications software products.

Turnkey systems vendors, on the other hand, are experiencing moderately adverse effects from the slowed economy.

- Hardware purchases are put on hold—and hardware is a key ingredient of the turnkey solution.
- Turnkey vendors who sell to manufacturing vertical markets are feeling a negative impact as capital expenditures are delayed. Because spending on turnkey systems by the manufacturing sectors—principally CAD/CAM products and resource planning—accounts for a relatively large percentage of total expenditures on turnkey systems (36%), whatever impacts manufacturing sector health also affects turnkey systems user expenditures.
- VARs and turnkey vendors that sell predominantly to small companies—such as the many VARs that sell to business services firms—are experiencing the adverse effects of an economic downturn as smaller firms are the first to cut back on capital expenditures.

Turnkey and VAR service contracts and support services, however, have not been negatively impacted by the economic slowdown. In fact, this portion of their business is expanding as customers look for ways to leverage the products they already have.

2. Hardware

Growth in expenditures for both applications software products and turnkey systems is directly related to hardware trends. Hardware trends impacting applications software and/or turnkey systems growth are new hardware unit shipments, the hardware installed base, more powerful desktop systems, and the continuing decline in hardware prices.

a. New Hardware Unit Shipments

Since software needs hardware on which to run, growth in hardware unit shipments over a multiyear period has a direct impact on applications software products.

The annual shipment rate of PCs and workstations has slowed, compared to the heyday in the mid-1980s; annual growth is in the 10%-15% range rather than the 25%-30% range of five years ago. And a growing percentage of PC shipments are replacement computers.

Minicomputer shipments are expected to grow 5%-7% per year and mainframe shipments are expected to grow only 3% to 5% per year. Much of the growth in mainframe shipments will be new IBM ESA/390 machines, many of which will replace existing installations. The systems software products market will benefit more from this than will the applications software products market.

b. Hardware Installed Base

As applications software products are added to the existing installed hardware base, the size of the installed base also impacts expenditures. As turnkey purchases are by definition bundled hardware/software, the hardware installed base is irrelevant to turnkey growth.

The mainframe installed base will be relatively flat over the next five years. Mainframes will not go away; they will be used for enterprise-wide systems management, data storage and maintenance, execution of high-volume transactions, and where high-level security is required.

The installed base of minicomputers will also remain essentially flat over the next five years. These midrange computers will be positioned as distributed transaction processing engines, and will continue to have an effective niche role in remote transaction processing and departmental general-purpose processing.

Approximately 40 million workstations and personal computers are in use today, up about 10% from 1989. Corporate America has an abundance of underutilized personal computers. In Fortune 500 companies, an estimated one out of every 6 white collar workers has a desktop computer; the majority of these computers remain idle for a majority of the day. IS departments are thus seeking ways to exploit this vast MIP storehouse.

Workstations and personal computers will continue to grab a larger piece of the overall installed base. The total number of computers installed will continue to increase, rather than workstation growth being at the expense of the existing minicomputer and mainframe installed base. The larger machine markets will simply continue to experience slowing growth in unit sales.

c. More Powerful Desktop Systems

Growth in the low-end PC market has slowed; the greatest growth is in more powerful 386- and 486-based products and workstations. Sales of higher-end personal computers and workstations will drive a higher investment in applications software products per computer. The impact should begin to be felt to a greater degree by 1992.

386- and 486- based machines are now entering the market at prices in the \$15,000 range. In 1989 and 1990 a number of new workstations were announced utilizing RISC and SPARC processors: DEC announced its DEC Station family of UNIX workstations, utilizing a RISC processor from MIPS. Computer Systems Inc. and Sun announced new products based on the SPARC processor; HP/Apollo and DEC both introduced new workstations in the late summer of 1989; and IBM introduced its RISC workstations.

The current economic downturn is causing some hardware cuts, especially at the PC and workstation level. Thus in the short term, unit shipments are curtailed, but over the long term their presence will have a significantly positive impact on applications software expenditures. Just a few years ago, only the biggest companies could have afforded this capacity. Now the \$50 million and under company can afford large-scale automation, which opens up new untapped territories.

The ever-increasing power of workstations and personal computers also continues to broaden the market for turnkey systems vendors and VARs. As smaller computers take on the power of a minicomputer, the level of interest by midsize and smaller businesses in adopting greater computerization grows. The midsize and small firms are market segments that turnkey vendors and VARs are well suited to serve.

The use of LANs and multiuser solutions will add a new market for the turnkey supplier/VAR—network products and services.

d. Continuing Decline in Hardware Prices

Declining hardware prices and profit margins are not new issues for turnkey systems vendors; they have been plagued with these issues since the introduction of the personal computer. As personal computers became more readily available at lower prices and through alternative distribution channels, the advantages of turnkey solutions were eroded.

Turnkey vendors have historically sold minicomputer systems whose prices remained high and relatively stable until workstations and PCs eroded their popularity. This has created cost structure concerns, not only from the standpoint of declining hardware prices, but also because the cost of sales increases per unit. Thus, in order to grow, turnkey vendors/VARs need to sell more and/or diversify into higher margin products or services.

Today's opportunity is in the regionalized VARs who are oriented to PC- and server-based solutions.

3. Customization and Integration Services

Modification of packaged applications software is becoming much more predominant and provides growth opportunities for both applications software products and turnkey systems vendors.

Because there are fewer first-time buyers than before (and because their hardware margins are declining), turnkey vendors and VARs have to concentrate more on gaining revenue from service, support and replacement-computer markets. Many of them are adding applications development tools to their product lines, not only to assist in customization projects, but also to empower users to do it themselves. This is proving to be a lucrative diversification effort for companies such as ASK that, through the acquisition of Ingres, offers 4GL and RDBMS tools and products.

As integration of hardware and software becomes more of a priority, applications software vendors, turnkey vendors and VARs will need to offer this capability to their customers or align with systems integrators and professional services firms.

4. Applications Development Technology

Expenditure growth for both applications software products and turnkey systems will be enhanced by current trends in applications development tools. These 4GL and CASE tools not only enhance vendors' internal efforts in developing new products, but as mentioned earlier, provide a new product line to offer to customers and therefore a basis for additional revenues.

RDBMS technology is still far ahead not only of users' ability to fully assimilate it, but of vendors' ability to create useful applications software products. Manufacturers for the most part have yet to write and/or rewrite their products to be true relational products.

- The data base providers and SQL products will provide transportability of applications solutions.
- In 1992 and beyond, more useful RDBMS-based products will appear, again providing a new source of revenue for vendors. RDBMSs give vendors an opportunity to provide SQL-compliant data management tools. Also, RDBMS-based applications mean higher-ticket (client-server) hardware for turnkey vendors.

Presentation Manager and Windows have become de facto GUI (graphical user interface) standards that, because of ease-of-use qualities, promote growth of applications software. The development of friendlier,

graphics-based user interfaces, including multitasking capability, for the more general end-user computing environment will expand the number of applications utilized per desktop platform. GUIs have made UNIX easier to use, and more vendors are therefore developing UNIX applications.

5. Architectures and Standards

In the long term, platform and systems software standards will fuel the demand for new generations of applications software products that conform to these standards. In the short term, however, the movement towards standards will have a negative impact on user expenditures. Key standards have yet to be finalized and users will postpone large purchases in anticipation of eventually having products that adhere to standards.

Even though an aggressive software effort towards standardization on the part of the large computer systems and software vendors—such as IBM and Computer Associates—will drive the market, in the short term standards will be a growth inhibitor, as porting products over to standards is expensive and time consuming.

UNIX will be the key open system of choice, and a great deal of development effort on the part of both applications software and turnkey vendors is underway. In the long term, proprietary standards—SAA and CA90s in particular—as well as UNIX will have a positive effect on both vendors and users. Because the applications will work on many platforms rather than one or two, vendors and users will benefit from reduced development costs, and users will be able to integrate their hardware and software with ease. Software vendors will have access to a larger, albeit more competitive, market.

New products will be forthcoming due to the trends toward standards-compliant application software products and client-server architectures. Again, the product transition to client-server architectures will be a growth inhibitor in the short term as existing products are re-engineered and new products are built from the ground up. Although there will be some replacement, client-server products will represent a strong growth opportunity after 1993 for applications software vendors and turnkey vendors/VARs.

6. Customer Difficulty with Technology Assimilation

Computer hardware and software technology is changing so rapidly that it will cause assimilation difficulties for much of the end-user community. Customers may get disillusioned because of media hype about new technologies being immediately available, cheaper, and easier to use; whereas in fact, the new technologies are complex and little is yet available. Much of the new product introduction appears to be technology-driven rather than market-driven. In addition, the complexity of the newer applications will require significantly higher levels of end-user

education and training. What will therefore ensue is a period during which there will be a more difficult selling environment.

With each workstation introduction, the customer has more hardware products to choose from, resulting in more extensive evaluation before making a purchase decision. The increased confusion is causing customers to defer purchases.

A continuing lengthening of the sales cycle is also caused by users' need to examine more applications software product options from more vendors.

7. Globalization

Applications software products that deal with the increasingly integrated worldwide markets for larger corporations is a whole new sector for application solutions vendors. Applications addressing customs issues, currency translation and other needs offer product opportunities on an international scale.

C

Forecast by Platform Size and Submode

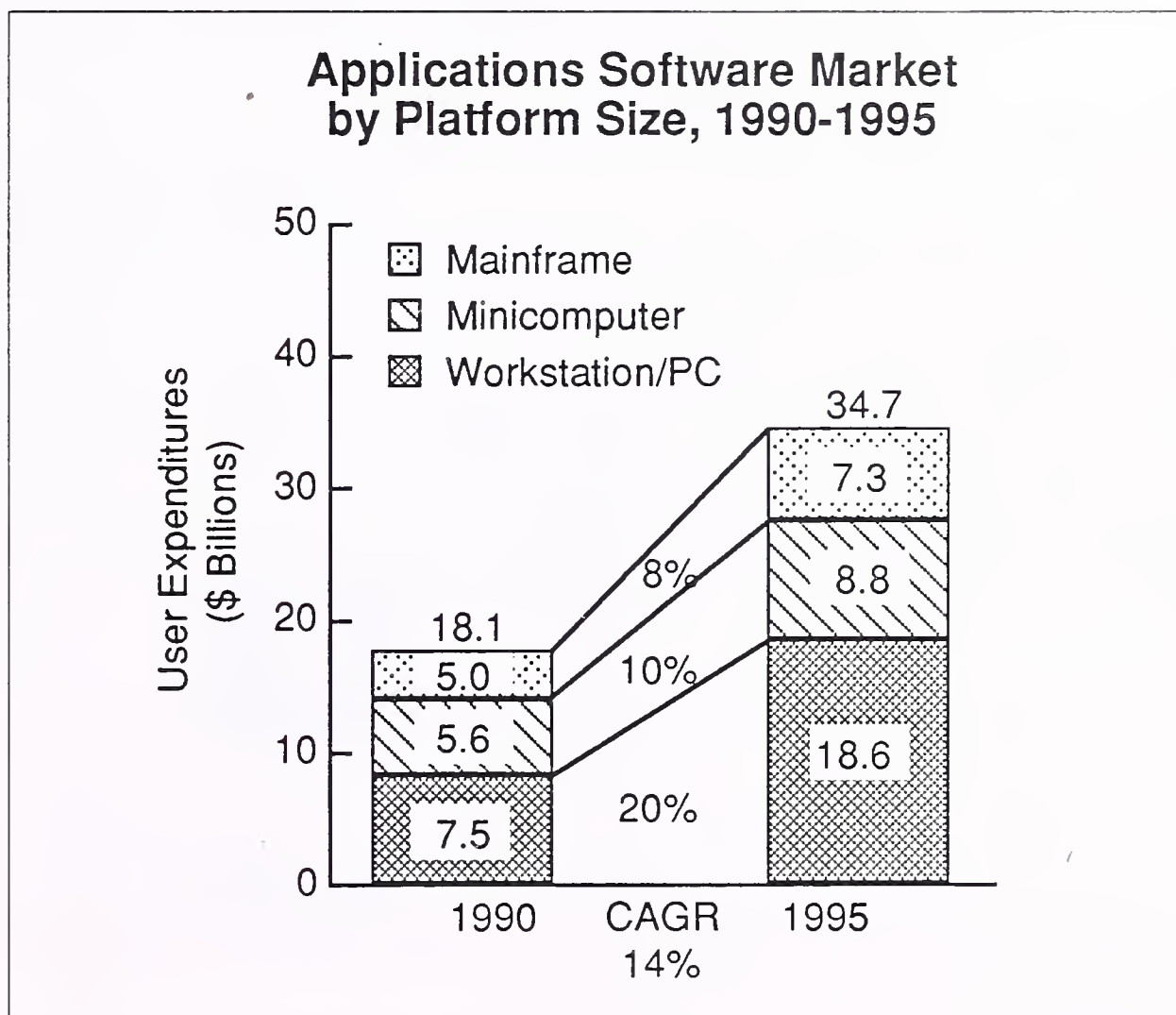
1. Applications Software Products Forecast by Platform Size

User expenditures on workstation and PC-based applications software products are growing almost three times as fast as mainframe-based products and twice as fast as minicomputer-based products. Exhibit IV-8 reflects the following trends:

- Mainframe-based applications software as a proportion of the whole will decline, as more software moves outward into the hands of users, and applications are downsized to smaller platforms.
- Software for mainframes is shifting from application-specific to generalized multi-application data bases. Mainframes will become repositories of data that users will access to meet specific needs.
- On the mainframe side, many central software systems are as much as 10 or 15 years old; thus, significant system upgrades based on old architectures and languages are impractical. Replacement raises financial problems, as well as inviting major reexamination of system requirements and functions that could prove costly and disruptive to ongoing operations and busy managers. The trend therefore is to develop/purchase new software for networked PCs and client-server architectures, thereby offloading applications from the mainframe, rather than replacing or significantly modifying mainframe-based applications software.

- The proportion of applications software that is minicomputer-based is also declining, but not to the same degree as it is for mainframes. Overall minicomputer platform sales have leveled off; anticipated growth is in the 5%-7% CAGR range through 1995. Minicomputers will continue to grow as departmental systems and will be used to a limited degree as servers.
- The increasing power of the 32-bit microprocessor-based PC/workstation platforms is creating new market opportunities for applications software products that can utilize the rapidly improving performance characteristics of these machines.
- Workstations will have a major role in the client-server segments of the evolving distributed relational data base market. The networking capabilities inherent in these computers are creating major market opportunities for multitasking and multiuser applications.

EXHIBIT IV-8



2. Turnkey Systems Forecast by Submode

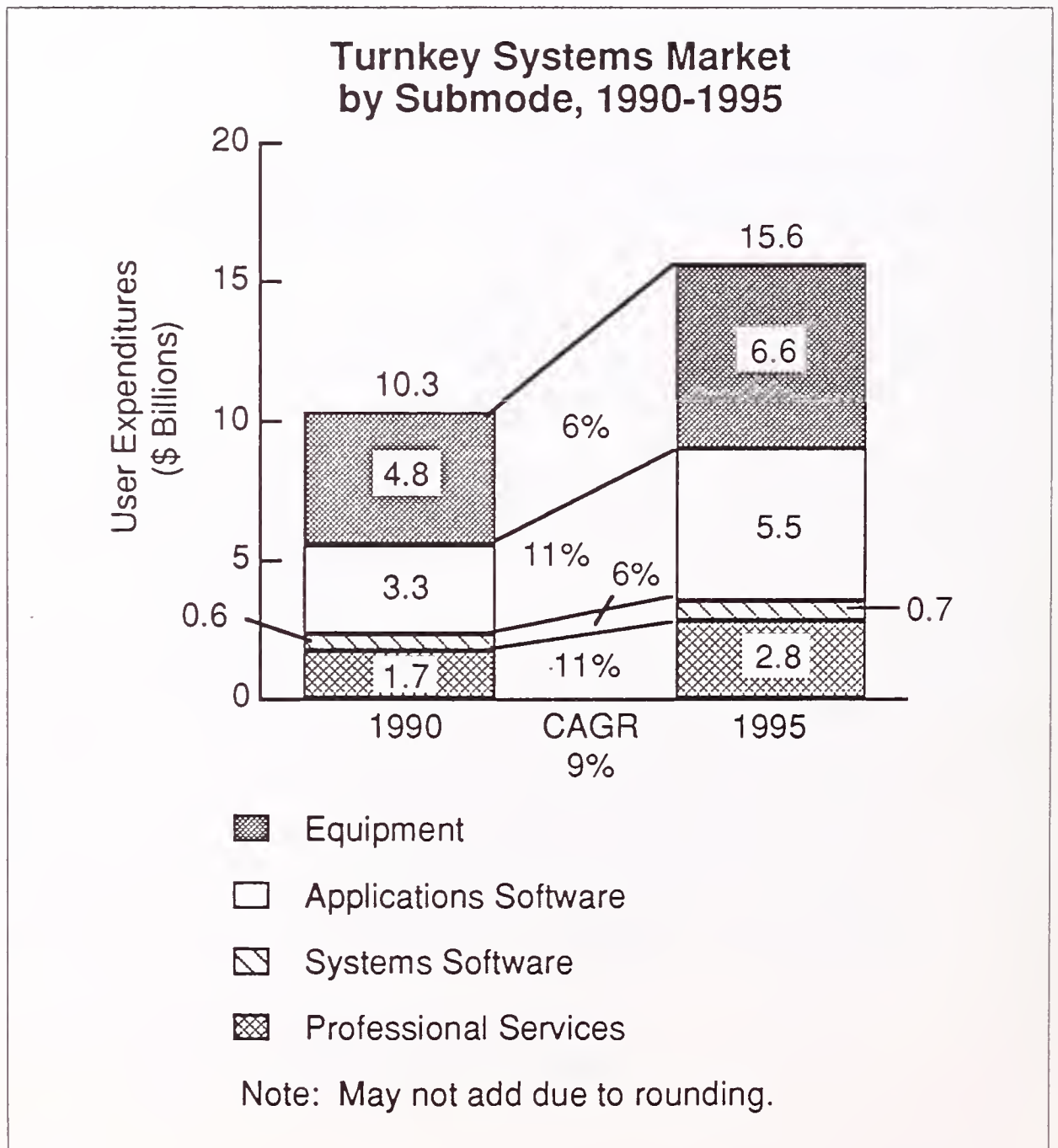
Exhibit IV-9 reflects the following turnkey systems trends:

- User expenditure on equipment is advancing slowly and hardware will continue to decline as a portion of overall turnkey systems expendi-

tures. This slow growth rate of the equipment segment, because of price/performance improvements, is a major growth inhibitor of the overall turnkey systems market. Downsizing to workstations and PCs brings with it lower hardware margins for turnkey vendors, and the potential burden of a larger hardware installation, maintenance and support staff. Many turnkey vendors are therefore opting to resell only the higher-priced workstations and leave the lower-end PC/workstation sales to hardware vendors and retailers.

- The applications software products market is growing as a percentage of the total turnkey systems market.
- Professional services is also growing as a percentage of the total market, yet its growth rate will remain the same as for applications software. Services include education, annual software updates, implementation and integration services. Many turnkey vendors and VARs are opting to align themselves with professional services firms and systems integrators in addition to or rather than increasing their own integration capabilities.

EXHIBIT IV-9



D**Industry and
Cross-Industry
Sector Forecasts**

The information services market is divided into 16 industry sectors which are based on the 1987 revision of the Standard Industrial Classification (SIC) Code system. In addition to these vertical industry sectors, INPUT has also identified seven cross-industry or horizontal market sectors. These sectors or markets involve multi-industry applications.

In order to be included in an industry-specific sector, a product or service must be specific to that sector only. If a service or product is used in more than one industry sector, it is considered cross-industry. The reader is referred to INPUT's series of industry sector reports that addresses the information services and software products market for each of 16 specific industries.

1. Industry Sector Forecasts

In 1990, industry-specific markets accounted for 55% of the total applications software products market and 87% of the total turnkey systems market. Industry-specific solutions will continue to represent the larger and faster growth market over the next five years.

a. Growth Rates of Industry-Specific Markets

The fastest growing industry-specific market is telecommunications. Telecommunications industry applications have traditionally been developed internally, with as much as 90% of applications resulting from internal development. Since deregulation, however, telecommunications companies are looking increasingly to outside providers. As shown in Exhibit IV-10, the telecommunications applications software products market will grow at a 20% CAGR, compared to the 9%-17% CAGR for the rest of the industry sectors. As shown in Exhibit IV-11, the telecommunications turnkey systems market will grow at a CAGR of 13% for the next several years.

The slowest growing industry-specific market is miscellaneous industries (agriculture and construction), with CAGRs of 9% for applications software products and 7% for turnkey systems. Miscellaneous industries is also the slowest growing industry sector market for information services as a whole. Other slow growth markets for applications software products are transportation and education, and for turnkey systems the slow growth markets are the federal government, medical, and insurance.

b. Relative Sizes of Industry Sector Markets

As shown in Exhibits IV-10 and IV-11, the largest industry-specific markets for both applications software products and turnkey systems are discrete manufacturing and banking and finance. Linking the factory floor with business/planning and engineering/design areas will continue to propel user expenditures for discrete manufacturing applications software products; and CAD/CAM is the largest of all turnkey systems applications.

Banking and finance has historically been the leading user of information services among all the industries that INPUT surveys. It is the second largest industry-specific market for turnkey systems. Even so, the turnkey systems market sector will decline as a portion of overall banking and finance information services as most of the banking and finance turnkey systems are purchased by the dwindling number of independent small banks and thrifts.

A significant runner-up in terms of size for turnkey systems is the medical sector, where hospital accounting systems, laboratory management systems and doctor/dentist office systems will continue to be important application growth areas.

The smallest sectors for both applications software products and turnkey systems are state and local government, and utilities. These sectors are also the smallest sectors for information services as a whole.

EXHIBIT IV-10

Industry-Specific Applications Software Products Markets, 1990-1995

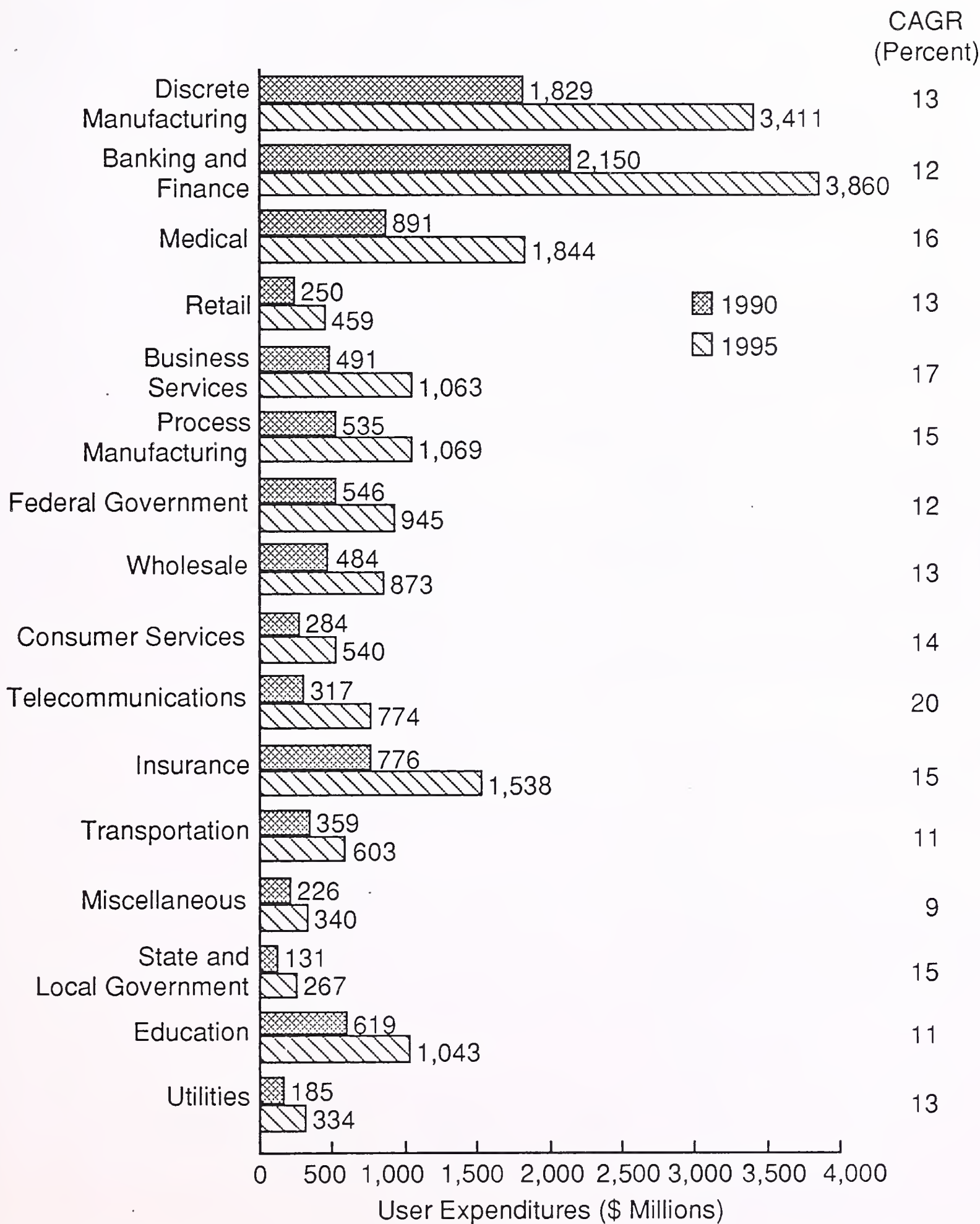
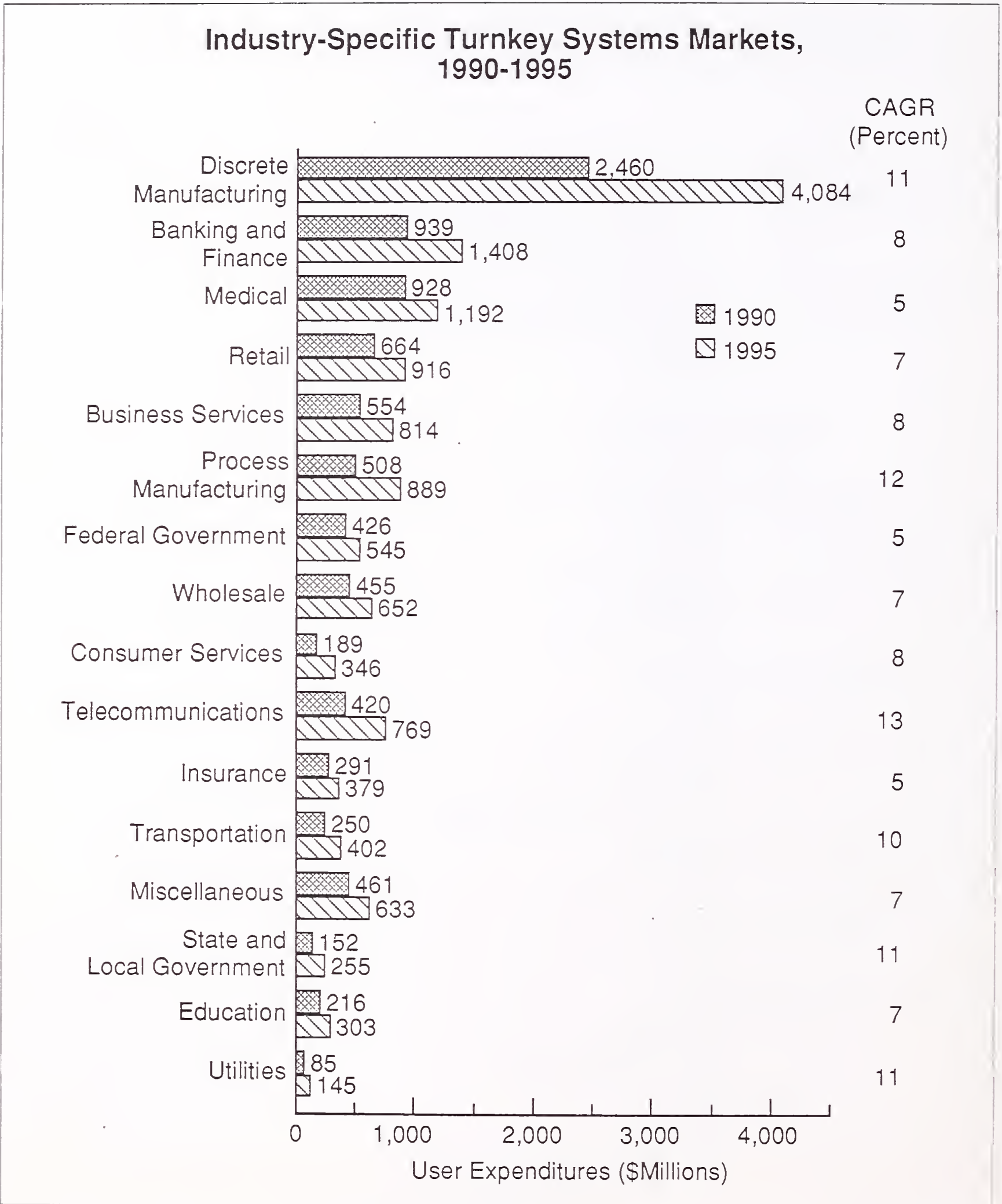


EXHIBIT IV-11



2. Cross-Industry Sector Forecasts

The market for cross-industry (multi-industry or horizontal) applications software products is considerably larger than cross-industry markets for turnkey systems (\$8.1 billion versus \$1.3 billion in 1990). This reflects the fact that the primary markets for turnkey systems are industry-specific markets, and usually specific niche segments within such markets. Examples include hospital management, physicians' group practice and insurance agency systems.

INPUT believes that cross-industry applications will increasingly be included with industry-specific market solutions, as turnkey systems suppliers seek out additional software products with which to increase revenues by providing additional applications that can be marketed to both new and existing customers.

User expenditures for cross-industry applications software products will grow at a 14% CAGR through 1995—about the same as for cross-industry information services as a whole—whereas user expenditures for cross-industry turnkey systems will only grow at a 6% CAGR.

a. Growth Rates of Cross-Industry Markets

As shown in Exhibits IV-12 and IV-13, the fastest growing cross-industry market for both delivery modes is education and training, due in large part to its small market size. Rapidly changing technologies, a shortage of skilled employees, increasing global competition, and emphasis on cost containment are all positive factors in the growth of education and training in general. The fact that technology-based education and training is less expensive and more convenient than instructor-led training is a force driving its more widespread use.

All other cross-industry markets for applications software products will exhibit strong growth in the 15% to 16% range, with the exception of human resources (11%) and accounting (13%), which are showing signs of maturity.

The only other cross-industry markets with any significant relative growth for turnkey systems are "other"—telemarketing, sales management and electronic publishing— (9% CAGR) and engineering and scientific (7% CAGR). The rest of the cross-industry markets for turnkey systems have CAGRs of 3% or less.

EXHIBIT IV-12

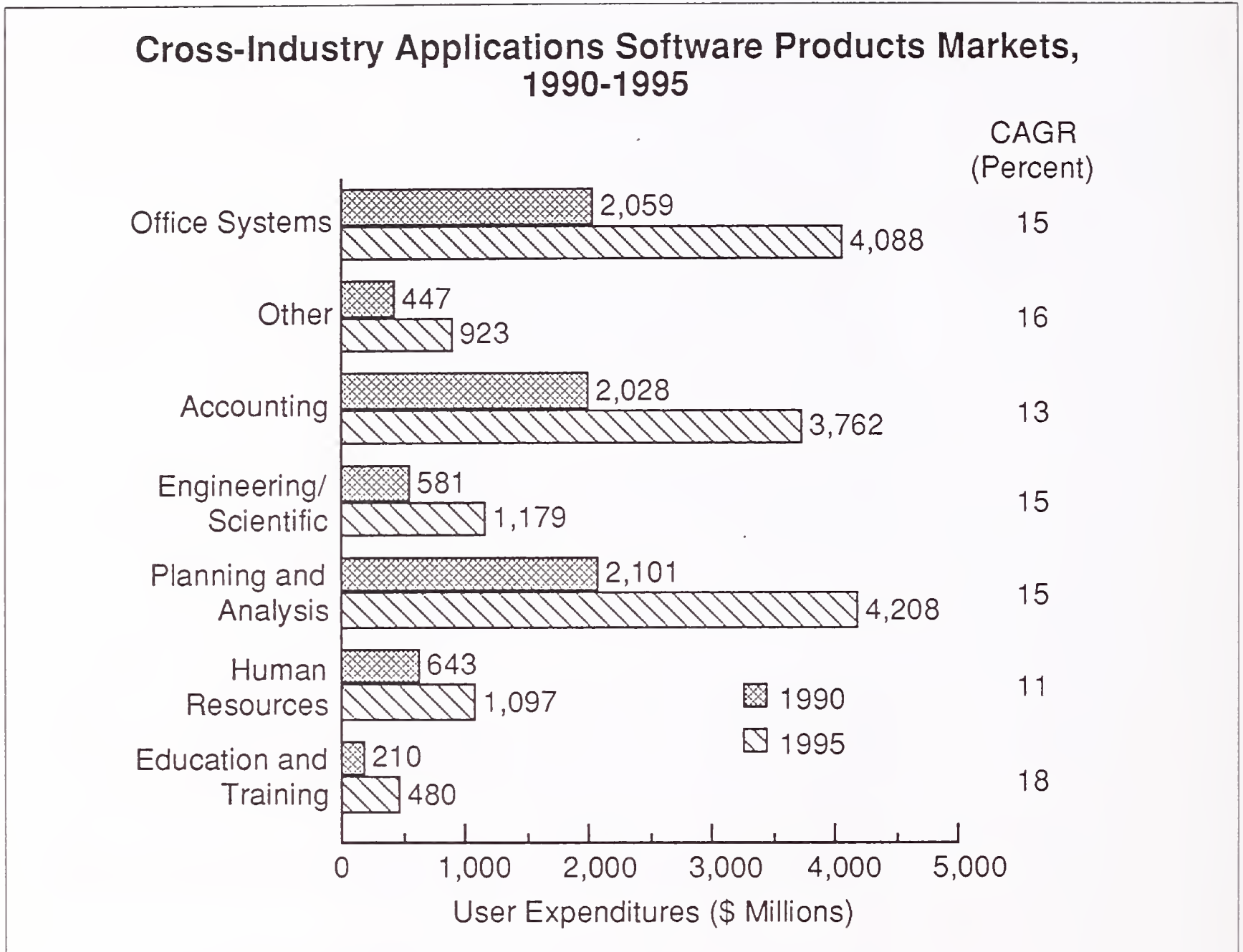
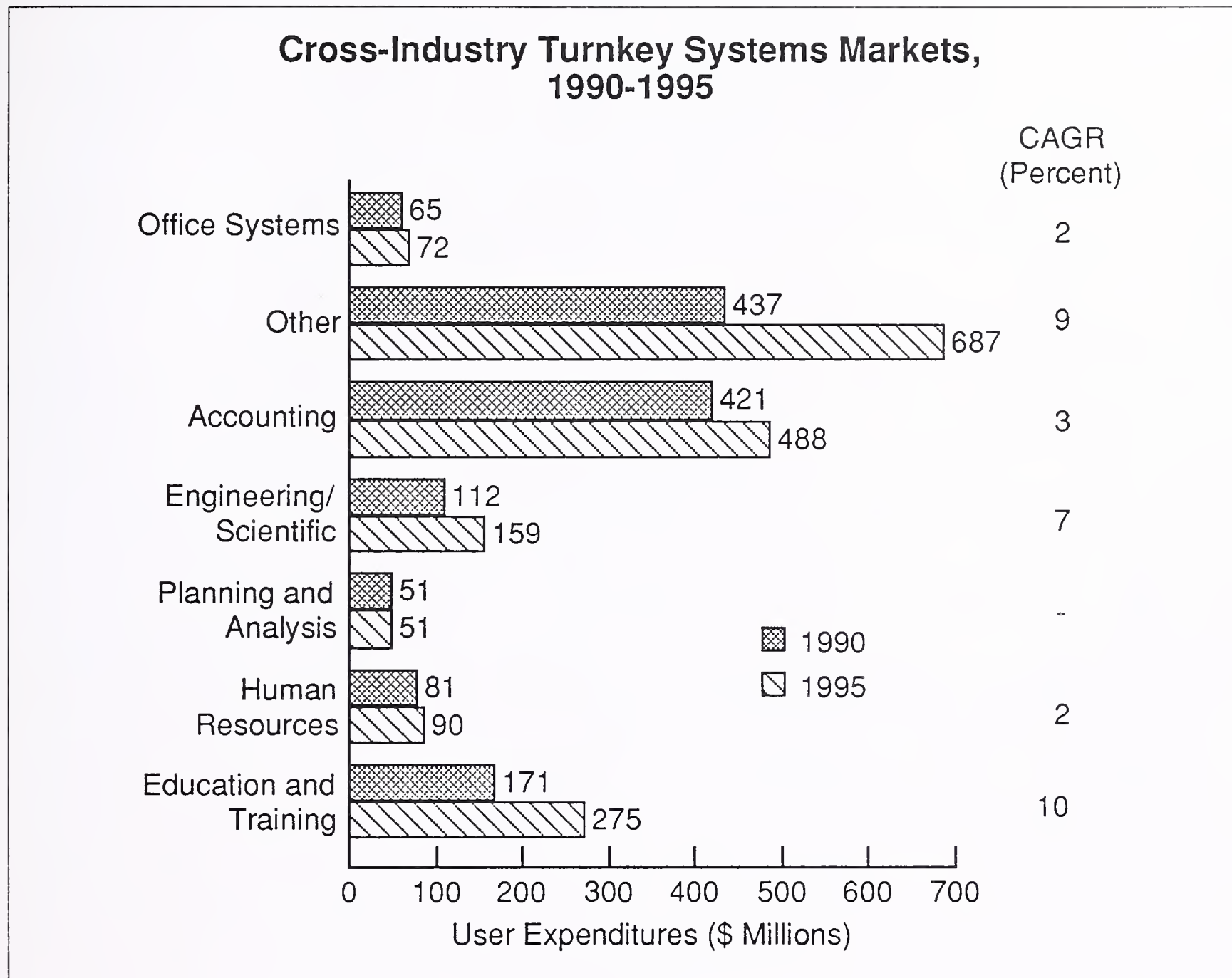


EXHIBIT IV-13



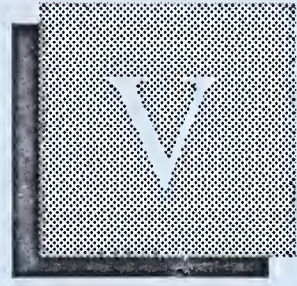
b. Relative Sizes of Cross-Industry Markets

The largest cross-industry markets for applications software products are planning and analysis and office systems.

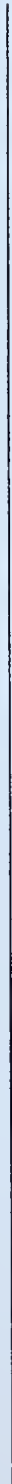
Planning and analysis applications are spreadsheets (which are by far the largest application), executive information systems (EIS), financial modeling or planning systems, and project management.

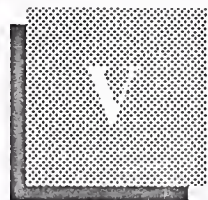
Office systems applications are word processing (by far the largest application), integrated office systems, graphics, and desktop publishing.

The largest cross-industry markets for turnkey systems are other and accounting (one of the oldest and most common applications in any company). Both of these turnkey markets, however, are smaller than their applications software products counterparts.



Issues and Trends





Issues and Trends

Issues and trends impacting application solutions are summarized in Exhibit V-1. The key technology trends, described in section B, are causing changes in buying patterns, channels of distribution and business strategies for application solutions vendors. Thus, application solutions products and markets are in transition as they respond to technology changes. New technologies and products are just beginning to come out into the marketplace, so this transition will not be in full force until about 1993 and will not be complete until after 1995.

EXHIBIT V-1

Application Solutions Market Key Issues and Trends

- Shifting technology foundations
- Changing buying patterns
- Price and investment pressure
- Changing distribution channels
- Importance of value-added services
- Market specialization

A

Shifting Technology
Foundations

Many changes are occurring in application solutions technology, which are listed in Exhibit V-2.

EXHIBIT V-2

Application Solutions Market Shifting Technology Foundations

- Downsizing and client-server architecture
- Relational data base management systems
- GUIs
- LANs
- UNIX, open systems and portability
- OS/2 workstation-based applications
- Object-oriented software development

1. Downsizing and Client-Server Architectures

The movement to smaller hardware platforms and client-server architectures is compelling from the end-user point of view because it provides greater speed and flexibility, easier access to data, and lower costs.

Development of new generations of application software products running on workstations and PCs and in a client-server mode requires splitting software applications between an intelligent workstation and a host. Most of what has already been introduced and touted as client-server is nothing more than the capability to download data to a PC for individual use and manipulation; the actual application software still resides entirely on the PC or the host. Although a great deal of real client-server software is currently under development, a migration to these applications will take several years. The reasons client-server-based application solutions are slow in coming are:

- Lack of people who know how to develop such programs
- The high costs involved in re-engineering previously existing programs
- The high cost to the end user of purchasing 386- and 486-based machines — the primary platforms for client-server models — and implementing LANs, if they have not already done so

2. Relational Data Base Management Systems (RDBMSs)

RDBMSs and their primary development language, SQL, have unique qualities that facilitate the use of distributed or client-server architectures. Distributed RDBMSs make data available and useable at its source yet remain part of the corporate data base, independent of geographic or physical location. Users are therefore no longer dependent on MIS to develop an application or generate a report. This facilitates use of corporate data and end-user access to corporate data bases.

Application solution companies are scrambling to develop RDBMS-based products to compete in the 1990s marketplace. Oracle launched this trend with its financial application software products. Vendors are writing products using general SQL tools and are teaming with RDBMS companies such as Ingres, Sybase, and Gupta as well as Oracle to make their application solutions available across a spectrum of RDBMSs and hardware platforms.

Again, application solutions that are truly RDBMS-based are slow to hit the market. Application solutions companies are stymied: they want to keep their applications portable; they like a flat-file DBMS because it's easy to maintain, performance is good and it's easy to port; and they've had a flat-file DBMS for a few years and wish to add new modules. But now they have to struggle with how to implement an RDBMS. Due to this dilemma, most of the RDBMS application solutions are not new products, but are re-engineered versions of existing products.

3. Graphical User Interfaces (GUIs)

The graphical user interface is upon us. Standards are in place now (PM and Windows) and usage is beginning to grow. However, there is little experience with GUIs and no experts to explain how to build applications.

GUIs, along with CUA and SAA standards, will have a significant impact on the application solutions market, but as with all advances they will take time to be understood, learned and applied. A GUI increases the productivity of a user through standardization because menu bars and dialogue boxes are similar across a number of applications. Therefore, a user does not have to learn the idiosyncrasies of each application, but may begin using it immediately. GUIs will promote the use of application solutions by the general user base and allow for use of more application solutions per user.

4. Local-Area Networks (LANs)

Local-area networks (LANs) will become more common; from an installed base of 15% to 20% of all PCs and workstations they will grow to

55%-60% of the total base by 1995. The growing ability to set up client-server relationships, and the maturation of network management capabilities are reasons for LAN growth.

The proliferation of microcomputer networks is likely to lead midrange systems into the role of network servers. Minicomputer vendors will need to change their orientation and to support LANs more completely than is currently popular if they want to remain competitive.

Much of the growth will be among midsized and small firms, rather than the very large firms that already have a proliferation of LANs. For companies with multiple LANs, the emphasis will be on tying them together into an enterprisewide network rather than buying more LANs.

5. UNIX, Open Systems and Portability

Few vendors offer a full complement of software or hardware. Therefore, users want to be able to pick and choose from among several application solutions and hardware platform vendors. Open system standards will allow this to happen to an increasing degree throughout the 1990s.

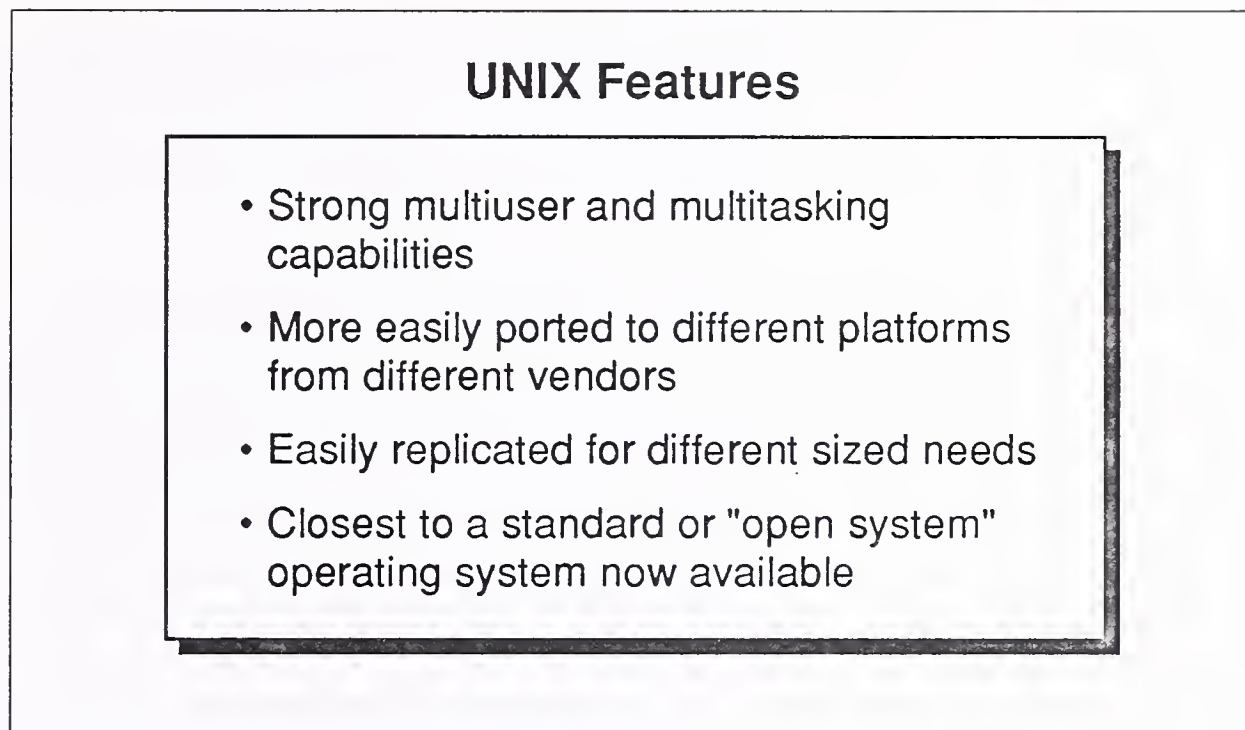
The positive impacts of open systems for application solutions vendors are:

- The ability to strengthen staff technical skills by focusing them on preferred standards instead of proprietary technology
- Long-term decreased development costs because vendors will not have to develop multiple applications for multiple platforms
- The ability to compete on skills and solution, not hardware and price

Open systems will be slow in producing these positive results, however, because acceptance of UNIX is progressing steadily but modestly.

Traditionally an operating system restricted to the engineering and technical realm, UNIX is making significant inroads into the commercial realm because of the desirability of its features (listed in Exhibit V-3) that enhance client-server computing.

EXHIBIT V-3



UNIX acceptance is slowed, however, because:

- The commitment of the other (non-IBM) vendors is half-hearted; their stance, at least until recently, has generally been to offer UNIX as an alternative if customers ask for it. A fundamental incompatibility exists between their desire to "lock" the marketplace into buying their own hardware and software, and the market's increasing demand for multivendor, open systems.
- Although progress is being made towards a single UNIX standard, dozens of versions exist; which curtails application development efforts.
- UNIX is perceived as not as mature/robust as proprietary systems.
- There is a lack of resources large enough to support full scale UNIX application development and development for other operating systems as well.
- UNIX is perceived as complex.
- It is difficult for some to acknowledge the power of desktop computing versus the central mainframe.
- Distribution channels are underdeveloped; UNIX is just beginning to appear in the retail channel in shrink-wrapped versions.

The adoption of UNIX is an evolutionary process. It has an advantage over proprietary standards in that it cuts across multiple vendors. Open systems with UNIX are less complex than SAA or perhaps CA90s.

Recent INPUT research found UNIX in use for some commercial systems in 25% of the information systems organizations surveyed, and that the use would grow to 40% in 1991. Certainly UNIX is not the dominant operating system where it is in use, but it is fair to say it has arrived.

6. OS/2 Workstation-Based Applications

The expected shift to workstation-based applications using OS/2 technology has been very slow. IBM and Microsoft have been late in bringing the full capabilities to market; the investment required has proven to be higher in hardware dollars and even higher in development than was expected; and application software vendors have not moved to build OS/2-based applications for larger organizations.

Users (the information systems department) and software vendors continue to have a wait-and-see attitude. Users will make the technology investment when there is a viable application solution to a business need, and the software development vendor will build an OS/2 workstation-based product when there is a real demand.

In many cases, the move to a workstation-based application will be the result of replacing an existing mainframe or minicomputer solution. User and vendor hesitancy will slow growth for the next two to four years in what will eventually be a very promising market opportunity.

7. Object-Oriented Software Development

Companies such as Gupta Technology and Servio Logic have proven that commercial object-oriented DBMS products can be created, but have yet to establish a general market for them.

Object-oriented programming tools will be a leading-edge competitive product unto themselves—full-featured applications development tools—but this will take five or more years.

In the meantime, object-oriented programming is initially being well received and adopted as an embedded product in the tool building community. Examples of tools being developed with object-oriented programming include Servio's report writer, help facility, menu builder, tools that allow definition of data structures and design forms, and a schema designer that builds a picture of what the data base looks like and generates an underlying configuration.

Some of the remaining inhibitors to the adoption of object-oriented technology include the following:

- The ability to take all common parts of objects and group them—the object action model of systems development—has not been provided;

therefore, object-oriented programming has not gone beyond tool building.

- Object-oriented programming languages do not have the richness that 3GLs and 4GLs have today.
- Object-oriented programming is a significantly different paradigm from existing programming. People need to be working in C++ and SmallTalk (languages you can do object-oriented programming with) but the general business programming community doesn't know about these and does not want to learn. People are simply slow to change.
- For an object-oriented data base to catch on in the general user community it must be made possible to access the data base with a language users are familiar with, such as an object-oriented version of SQL. Also, front-end tools that make languages transparent to end users must be made available.

Leading-edge user companies are running pilots and experimenting, but widespread acceptance requires a major player(s) that endorses it.

In the long run, object-oriented programming will fuel healthy growth of CASE. A number of CASE tools have, to a varying degree, expert rule-based logic and can benefit from object-oriented technology. KnowledgeWare uses Prolog to build rules into its systems.

B

Changing Buying Patterns

Key ways that buying patterns are changing are outlined in Exhibit V-4 and described below.

EXHIBIT V-4

Application Solutions Market Changing Buying Patterns

- Make versus buy decisions
- Solutions versus products
- A more strategic purchase
- User involvement and role of operating executives

1. Make versus Buy Decisions

The growing inclination of the buyer to purchase at least part of the application solution is moving in favor of the application solution vendor. The reason is that the complexity of software development is increasing due to integrated applications, enterprise computing, client-server architectures, and the eventual need to bring software in line with standards such as UNIX and SAA. Key corporate applications now depend on networking and the DBMS to make corporate contributions. In addition, development backlogs are increasing; INPUT research suggests that software maintenance consumes 65% or more of the application development budget for many companies.

Maintaining a supply of qualified application developers is a challenge that IS organizations are going to find increasingly difficult in the 1990s. Addressing this challenge in today's economic environment is especially difficult when many companies have had to downsize their work forces to reduce operating expenses.

These factors suggest a preference for purchasing application solutions rather than developing them from scratch. A fundamental issue remains whether or not the application solution can be easily modified to meet specific needs. Those that can be most easily modified, by the vendor, the user, or both, will be most successful. Hence the interest on the part of application solution vendors to incorporate and sell application development tools.

Turnkey systems vendors provide the least amount of flexibility for the user. In addition to the potential for inflexible applications software, customers don't want to be locked into a certain type of hardware because of the rate of introduction of new hardware. In response to these market conditions, turnkey systems vendors and VARs are porting their applications to UNIX, offering a number of different hardware platforms, or exiting the hardware portion of their business entirely.

2. Solutions versus Products

The steady spread of open systems architecture, driven by UNIX, communications standards, use of SQL as the data base language of choice, and the general standardization of the underlying information systems technology is shifting the focus more and more towards the actual solution—the applications software product, along with implementation and support services—and away from the platform.

The trend towards a standard platform can potentially take sales away from the turnkey systems vendors and VARs. In most large equipment sales today, the hardware typically goes straight from manufacturer to customer site, with little necessity for a turnkey system vendor. The reason for this is that installing equipment—workstations and PCs—is simpler and less time-consuming than it used to be, due principally to the availability of more standard platforms. This state of affairs has left the turnkey vendor with less value to add in terms of implementation services. It has also provided an opportunity that some turnkey systems vendors and VARs have pursued—LAN integration.

Many turnkey vendors no longer directly handle the equipment, with the systems manufacturers assuming direct responsibility for that portion of the total solution. Vendors such as Interleaf and ASK have changed their strategy to more closely align with that of applications software products companies. Only a few very large turnkey companies remain—Intergraph and Prime Computer, for example—which produce the entire turnkey system, including the equipment and applications software.

As a new generation of powerful distributed workstations enters the market, the same non-turnkey approach will likely take hold as well, especially as UNIX-based workstation architectures provide a stable platform for software developers.

3. A More Strategic Purchase

Integration—not only of applications software products with each other and with RDBMSs, but also integration of hardware platforms—has become a key application solution requirement. Integration eliminates the need to enter and store the same information several times, reducing the amount of disk storage needed, and provides for efficient verification, updating and editing of information by users at their terminals.

Primarily because of these integration aspects, the size of a purchase and the complexity of the decision is expanding. More people must therefore be involved in the purchase decision, and selling cycles are elongated. Top corporate executives, not just the IS head, get involved. Vendors are reorienting their sales strategies in response to these trends.

Vendors are beginning to create strategies and organizations to assist in customers' integration efforts. For example, to coordinate integration strategies, IBM recently created a Systems Structure and Management unit, charged with overseeing cooperative processing, client-server computing and integration between the company's SAA and AIX platforms. It also created a second unit that will coordinate the development of all operating systems for personal computers and workstations.

4. User Involvement and Role of Operating Executives

The role of the end user in information technology and application solution decisions has been changing steadily since the early 1980s. Once the PC and end-user 4GLs proved what could be done by a programming novice, management began to be more aware of their impact on and potential for information systems.

By the late 1980s, with the advent of systems integration projects and the direct selling of general management by systems integration and professional services vendors, many of the larger-purchase decisions were being made as part of major systems decisions by senior operating management. The impacts of these changes on the application solutions selection (both applications software products and turnkey systems) include both positive and negative growth factors:

- The application systems planned have become more complex, leading to more significant and difficult decisions. The result is often a slower decision.
- The solution typically encompasses more than the application software product. Initially this created the market for turnkey vendors who did integration without customization. Today, customization is common; the solution includes multiple application software products from more than one vendor—thus, the systems integrators' role.
- On the positive side, the involvement of senior user management has increased the pressure for compromise, which has directly helped the applications software market.

C

Price and Investment Pressure

Declining hardware margins contribute to declining margins for turnkey systems vendors and VARs. The future focus will clearly be on the applications software products portion of the equation.

The high costs of applications software product development and shortening product life cycles will increasingly require use of outside capital resources to fund new product development and expand marketing presence, except for the largest of application solution vendors.

- As this scenario is unfolding, a major source of traditional outside capital, the public stock market, is turning lukewarm on high-technology investments. Thus, more of the funding for new product development will likely have to come from within the industry—the larger, better capitalized companies.
- Due to limited capital resources, application solutions vendors are forming alliances and are making a push for standards so they can leverage their development efforts.

- To help assure the existence of applications software product and turnkey systems alternatives, the major hardware manufacturers (IBM and DEC) and the larger services firms (Andersen and EDS) are making minority investments in numerous software companies (both systems and applications software products). In addition IBM, DEC and others have moved to help the turnkey/VAR vendors by reducing competition between VAR sales representatives and those of the manufacturer. The commission structures reward both regardless of who makes the sale.

These changes will help offset some of the price and investment pressures being felt throughout the software vendor community and will help assure that there is an adequate flow of new applications software products.

D

Changing Distribution Channels

Users select channels based on what role they want the vendor to play. Due to increasing complexity and levels of integration, customers are increasingly seeking a single point of contact. This single point of contact could be a systems integrator, a systems operations company, an applications software products company, a turnkey systems vendor or VAR, or a professional services firm. Thus, the channels of distribution for application solutions are complex and interwoven, with many different kinds of vendors participating at different levels, as shown in Exhibit V-5.

EXHIBIT V-5

Application Solutions Market Changing Distribution Channels

- SI and SO
- Application software versus turnkey
- Turnkey/VAR versus systems integration
- National versus regional VARs
- Importance of alliances
- Channel conflict

1. SI and SO

The role of systems integration and systems operations vendors in the sale and support of applications software products is growing steadily.

- Applications software is the foundation of Systematics' systems operations business in the banking industry.
- EDS assesses its prospective systems operations customers based on the opportunity to leverage the customers' internal application systems into marketable application software products.
- Andersen has formed alliances, and acquired rights to application software products to help drive its systems integration business.

Software will be 7% of the systems integration market in 1990. Success in the 1990s for many applications software products firms will require an alliance with one or more systems integration or systems operations vendors.

2. Turnkey/VAR versus Systems Integration

Turnkey vendors and VARs will need to provide more systems integration services. A small percentage of turnkey vendors/VARs will perform system integration services themselves. Many others, reluctant to increase SI capabilities, will opt to focus on what they do well—applications software. It is likely that the majority of SI work will be performed through alliances that turnkey vendors form with systems integrators and professional services firms.

Intergraph, for example, has a Registered Consultant program for third-party systems integrators to provide SI services to Intergraph customers. Intergraph prefers to sell core systems and develop applications software. Intergraph's current attitude is that it is not worth its time to do consulting, and would prefer to hand over such work to another SI firm.

3. National versus Regional VARs

The VAR sector has grown primarily on a geographical basis, with the majority of the VARs serving a limited regional area. However, as users and information services departments turn to VARs for ongoing support rather than turnkey solutions, geography is becoming a factor.

Opportunities like the one Kodak offered Businessland—to provide full support to its personal computer users—are only possible through companies of Businessland's size and geographical coverage.

As a result, companies such as Evernet are being formed that are building nationwide VARs through acquisition. In the past year, Evernet has acquired VARs that specialize in installation and support of local-area networks. As Evernet's geographical coverage expands it will be equipped to support organizations nationwide and will have a strong advantage over more narrowly focused regional VARs.

4. Importance of Alliances

Size is becoming more important, as a predictor of both survival and the level of support an applications software products or a turnkey systems company can deliver to its customers.

Although there are few barriers to entry in the software arena, it is questionable whether a small software company or VAR can remain viable without strong alliances. VARs and the smaller turnkey systems vendors are at a disadvantage in terms of geographic reach. They may have the best software for a specialized niche, but no way to expand their customer base; marketing alliances are a key requirement for growth.

Small companies can no longer expect to survive on their own in the long term. Such companies need a broader distribution reach, and the advertising, marketing and public relations that only a larger buyer can provide. Size alone provides far greater benefits to the business side of a software operation than it does to product idea generation.

Luckily for them, VARs and the more traditional turnkey systems vendors are finding that computer manufacturers and professional services firms are interested in forming strategic alliances. Over the next few years, alliances can be expected to reach the level of minority investments, similar to those made by computer manufacturers in the applications software area.

For example, EDS and HP have recently invested \$60 million, representing 30% of equity, in ASK. This investment made it possible for ASK to purchase Ingres. As ASK is a key applications software supplier to the manufacturing sectors, HP and EDS will both benefit through the formation of marketing alliances with ASK to sell to this sector.

EDS, an outsourcing and integration company, distributes ASK products as part of its service offerings, and ASK positions EDS as a preferred integrator for ASK customers. This provides a new distribution channel for ASK and Ingres. EDS will "sell" these products in the context of systems integration projects or facilities management contracts only.

Computer manufacturers are interested in assuring the availability of applications software solutions on their platforms, particularly manufacturers shifting to open systems architectures. The result is favored treatment in joint marketing efforts.

Likewise, professional services firms and systems integrators are interested in maintaining client control and in assuring their ability to offer solutions, not just consulting and systems development services. They need VARs with unique vertical industry application solutions that they can offer to their clients through joint sales and subcontracting relationships.

Small applications software companies will also benefit through alliances with not only hardware manufacturers and professional services firms and systems integrators, but also turnkey systems vendors and VARs.

The expanding role of professional services and systems integration firms in major application solutions requires modified sales strategies, as this can remove selection authority from the final customer and place it in the hands of another vendor.

5. Channel Conflict

The increasing presence of equipment and software companies, distributors, agents/brokers and computer retailers in the turnkey systems/VAR marketing channel has made channel conflict a principal issue for independent turnkey systems vendors. Over the last year this has led hardware vendors to introduce new schemes that have dramatically reduced channel conflict, yet continue to maximize the benefits of using third-party sales channels. Hardware vendors have tried to maximize the sell-through side of business so that OEMs, systems integrators and VARs can take more responsibility for the sale.

Particular strategies include:

- Commission schemes whereby a hardware vendor's direct sales force is paid the same, irrespective of who actually makes the hardware sale—manufacturer or VAR
- Commission schemes based on how much a customer buys rather than how much the direct sales rep sells. Measurement schemes require the direct sales rep to report what his customers buy, irrespective of whom they bought it from. This scheme is meant to minimize conflict over who gets the hardware order and to enhance the direct sales force's ability to manage its territories.
- Dual aggregation for customer discounts, so that the customer gets the discount even if he buys hardware from two sources. Thus, there is no disincentive to buy from a turnkey vendor rather than a hardware vendor, because the discount is cumulative.
- Making the relationship between hardware vendor and turnkey vendor/VAR more of a partnership, particularly for larger accounts. For

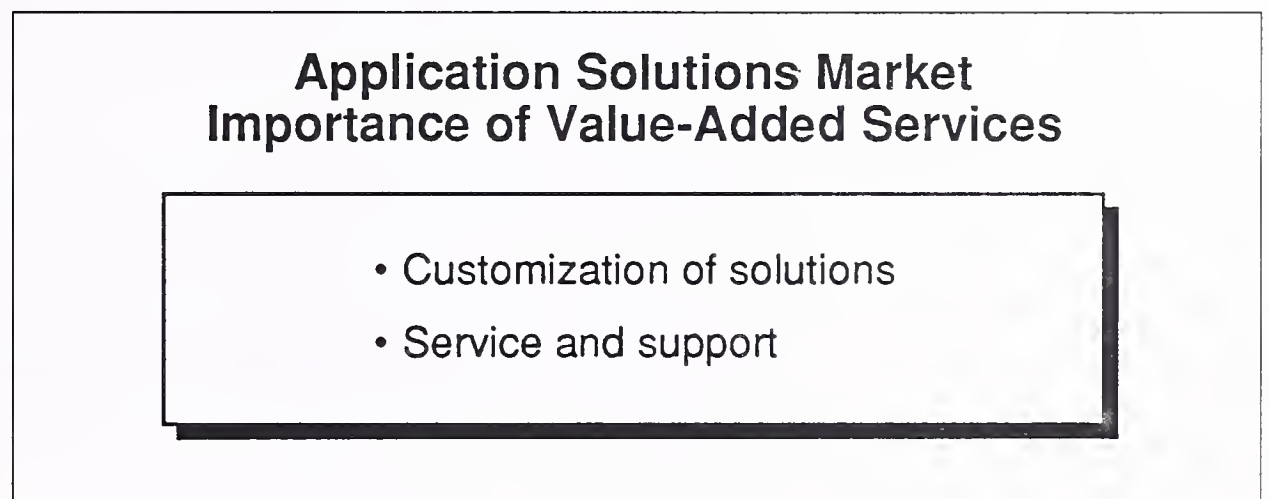
example, IBM calls its partners industrial resellers (IRs); Hewlett-Packard has value-added businesses (VABs); and DEC has complementary solution organizations (CSOs), all of which connote more than just a delivery mechanism. Partnerships will become increasingly important as vendors and their turnkey suppliers find themselves competing with other hardware manufacturer/VAR sales relationships in the trend to total solutions selling.

E

Importance of Value-Added Services

The VAR market is changing in a number of ways. The principle change is towards increased dependence on services as a source of revenue. Important aspects of value-added services are shown in Exhibit V-6.

EXHIBIT V-6



1. Customization of Solutions

Ease of customization is an important attribute of applications software products and, to a growing degree, turnkey systems.

Leading vendors are now more often providing custom consulting services. They recognize that in spite of lower margins on services versus software products, they can gain overall market share and increase company revenues. If they do not offer these services, someone else will.

The ability for smaller companies to gain true value out of today's personal computer- and server-based applications products is predicated on some level of customization. The ability for a VAR to develop a profitable business from low-priced hardware and software is also dependent on customization services.

2. Service and Support

The increasing power of smaller computers is allowing many businesses to increase their use of computing throughout their operations. At the same time, smaller businesses (\$20 million or less in revenue) are reluctant to make the staff commitment often required.

Today's VAR needs to be prepared to offer and to proactively provide service and support after the initial installation. The smaller business cannot track technology, and cannot supply staff for service and support, yet if the business grows it will need to know when to change the application solution. The VAR, like the larger systems integrator, has the opportunity in the 1990s to develop and retain lasting client relationships.

F

Market Specialization

1. Regionalization

Regionalization is both a strength and a deterrent to growth for VARs.

- Limited geographical coverage prevents larger organizations from using VARs on a broad basis, but offers VARs the opportunity to gain strong control of a local or limited geographical market.
- National coverage gains access to larger dispersed organizations, but increases the business pressure of the VAR to provide equal services at all locations. Fast expansion of a services-based business has often proved to be difficult and at times leads to negative business growth or even failure. Evernet's process to gain national coverage through acquisition of established LAN VARs will provide a test of that strategy.

2. Technology

Technology specialization will, in the near term, prove to be a basis for growth. Today's ever-expanding information technology base is making it possible for information services companies of all sizes to know and understand specific technologies better than the information systems function of even the largest organizations. Technology specialization rather than diversification should prove to be a stabilizing factor for VARs.

On the other hand, applications software products companies will find themselves under pressure to broaden coverage of their products across platforms of differing technology. Every DEC VAX application vendor is challenged today to offer UNIX-based solutions. Doing so will tax the marketing and development resources of many of them and can lead to slower growth in the near term.

G

Future Issues and Trends

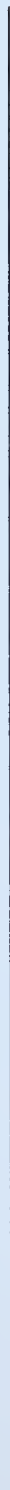
The following are projections for 1995 and beyond, relative to the application solutions markets.

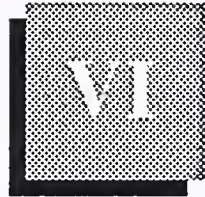
- The key link to success may be how to compete when the basis for applications software products is open systems and portability.

- More emphasis will be placed on integration services, not only as ways to differentiate, but to provide growth and profit.
- Due to the general sameness of all applications software products, value-added features and functions and ease of use will become even more important buying criteria.
- In addition to RDBMS-based client-server application solutions and integration services, new technologies will become necessary for turnkey suppliers and VARs to enhance their product offerings. These will include: voice recognition, voice response, multimedia and natural language interfaces.



Competition





Competition

In this chapter INPUT analyzes the key competitive trends facing the applications software and turnkey systems markets and profiles leading vendors.

A

Competitive Strategies During the next five years, emphasis will continue to shift from vendors that provide specific products and services to vendors that can integrate not only a variety of applications software products, but also a variety of hardware platforms. Customers now want complete, integrated solutions from one vendor, be it an applications software products vendor or a turnkey systems vendor. Examples of companies that are pursuing this strategy are:

- During the past year, Oracle entered the human resources, accounting, and manufacturing sectors from a systems software (RDBMS) orientation. The company is also launching into the market for integrated CASE solutions for multiple platforms.
- In 1989, turnkey systems supplier Auto-trol reoriented its strategy so as to provide total integrated solutions, including integration of hardware platforms and customized and standardized software.
- Microsoft is redirecting its energy into connectivity among platforms, applications and network operating systems through heavy emphasis on LAN Manager.

In response to market demand, applications software products and turnkey vendors are also beginning to port their products to standard platforms and client-server architectures.

- Lawson Associates, a long-time supplier of financial, HRMS and distribution software that operates on IBM AS/400s, is counting on UNIX as the major growth spot for its company over the next five

years. Lawson has recently ported its software to IBM's AIX and HP-UX and is working on ports to the UNIX implementations of Sequent Computer Systems and DEC.

- Auto-trol is adapting all software programs to UNIX.
- PeopleSoft, a newcomer, is starting off with a client-server human resources package.

Until now, a key way for vendors to expand was to develop or purchase additional platform offerings. Companies that have expanded by acquiring firms that support other platforms, or expanding their own development efforts into other platforms are limited in what they can develop for each platform. They have had to grapple with the question: which is more important, breadth or depth? This question will become less strategic as standards set in.

Turnkey systems vendors continue to move away from proprietary hardware and to diversify away from reliance on turnkey sales. For example:

- In 1990 a leading electronic publishing vendor, Interleaf, exited the turnkey systems marketplace by discontinuing its hardware sales and increasing its emphasis on software and services. Interleaf is aggressively building its systems integration capabilities and is also creating strategic business units focused on target markets to allow it to become partners with its largest customers.
- CAD/CAM vendors Intergraph, ComputerVision, Applicon and Schlumberger have all exited the hardware business.

B

Shifting Market Structure

If one phrase could characterize the applications software products and turnkey systems competitive environment, it would be interwoven and complex. A number of converging trends described throughout this report are creating a confusing competitive environment that is not expected to settle out until the end of the forecast period.

1. Overlapping Products and Services

Applications software and turnkey companies are in some instances competing against one another and in other instances are in alliance with each other. This is happening to such an extent that INPUT believes the two delivery modes may merge within the next five years, as turnkey systems vendors continue to exit the hardware reseller business and as hardware vendors enhance sales through applications software offerings.

Applications software and turnkey systems vendors have been steadily expanding their product offerings to related software service areas such as professional services (consulting, education and training), software development, systems integration and software integration. This places them in head-on competition with professional services and systems integration firms.

For the most part, different sets of applications software products vendors and turnkey systems vendors/VARs still compete in different vertical and cross-industry sectors. But this, too, is changing. A trend is underway for vendors—and not just the larger firms such as Computer Associates and D&B Software—to play in multiple market sectors, or for single companies to offer a complete set of applications software products for a specific vertical sector, particularly as integration becomes more of a selling factor.

2. Consolidation to Continue

The fundamental reasons for consolidation are to acquire technology and/or to gain market share:

- Turnkey systems vendor ASK acquired Ingres as it broadens its product offerings to include 4GL application development tools, and advanced relational data bases as well as applications software and hardware. ASK's plan is to sell these additional products and to use Ingres' tools and data base products to develop a new-generation manufacturing information system for open, networked computing.
- McCormack and Dodge Corp.'s acquisition by Dun and Bradstreet Corp. and its subsequent merger with Management Science America Inc. into Dun and Bradstreet Software Services is a case study of the consolidations occurring among mainframe computer software publishers. Software companies seek economy of scale, existing sales forces and cash support through mergers as software products are impacted by lower hardware sales growth.
- The most celebrated acquirer in the software products arena is Computer Associates, which has acquired a total of 20 companies during the 1980s, half of which are applications software products firms. Through its acquisition strategy, Computer Associates has amassed a very large customer base in a wide variety of vertical and cross-industry markets and is seeking to integrate them all through its CA90s standard architecture strategy.
- Turnkey vendor Mentor Graphics acquired Performance CAD, a maker of integrated circuit timing analysis tools in 1989; and Silicon Compiler Systems, a vendor of electronic design automation software for integrated circuit design, in 1990.

Due to the continued decline in stock market interest in high-technology companies, fewer IPOs are taking place, and venture capital funding has dwindled. Thus, opportunities for acquisition—either of entire companies or of product lines—abound for vendors evaluating make-versus-buy product expansion decisions.

The applications software products and turnkey markets are still very fragmented. This also suggests that there is significant potential for achieving increased market share through acquisition.

The eventuality of standards will cause more consolidation, as will the continuing need in the marketplace to eliminate redundancies. Consolidation will be fueled by the fact that a number of similar product offerings exist in the marketplace, which in a merger can lead to a reduction in overhead redundancies and the benefits of economy of scale.

Consolidation will also be fueled by the fact that large vendors are better able to afford the investment necessary to cover the increasing costs of product development related to more complex software product requirements. Computer Associates—the largest independent software vendor—has some 3,000 systems analysts and programmers at work on CA90s.

Mergers can be advantageous financially, but may mean employee layoffs, problems with disparate corporate cultures, and reduced support for customers, who express concern about systems being switched between vendors. In the meantime, however, the vendor gets an expanded customer base and new markets.

3. Lawsuits

The added value that both applications software products and turnkey systems companies provide is applications software. In light of the myriad of vendors that are adding services to their offerings, applications software will remain a critical differentiator. This suggests that patent infringement suits are likely to become increasingly common through 1995.

- A recent example is Integral Systems' lawsuit charging that a pair of former executives illegally used Integral trade secrets and proprietary information in the development of HRMS products at PeopleSoft.
- A number of lawsuits have been filed among the leading software vendors to protect the "look and feel" characteristics of their user interfaces.

C

Market Shares/
Leading Vendors

Competitive trends affecting market share include:

- Except for the very largest of players, the key competitors in the applications software and turnkey systems marketplace as a whole vary from year to year as firms are acquired and new companies enter.
- Applications software start-ups will continue to enter the market. It costs close to nothing to launch a software start-up. Much of the product innovation in the software industry has come from the smaller, entrepreneurial companies.
- On the other hand, the requirement for integration services, translation software, and support makes cost of entry prohibitive for a turnkey vendor or a VAR who doesn't already have the infrastructure in place.
- The market is fragmented and will continue to be so as the majority of vendors specialize in specific vertical and cross-industry sectors. Thus, although a company may have a relatively small share of the overall market, it could be a leader in its vertical niche.
- Because of declining profit margins on their hardware, more competition will come from hardware vendors who also have their own applications software products. As mentioned above, these companies are eager to form alliances with applications software products vendors and VARs. It will become more difficult to know what market share each vendor has, due to confusion between sales of its own products and sales of other third-party applications software products.
- Traditional applications software products companies with predominantly mainframe-based products that do not make a timely transition to workstation- and RDBMS-based products and client-server architectures will lose substantial market share. This is a difficult transition for these companies because they must continue to cater to the needs of their existing clients and assist them with migration to new technology products without eliminating the usefulness of the existing product base, and at the same time attract new customers with entirely new products.
- Likewise, turnkey systems vendors who do not port their products to standard platforms will face increasing difficulties in terms of staying power.

The leading applications software products vendors are shown in Exhibit VI-1, and the leading turnkey systems vendors are listed in Exhibit VI-2. Revenues for each company are developed from a combination of INPUT interviews and information from INPUT's vendor files. Revenues are noncaptive U.S. revenues only.

EXHIBIT VI-1

Leading Applications Software Products Vendors

Vendor	1989 Revenues (\$ Millions)	Market Share (Percent)
IBM	700	4
Groupe Bull	460	3
Lotus Development	329	2
Dun & Bradstreet	295	2
Computer Associates International	227	1
Microsoft	206	*
Covia	140	*
Hewlett-Packard	138	*
Cadence Design	115	*
Lockheed	110	*
Software Publishing	94	*
Unisys	92	*
Control Data Corp.	87	*
Ashton-Tate	84	*
Claris	82	*
Digital Equipment	82	*
Auto Desk	80	*
Subtotal	3,321	20
All Other	12,887	80
Total	16,208	100

*1% or less per vendor.

Only 17 applications software products have revenues in excess of \$80 million. No single company has even a 5% share of the overall market (the reader is referred to individual industry sector reports for listings of leading vendors by sector.) Note that the information in these two exhibits shows vendor revenues rather than user expenditures.

Traditionally, the largest companies in the applications software products industry have been the suppliers of mainframe and minicomputer software, due to the higher unit pricing of microcomputer software. Historically, this pricing has been based on the rule-of-thumb practice of pricing software proportionate to the cost of the hardware on which it runs.

The largest companies in the 1990s will not necessarily be the same as the largest companies in the 1970s and the 1980s, which were undergoing evolutionary changes and were all still host-based. Now the market is switching to workstations and client-server architectures. Only those that successfully re-engineer their software, or have the funds to develop entirely new products from the ground up, to run on intelligent workstations will survive. In the meantime, a new group of major players could emerge, which may include European and/or Japanese giants.

The turnkey systems market consists of a large number of vendors (over 7,000), with only a modest number (perhaps 150) having annual revenues over \$10 million. The vast majority have revenues under \$2 million.

The list in Exhibit VI-2 represents the large turnkey companies, many of which have been in existence for several years and that play a strong role in one or more vertical industry markets. One example is Reynolds and Reynolds, which has long had a leading position in the automotive dealership market. Note that computer systems vendors who also sell software bundled with their general-purpose hardware are not considered turnkey systems vendors and are therefore not listed.

EXHIBIT VI-2

Leading Turnkey Systems Vendors

Vendor	1989 Revenues (\$ Millions)	Market Share (Percent)
Intergraph	442	5
Mentor Graphics	426	4
Reynolds and Reynolds	185	2
Schlumberger/Applicon	158	2
Gerber Scientific	150	2
Mentor Graphics	146	*
Triad Systems	128	*
HBO	107	*
National Computer Systems	103	*
Bolt, Beranek & Newman	95	*
EDS	95	*
Shared Medical Systems	74	*
Interleaf	64	*
Agency Management Services	62	*
Cerner	50	*
Subtotal	2,285	24
All Other	7,239	76
Total	9,524	100

*1% or less per vendor.

D**Vendor Profiles**

The following are profiles of several of the independent applications software products and turnkey system companies mentioned in this report. They are representative of the types of companies and strategies operating in the application solutions marketplace.

1. ASK Computer Systems, 2440 W. El Camino Real, Mountain View, CA 94039-7640

ASK Computer Systems is a turnkey vendor and supplier of financial management information systems for manufacturing companies (MANMAN). It is a leader, with approximately 40% share in this niche.

ASK's recent activities include:

- Ongoing development of a new client/server-based product line, Advance. This product will incorporate all of the functionality of its existing MANMAN product plus additional features/functions.
- Expansion beyond turnkey systems into application development tools through acquisition of Ingres
- A major new extension to its existing product line aimed at additional manufacturing sectors—process-oriented manufacturers

In September 1989, ASK acquired applications software products company Data 3 Systems, which develops, markets, and supports proprietary integrated manufacturing software systems and support services for the IBM /36, /38 and AS/400 computer systems.

In addition to being available as part of a turnkey system, ASK's MANMAN applications software product can also be licensed separately or used by the customer through the company's ASKNET on-line remote processing service.

The company, with fiscal 1990 revenues of \$207 million, is positioning itself as the dominant supplier of UNIX and client-server applications software solutions to the manufacturing sectors. The combined revenues of ASK and Ingres, acquired in December 1990, approach \$400 million.

2. Auto-trol Technology Corporation, 12500 N. Washington, Denver, CO 80233

Auto-trol is a turnkey supplier to companies involved in building design, industrial plant design, process plant design, electronic publishing, telecommunications, mechanical design and analysis, and machine tooling. The company has positioned itself as a turnkey supplier of 32-bit workstation-based solutions with special expertise in distributed data processing environments and networking. It has reseller agreements with DEC, Sun, and HP/Apollo for their hardware platforms.

Fiscal 1989 revenues were \$77.4 million, down slightly from fiscal 1988. Net earnings for 1989 were a negative \$2.4 million.

During 1989, Auto-trol reoriented its strategy to provide total integrated solutions, including integration of hardware platforms and customized and standardized software. The company is adapting all of its software to UNIX and has introduced new applications packages integrated with a RDBMS.

Auto-trol's annual report characterizes the company as a systems integrator. The company provides the following services:

- On-site consultation
- Integration planning
- Training
- Installation
- Start-up assistance
- Implementation
- Solution customization
- Drawing conversion
- Data base creation
- Special products
- Hardware and software service

3. Barrister Information Systems Corporation, 45 Oak Street, Buffalo, NY 14203

Founded in 1972, Barrister is an example of a turnkey systems vendor that has focused on a vertical industry—the legal profession—and which has become predominantly a systems integrator. Today, approximately 60% of its revenues comes from systems integration and other services, and this percentage is expected to increase.

Barrister has also broadened its equipment base to include not only its proprietary hardware minicomputer platform but also IBM's AS/400 and PS/2, AST, and Wyse workstations; the company is seeking other hardware vendors to ally with. In addition, Barrister is porting its applications software products to UNIX.

Implementing a broader technology-based strategy has not been without difficulty. In 1989, the shift to microcomputer- from minicomputer-based products negatively impacted revenues, and the focus on UNIX has increased development costs and delayed new product availability. In fiscal 1990, revenues were \$29.1 million, down from \$31.9 million in fiscal 1989. This impact in part is the reason for Barrister's shift towards more emphasis on services.

In 1991, Barrister will introduce its Advanced Law Firm Financial Management System (ALFMS), which will be based on a client-server architecture and which will initially run on Barrister hardware. Future versions will run on standard platforms.

The strategy shifts Barrister has made are typical of those being made by many turnkey/VAR vendors to position themselves for the 1990s.

4. Computer Associates International, Inc., 711 Stewart Avenue, Garden City, NY 11530-4787

Computer Associates (CAI) is well recognized as the largest software products company, with major products lines in both systems and applications software and on all three platform levels—mainframe, midrange, and workstation/PC. The growth has been fueled by acquisition throughout the 1980s, the three most prominent being UCCEL (1987), Applied Data Research (1988), and Cullinet (1989).

Computer Associates' strategy reinforces a number of the trends impacting the applications software products and turnkey markets:

- Consolidation as just highlighted. CA has both grown through acquisition and has suffered, at least in the recent period, because of it. The impacts of the Cullinet acquisition on sales and income growth have been negative in the early part of 1990.
- CA90s is the technical foundation for over 250 Computer Associates Enterprise Software Solutions. It consists of three levels of services:
 - User Interface and Visualization Services act as the point-of-entry for users, provide a consistent look and feel for users across the CA-CAS product family, and provide common reporting tools.
 - Integration Services supports overall integration among solutions; services include data base integration and advanced security capabilities.
 - Distributed Processing Services supports distributed data base operations across multiple platforms.
 - Platform Layer allows solutions to extend across a wide range of operating systems and hardware environments. Although the CA-CAS system currently supports the IBM mainframe platform exclusively, CA90s facilitates migrating this solution to multiple operating platforms.
 - CA Repository Services offering is described by the company as a major component of the company's CA90s.

As the largest independent software company, CA is working hard to provide a framework for its future in the eyes of its customers. It is having difficulty selling products because the market views it as acquiring mature products in which CA will not make a significant investment.

5. Dun & Bradstreet Software Services, Inc., 3445 Peachtree Road, NE, Atlanta, GA 30326-1276

Dun & Bradstreet Software (DBS), a company of The Dun & Bradstreet Corporation, was formed in March 1990 by the merger of Management Science America (MSA) and McCormack & Dodge (M&D).

D&B plans to offer a migration path from the current MSA and M&D products to a future architecture encompassing open systems, including IBM's SAA and UNIX. D&B will also continue to support both the E series software from MSA and the M series line from M&D.

The merger is an indication that the mainframe software market is slow; survival through consolidation may also be a means of growth. D&B Software has lost sales momentum as a result of the merger, as customers wait to see how the product lines shake out.

6. Integral Systems, 2185 N. California Blvd., Walnut Creek, CA 94596

Integral's strategy is to offer a complete portfolio of financial, accounting, and human resources management software across all of IBM's SAA-compliant platforms. INPUT estimates revenues for Integral Systems at approximately \$76 million for calendar 1990.

Integral is one of the few companies that has DB2 versions of its financial applications as well as OfficeVision capabilities for both financial and human resources products.

Integral initially entered the accounting software business with its acquisition three or four years ago of Sysgem, which provided a full range of accounting and human resources software products. In August 1989, Integral Systems merged with Data Design, a company specializing in financial management software for IBM mainframes and workstations.

Integral is expected to continue a strategy of growth by acquisition.

7. Intergraph Corporation, One Madison Industrial Park, Huntsville, AL 35807-4201

Intergraph is a turnkey supplier of systems that support design, drafting, and analysis functions. Its four main markets are architectural and civil engineering, geographical information systems mapping, mechanical

design, and federal systems. Revenues for the fiscal year ending December 1989 increased 7% to \$860.1 million. Net income decreased 10%.

In 1984, Intergraph underwent a major transition in its product strategy from using DEC's minicomputers as the primary hardware platform to using its own workstations based on the CLIPPER microprocessor. Although this strategy was first implemented six years ago, Intergraph is still experiencing the adverse impact of the lower selling prices that workstations, versus minicomputers, command.

Intergraph CLIPPER-based workstations and servers are based on a common RISC hardware platform and run under Intergraph's UNIX operating system. All software is therefore compatible across models. Intergraph has a marketing alliance with Informix whereby Intergraph sells Informix RDBMS products. Intergraph products are integrated and based on the Informix RDBMS. Intergraph also resells Oracle and Ingres RDBMS products.

Intergraph has made the following acquisitions during the last several years:

- In 1987, Intergraph acquired the CLIPPER Division from National Semiconductor.
- Intergraph, in late 1989, acquired Quintus Computer Systems of Mountain View, CA. Quintus, which had approximately \$3.3 million in revenue for 1988, is one of the leading suppliers of Prolog-based software development tools.
- In December 1990, Intergraph acquired Daisy/Cadnetix, which had been under Chapter 11 protection since May. Daisy produced systems for the computer-aided engineering market.

Because the trend towards systems with higher performance and lower prices is continuing, the company must continue to sell its products in higher volumes and at lower cost, or to sell additional services in order to maintain or exceed historical revenue levels. A key challenge for Intergraph will be to continue to succeed with a proprietary hardware platform, given the increasing emphasis in the marketplace on standards.

8. PeopleSoft, Inc., 1600 South Main St., Walnut Creek, CA 94596

PeopleSoft was founded in 1986 by the co-founder and former chairman of Integral. It is a good example of a new breed of companies offering decentralized capabilities to a marketplace once dominated by centralized mainframe software product offerings.

Its core product, PSHRMS, incorporates:

- Client/server data base model
- Relational data bases, including DB2
- SQL
- IBM's SAA (PeopleSoft is an IBM Business Partner)
- Workstations
- Graphical user interface (Windows or Presentation Manager)

PeopleSoft's PSHRMS operates on a variety of computers (LANs, midranges, and IBM mainframes) and data bases (DB2, SQLBase, SQL Server, and Oracle).

PSHRMS consists of three fully integrated functional components: payroll, human resources, and benefits. PSHRMS also has several report writing options and PeopleTools, as well as a set of proprietary customization facilities. PeopleTools helps customers implement PeopleSoft HRMS more quickly. Through PeopleTools, users can modify existing screens and data base records, as well as add new ones, without programming. The goal of PeopleTools is to lower maintenance, enhancement, and operator training costs.

PSHRMS also has a kiosk module for employee access to benefits and selected personal data. PSHRMS, built from the ground up, is exemplary of the new generation of human resources products that are just beginning to appear on the market. Technology rather than functionality is driving its sales.

PeopleSoft has the advantage of not having to please an existing customer base. It sells to Fortune 1000 companies in all vertical markets.

9. Ross Systems Inc., 555 Twin Dolphin Drive, Redwood City, CA 94065

Ross Systems provides financial management, accounting, distribution, human resources, and business productivity application software products and associated support services exclusively for DEC VAX series computers. The company also provides education and consulting services and processing services.

Ross Systems in many ways typifies the challenges facing the traditional application software products firm. Though smaller than the traditional mainframe software companies, Ross has found expanding beyond the traditional DEC-based accounting application area a struggle. Under new ownership and management since late 1988, Ross has launched a growth-by-acquisition strategy, and most recently announced solutions to the software technology challenges it faces.

- In 1989, Ross acquired Cardinal Data Corporation, adding software for the distribution industry, and in early 1990, acquired Argonaut Information Systems, adding a line of human resources application products.
- At the same time, Ross has launched a technology transition for its existing products, the Renaissance Series, which fulfills the need to provide RDBMS versions, address portability, and simply upgrade products to compete with the Oracle financial products. Ross accounting software ties into Comshare's EIS and Access Corporation's 2020 spreadsheet. Ross is also making a major product development push into the RDB (DEC relational data base) market.
- Ross is also using marketing alliances to broaden its appeal and to provide greater leverage for its sales and marketing efforts. Alliances with a 4GL developer (SmartStar), an RDBMS developer (Ingres), the leading marketer of executive information systems products (Comshare), plus stronger ties to Digital Equipment are all part of its efforts to be the largest provider of DEC application products.
- Ross Systems also has a cooperative marketing agreement with Ingres (ASK) under which the two companies will cooperatively market the INGRES toolset with Ross Systems' Renaissance Series of financial management and accounting software and will work to prototype an INGRES-based version of Renaissance applications for DEC's ULTRIX operating system.

Ross Systems' overall strategy is to build a broad-based VAX application software company by acquiring other companies offering complementary cross-industry or specific vertical market software products. Through a combination of accelerated internal growth and acquisitions, Ross Systems' goal is to reach \$100 million in annual revenues by 1992. Ross Systems management estimates that fiscal 1990 revenues will exceed \$36 million.

10. Triad Systems Corporation, 3055 Triad Drive, Livermore, CA 94550

Triad is a turnkey systems supplier to three vertical markets: automotive parts after market, retail hardgoods dealers, and dentists. The company also provides automotive parts pricing and catalog updating data bases for electronic information services. Triad also provides lease financing to many of its turnkey system clients through its wholly owned subsidiary, TSC Leasing Corporation.

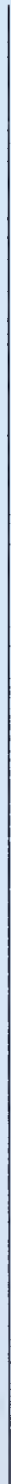
Fiscal 1989 revenue reached \$148 million, a 9% increase over fiscal 1988. Net income, however, declined 32% to \$5.7 million in fiscal 1989.

In August 1989, following a hostile takeover attempt, Triad completed a recapitalization, resulting in the reclassification of outstanding common stock. During 1989, the company recorded nonrecurring charges of \$7.4 million, related primarily to Triad's successful takeover defense.

The company's strategy is to increase its installed base through greater penetration of the retail hardgoods and dental markets and through expansion into additional segments of the automotive parts after market. The company also seeks to increase its installed base through acquisitions of product lines or businesses in its existing vertical markets.



Conclusions and Recommendations





Conclusions and Recommendations

A

Conclusions

The growth rate of user expenditures on applications software products was 23% for the period 1985 to 1989; and the growth rate for turnkey systems for that same period was 11%. The next five-year period (1990 to 1995) will witness a slower growth rate for both delivery modes—14% for applications software products and 9% for turnkey systems.

This slowed growth is due in large part to the transition to standards and open systems, and to client-server architectures, as applications solutions are developed that run on these new platforms. End-user education will be less of an issue for applications solutions compared to systems software. Graphical user interfaces and standards will make application solutions more self explanatory, hiding complexities of computer hardware, networks, and systems software from the user.

Applications software has clearly become the most important ingredient of an information systems solution. Turnkey vendors will continue to deemphasize hardware, and hardware vendors will attempt to regain account control through RDBMS products, network software, or through distribution strategies. A struggle for account control will ensue among applications software vendors, turnkey vendors, and hardware vendors. One-stop shopping is becoming more desirable.

Of concern to vendors is how quickly the market will adopt the new solutions built upon the new technologies. The selling environment will be difficult throughout the forecast period until the new technologies are more entrenched.

B

Recommendations

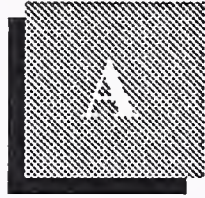
During this forecast period, mature companies with a solid installed base and an already good market position will have an advantage.

For long-term viability in the application solutions marketplace, the following approaches are recommended:

- A migration path to new technology-based application solutions must be provided, and care must be taken so as not to render existing product lines obsolete.
- Only the largest vendors have all the components to be successful; for all the other vendors, focus is therefore a key success criterion.
- Application solutions sales forces are now selling to a larger set of customers, given the enterprisewide nature and integration of many of their products. Sales forces will have change from a tactical to a strategic sell. In previous years, the person who purchased software and hardware was a technical person. Now more and more the end user is helping to make decisions.
- Turnkey vendors must either diminish reliance on hardware or support a broad range of hardware platforms. Vendors are getting more pressure to open up their systems. Customers may still want a turnkey solution but don't want to feel trapped. As platforms become more of a commodity, this will become easier to do.
- Through the 1990s, applications software will become more alike in terms of functionality. Functionality therefore will become less of a differentiator in the long term, except for small niche markets. Vendors will need to differentiate on the basis of:
 - Level of integration
 - Value-added services
 - A lasting technology base
 - Broad applications software offerings
- In light of the integration trend, product breadth is important. A niche company will have to have strong alliances or risk being acquired.
- An applications solutions vendor must be aware of its limitations in providing integrated products and not overextend itself.
- Being large is a criterion for success. Largeness can be achieved through carefully selected and managed alliances.
- Vendors need to assure that their alliances are strategic. In a successful alliance, each company must be strategically valuable to the other. The challenge becomes keeping two companies' strategies complementary over time as management teams inevitably change.

- Consolidation causes temporary chaos and inefficiency as management teams get used to each other and product lines are merged. Acquire for long-term positioning rather than for current market share.
- Firms are selling to a confused marketplace. Provision of high-quality education, service, and support—or aligning with a company that can provide these—is critical to success.

Appendixes



Definition of Terms

A

Overall Definitions and Analytical Framework

Information Services - Computer/telecommunications-related products and services that are oriented toward the development or use of information systems. Information services typically involve one or more of the following:

- Processing of specific applications using vendor-provided systems (called **Processing Services**)
- A combination of hardware, packaged software and associated support services which will meet a specific application processing need (called **Turnkey Systems**)
- Packaged software (called **Software Products**)
- People services that support users in developing and operating their own information systems (called **Professional Services**)
- Bundled combinations of products and services where the vendor assumes responsibility for the development of a custom solution to an information system problem (called **Systems Integration**)
- Services that provide operation and management of all or a significant part of a user's information systems functions under a long-term contract (called **Systems Operations**)
- Services associated with the delivery of information in electronic form—typically network-oriented services such as value-added networks, electronic mail and document interchange, on-line data bases, on-line news and data feeds, videotex, etc. (called **Network Services**)

In general, the market for information services does not involve providing equipment to users. The exception is where the equipment is bundled as part of an overall service offering such as a turnkey system, a systems operations contract, or a systems integration project.

The information services market also excludes pure data transport services (i.e., data or voice communications circuits). However, where information transport is associated with a network-based service (e.g., EDI or VAN services), or cannot be feasibly separated from other bundled services (e.g., some systems operations contracts), the transport costs are included as part of the services market.

The analytical framework of the **Information Services Industry** consists of the following interacting factors: overall and industry-specific business environment (trends, events and issues); technology environment; user information system requirements; size and structure of information services markets; vendors and their products, services and revenues; distribution channels, and competitive issues.

All **Information Services Market** forecasts are estimates of **User Expenditures** for information services. When questions arise about the proper place to count these expenditures, INPUT addresses them from the user's viewpoint: expenditures are categorized according to what users perceive they are buying.

By focusing on user expenditures, INPUT avoids two problems which are related to the distribution channels for various categories of services:

- Double counting, which can occur by estimating total vendor revenues when there is significant reselling within the industry (e.g., software sales to turnkey vendors for repackaging and resale to end users)
- Missed counting, which can occur when sales to end users go through indirect channels such as mail order retailers

Market Sectors or markets, are groupings or categories of the users who purchase information services. There are three types of user markets:

- *Vertical Industry* markets, such as Banking, Transportation, Utilities, etc.
- *Functional Application* markets, such as Human Resources, Accounting, etc. These are also called "Cross-Industry" markets.
- *Generic* markets, which are neither industry- nor application-specific, such as the market for systems software.

Specific market sectors used by INPUT are defined in Section D, below.

Captive Information Services User Expenditures are expenditures for products and services provided by a vendor that is part of the same parent corporation as the user. These expenditures are not included in INPUT forecasts.

Non-captive Information Services User Expenditures are expenditures that go to vendors which have a different parent corporation than the user. It is these expenditures which constitute the information services market.

Delivery Modes are defined as specific products and services that satisfy a given user need. While *Market Sectors* specify *who* the buyer is, *Delivery Modes* specify *what* the user is buying.

Of the eight delivery modes defined by INPUT, five are considered primary products or services:

- *Processing Services*
- *Network Services*
- *Professional Services*
- *Applications Software Products*
- *Systems Software Products*

The remaining three delivery modes represent combinations of these products and services, bundled together with equipment, management and/or other services:

- *Turnkey Systems*
- *Systems Operations*
- *Systems Integration*

Section B describes the delivery modes and their structure in more detail.

Outsourcing is defined as the contracting of information systems (IS) functions to outside vendors. Outsourcing should be viewed as the opposite of *insourcing*: anything that IS management has considered feasible to do internally (e.g., data center operations, applications development and maintenance, network management, training, etc.) is a potential candidate for outsourcing.

IS has always bought systems software, as it is infeasible for companies to develop it internally. However, all other delivery modes represent functions or products that IS management could choose to perform or develop in-house. Viewed this way, outsourcing is the result of a make-or-buy decision, and the outsourcing market covers any product or service where the vendor must compete against the client firm's own internal resources.

B**Industry Structure and
Delivery Modes****1. Service Categories**

The following exhibit presents the structure of the information services industry. Several of the delivery modes can be grouped into higher-level **Service Categories**, based on the kind of problem the user needs to solve. These categories are:

- **Business Application Solutions (BAS)** - prepackaged or standard solutions to common business applications. These applications can be either industry-specific (e.g., mortgage loan processing for a bank), cross-industry (e.g., payroll processing), or generic (e.g., utility timesharing). In general, BAS services involve minimal customization by the vendor, and allow the user to handle a specific business application without having to develop or acquire a custom system or system resources. The following delivery modes are included under BAS:
 - *Processing Services*
 - *Applications Software Products*
 - *Turnkey Systems*

- **Systems Management Services (SMS)** - services which assist users in developing systems or operating/managing the information systems function. Two key elements of SMS are the customization of the service to each individual user and/or project, and the potential for the vendor to assume significant responsibility for management of at least a portion of the user's information systems function. The following delivery modes are included under SMS:
 - *Systems Operations*
 - *Systems Integration*

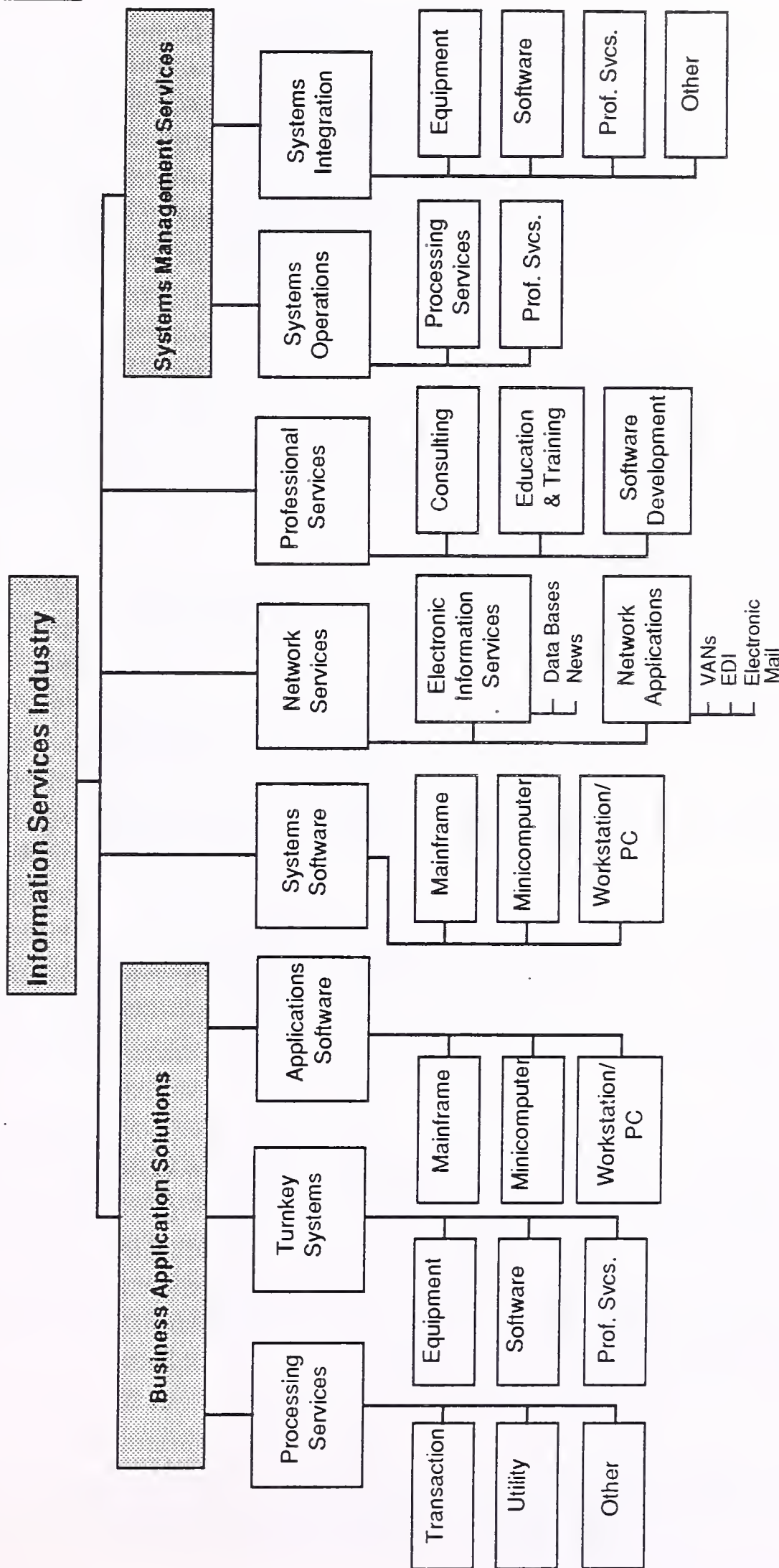
Each of the remaining three delivery modes represents a separate service category:

- *Professional Services*
- *Network Services*
- *System Software Products*

Note: These service categories are a new concept introduced in the 1990 MAP Program. They are purely an aggregation of lower level delivery mode data. They do not change the underlying delivery modes or industry structure.

EXHIBIT A-1

Information Services Industry Structure—1990



Source: INPUT

2. Software Products

There are many similarities between the applications and systems software delivery modes. Both involve user purchases of software packages for in-house computer systems. Included are both lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Vendor-provided training or support in operation and use of the package, if bundled in the software pricing, is also included here.

Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself.

- **Systems Software Products**

Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. These products include:

- *Systems Control Products* - Software programs that function during application program execution to manage computer system resources and control the execution of the application program. These products include operating systems, emulators, network control, library control, windowing, access control, and spoolers.
- *Operations Management Tools* - Software programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Included are performance measurement, job accounting, computer operation scheduling, disk management utilities, and capacity management.
- *Applications Development Tools* - Software programs used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Included are traditional programming languages, 4GLs, data dictionaries, data base management systems, report writers, project control systems, CASE systems and other development productivity aids. Also included are system utilities (e.g., sorts) which are directly invoked by an applications program.

- **Application Software Products**

- *Industry-Specific Application Software Products* - Software products that perform functions related to solving business or organizational needs unique to a specific vertical market and sold to that market

only. Examples include demand deposit accounting, MRPII, medical recordkeeping, automobile dealer parts inventory, etc.

- *Cross-Industry Application Software Products* - Software products that perform a specific function that is applicable to a wide range of industry sectors. Applications include payroll and human resource systems, accounting systems, word processing and graphics systems, spreadsheets, etc.

3. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged or custom application software into a single system developed to meet a specific set of user requirements. Value added by the turnkey system vendor is primarily in the software and support services provided. Most CAD/CAM systems and many small business systems are turnkey systems. Turnkey systems utilize standard computers and do not include specialized hardware such as word processors, cash registers, process control systems, or embedded computer systems for military applications.

Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

Most turnkey systems are sold through channels known as value-added resellers.

- *Value-Added Reseller (VAR)*: A VAR adds value to computer hardware and/or software and then resells it to an end user. The major value added is usually application software for a vertical or cross-industry market, but also includes many of the other components of a turnkey systems solution, such as professional services.

Turnkey systems are divided into two categories.

- *Industry-Specific Systems* - systems that serve a specific function for a given industry sector, such as automobile dealer parts inventory, medical recordkeeping, or discrete manufacturing control systems.
- *Cross-Industry Systems* - systems that provide a specific function that is applicable to a wide range of industry sectors, such as financial planning systems, payroll systems, or personnel management systems.

4. Processing Services

This category includes transaction processing, utility processing, and other processing services.

- *Transaction Processing*: - Client uses vendor-provided information systems—including hardware, software and/or data networks—at vendor site or customer site, to process transactions and update client data bases. Transactions may be entered in one of four modes:
 - *Interactive* - Characterized by the interaction of the user with the system for data entry, transaction processing, problem solving and report preparation: the user is on-line to the programs/files stored on the vendor's system.
 - *Remote Batch* - Where the user transmits batches of transaction data to the vendor's system, allowing the vendor to schedule job execution according to overall client priorities and resource requirements.
 - *Distributed Services* - Where users maintain portions of an application data base and enter or process some transaction data at their own site, while also being connected through communications networks to the vendor's central systems for processing other parts of the application.
 - *Carry-in Batch* - Where users physically deliver work to a processing services vendor.
- *Utility Processing*: Vendor provides basic software tools (language compilers, assemblers, DBMSs, graphics packages, mathematical models, scientific library routines, etc.), generic applications programs and or data bases, enabling clients to develop their own programs or process data on vendor's system.
- *Other Processing Services*: Vendor provides services—usually at vendor site—such as scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services, backup and disaster recovery, etc.

5. Systems Operations

Systems operations involves the operation and management of all or a significant part of the user's information systems functions under a long-term contract. These services can be provided in either of two distinct submodes:

- *Professional Services*: The vendor provides personnel to operate client-supplied equipment. Prior to 1990, this was a submode of the Professional Services delivery mode.
- *Processing Services*: The vendor provides personnel, equipment and (optionally) facilities. Prior to 1990, this was a submode of the Processing Services delivery mode.

In the federal government market the processing services submode is called "COCO" (Contractor-Owned, Contractor-Operated), and the professional services mode is referred to as "GOCO" (Government-Owned, Contractor-Operated).

Systems operations vendors now provide a wide variety of services in support of existing information systems. The vendor can plan, control, provide, operate, maintain and manage any or all components of the user's information systems (equipment, networks, systems and/or application software), either at the client's site or the vendor's site. Systems operations can also be referred to as "resource management" or "facilities management."

There are two general levels of systems operations:

- *Platform/network operations* - where the vendor operates the computer system and/or network without taking responsibility for the applications
- *Application operations* - where the vendor takes responsibility for the complete system, including equipment, associated telecommunications networks, and applications software

Note: Systems Operations is a new delivery mode introduced in the 1990 MAP Program. It was created by taking the Systems Operations submode out of both Processing Services and Professional Services. No other change has been made to the delivery mode definitions, and the total forecast expenditures for these three delivery modes are identical to the total forecast expenditures of the two original modes before the breakout of Systems Operations.

6. Systems Integration (SI)

Systems integration is a business offering that provides a complete solution to an information system, networking or automation requirement through the custom selection and implementation of a variety of information system products and services. A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price.

To be included in the information services market, systems integration projects must involve some application processing component. In addition, the majority of cost must be associated with information systems products and/or services.

The systems integrator will perform, or manage others who perform, most or all of the following functions:

- Program management, including subcontractor management
- Needs analysis
- Specification development
- Conceptual and detailed systems design and architecture
- System component selection, modification, integration and customization
- Custom software design and development
- Custom hardware design and development
- Systems implementation, including testing, conversion and post-implementation evaluation and tuning
- Life cycle support, including
 - System documentation and user training
 - Systems operations during development
 - Systems maintenance
- Financing

7. Professional Services

This category includes consulting, education and training, and software development.

- *Consulting:* Services include management consulting (related to information systems), information systems consulting, feasibility analysis and cost-effectiveness studies, and project management assistance. Services may be related to any aspect of information systems, including equipment, software, networks and systems operations.
- *Education and Training:* Products and services related to information systems and services for the professional and end user, including computer-aided instruction, computer-based education, and vendor instruction of user personnel in operations, design, programming, and documentation.
- *Software Development:* Services include user requirements definition, systems design, contract programming, documentation and implementation of software performed on a custom basis. Conversion and maintenance services are also included.

8. Network Services

Network services typically include a wide variety of network-based functions and operations. Their common thread is that most of these functions could not be performed without network involvement. Network services is divided into two major segments: *Electronic Information Services*, which involve selling information to the user, and *Network Applications*, which involve providing some form of enhanced transport service in support of a user's information processing needs.

- *Electronic Information Services*

Electronic information services are data bases that provide specific information via terminal- or computer-based inquiry, including items such as stock prices, legal precedents, economic indicators, periodical literature, medical diagnosis, airline schedules, automobile valuations, etc. The terminals used may be computers themselves, such as communications servers or personal computers. Users typically inquire into and extract information from the data bases. Although users may load extracted data into their own computer systems, the electronic information vendor provides no data processing or manipulation capability and the users cannot update the vendor's data bases.

The two kinds of electronic information services are:

- *On-line Data Bases* - Structured, primarily numerical data on economic and demographic trends, financial instruments, companies, products, materials, etc.
- *News Services* - Unstructured, primarily textual information on people, companies, events, etc.

While electronic information services have traditionally been delivered via networks, there is a growing trend toward the use of CD ROM optical disks to support or supplant on-line services, and these optical disk-based systems are included in the definition of this delivery mode.

- *Network Applications*

- *Value-Added Network Services (VAN Services)* - VAN services are enhanced transport services which involve adding such functions as automatic error detection and correction, protocol conversion, and store-and-forward message switching to the provision of basic network circuits.

While VAN services were originally provided only by specialized VAN carriers (Tymnet, Telenet, etc.), today these services are also offered by traditional common carriers (AT&T, Sprint, etc.). Mean-

while, the VAN carriers have also branched into the traditional common carriers' markets and are offering unenhanced basic network circuits as well.

INPUT's market definition covers VAN services only, but includes the VAN revenues of all types of carriers.

- *Electronic Data Interchange (EDI)* - Application-to-application exchange of standardized business documents between trade partners or facilitators. This exchange is commonly performed using VAN services. Specialized translation software is typically employed to convert data from organizations' internal file formats to EDI interchange standards; this software may be provided as part of the VAN service, or may be resident on the organization's own computers.
- *Electronic Information Exchange (EIE)* - Also known as Electronic Mail (E-Mail), EIE involves the transmission of messages across an electronic network managed by a services vendor, including facsimile transmission (FAX), voice mail, voice messaging, and access to Telex, TWX, and other messaging services. This also includes bulletin board services.
- *Other Network Services* - This segment contains videotex and pure network management services. Videotex is actually more a delivery mode than an application. Its prime focus is on the individual as a consumer or in business. These services provide interactive access to data bases and offer the inquirer the capability to send as well as receive information for such purposes as home shopping, home banking, travel reservations, and more.

Network management services included here must involve the vendor's network and network management systems as well as people. People-only services, or services that involve the management of networks as part of the broader task of managing a user's information processing functions are included in Systems Operations.

C

Vendor Revenue and User Expenditure Conversion

The size of the information services market may be viewed from two perspectives: vendor (producer) revenues, and user expenditures. While the primary data for INPUT's research is vendor interviews, INPUT defines and forecasts the information services market in terms of end-user expenditures. End-user expenditures reflect the markup in producer sales when a product such as software is delivered through indirect distribution channels, such as original equipment manufacturers (OEMs), retailers and distributors. The focus on end-user expenditure also eliminates the double counting of revenues which would occur if sales were tabulated for both producer (e.g., Lotus) and distributor (e.g., BusinessLand).

For most delivery modes, vendor revenues and user expenditures are fairly close. However, there are some significant areas of difference. Many microcomputer software products, for example, are marketed through indirect distribution channels. To capture the value added through these indirect distribution channels, adjustment factors which incorporate industry discount ratios are used to convert estimated information services vendor revenues to end-user expenditures.

For some delivery modes, including software products, systems integration and turnkey systems, there is a significant volume of intra-industry sales. For example, systems integrators purchase software and subcontract the services of other professional services vendors. And turnkey vendors incorporate purchased software into the systems which they sell to end users.

To account for such intra-industry transactions, INPUT uses other conversion ratios to derive the estimate of end-user expenditures.

The following table summarizes the net effect of the various ratios used by INPUT to convert vendor revenues to end-user expenditure (market size) figures for each delivery mode:

<u>Delivery Mode</u>	<u>Vendor Revenue Multiplier</u>
Application Software Products	1.18
Systems Software Products	1.10
Systems Operations	1.00
Systems Integration	0.99
Professional Services	0.99
Network Services	0.99
Processing Services	0.99
Turnkey Systems	0.95

D

Sector Definitions and Delivery Mode Reporting

1. Industry Sector Definitions (Vertical Markets)

INPUT has structured the information services market into 16 generic industry sectors, such as process manufacturing, insurance, transportation, etc. The definitions of these sectors are based on the 1987 revision of the Standard Industrial Classification (SIC) Code system. The specific industries (and their SIC Codes) included under these generic industry sectors are detailed in the attached table.

EXHIBIT A-2

Industry Sector Definitions

Industry Sector	SIC Code	Description
Discrete Manufacturing	23xx	Apparel and other finished products
	25xx	Furniture and fixtures
	27xx	Printing, publishing and allied industries
	31xx	Leather and leather products
	34xx	Fabricated metal products, except machinery and transportation equipment
	35xx	Industrial and commercial machinery and computer equipment
	36xx	Electronic and other electrical equipment and components, except computer equipment
	37xx	Transportation equipment
	38xx	Instruments; photo/med/optical goods; watches/clocks
39xx	Miscellaneous manufacturing industry	
Process Manufacturing	10xx	Metal mining
	12xx	Coal mining
	13xx	Oil and gas extraction
	14xx	Mining/quarrying nonmetallic minerals
	20xx	Food and kindred products
	21xx	Tobacco products
	22xx	Textile mill products
	24xx	Lumber and wood products, except furniture
	26xx	Paper and allied products
	28xx	Chemicals and allied products
	29xx	Petroleum refining and related industries
	30xx	Rubber and miscellaneous plastic products
	32xx	Stone, clay, glass and concrete products
33xx	Primary metal industries	
Transportation Services	40xx	Railroad transport
	41xx	Public transit/transport
	42xx	Motor freight transport/warehousing
	43xx	U.S. Postal Service
	44xx	Water transportation
	45xx	Air transportation (except airline reservation services in 4512)
	46xx	Pipelines, except natural gas
	47xx	Transportation services (except 472x, arrangement of passenger transportation)

EXHIBIT A-2 (Cont.)

Industry Sector Definitions

Industry Sector	SIC Code	Description
Utilities	49xx	Electric, gas and sanitary services
Telecommunications	48xx	Communications
Retail Distribution	52xx 53xx 54xx 55xx 56xx 57xx 58xx 59xx	Building materials General merchandise stores Food stores Automotive dealers, gas stations Apparel and accessory stores Home furniture, furnishings and accessory stores Eating and drinking places Miscellaneous retail
Wholesale Distribution	50xx 51xx	Wholesale trade - durable goods Wholesale trade - nondurable goods
Banking and Finance	60xx 61xx 62xx 67xx	Depository institutions Nondepository institutions Security and commodity brokers, dealers, exchanges and services Holding and other investment offices
Insurance	63xx 64xx	Insurance carriers Insurance agents, brokers and services
Health Services	80xx	Health services
Education	82xx	Educational services

EXHIBIT A-2 (Cont.)

Industry Sector Definitions

Industry Sector	SIC Code	Description
Business and Technical Services	65xx 73xx 81xx 87xx 89xx	Real estate Business services (except hotel reservation services in 7389) Legal services Engineering, accounting, research, management, and related services Miscellaneous services
Federal Government	9xxx	
State and Local Government	9xxx	
Miscellaneous Industries	01xx 02xx 07xx 08xx 09xx 15xx 16xx 17xx	Agricultural production - crops Agricultural production - livestock/animals Agricultural services Forestry Fishing, hunting and trapping Building construction - general contractors, operative builders Heavy construction - contractors Construction - special trade contractors
Personal/Consumer Services	4512x 472x 70xx 72xx 7389x 75xx 76xx 78xx 79xx 83xx 84xx 86xx 88xx	Airline reservation services Arrangement of passenger transportation (travel agencies) Hotels, rooming houses, camps, and other lodging places Personal services Hotel reservation services Automotive repair, services and parking Miscellaneous repair services Motion pictures Amusement and recreation services Social services Museums, art galleries, and botanical/zoological gardens Membership organizations Private households

2. Cross-Industry Sector Definitions (Horizontal Markets)

In addition to these vertical industry sectors, INPUT has also identified seven cross-industry or horizontal market sectors. These sectors or markets involve multi-industry applications such as human resource systems, accounting systems, etc. In order to be included in an industry sector, the service or product delivered must be specific to that sector only. If a service or product is used in more than one industry sector, it is counted as cross-industry. The seven cross-industry markets are:

- *Human Resource Systems*
- *Education and Training*
- *Office Systems*
- *Accounting Systems*
- *Engineering and Scientific Applications*
- *Planning and Analysis Systems*
- *Other Applications (including telemarketing, sales management and electronic publishing)*

3. Delivery Mode Reporting by Sector

The tables below show how market forecasts for individual delivery modes are related to specific market sectors.

Vertical Market Sectors Only

The following delivery modes are reported by industry sector (vertical market) only:

<u>Delivery Mode</u>	<u>Applicable Submodes</u>
• Network Services:	Network Applications
• Systems Operations:	All
• Systems Integration:	All
• Professional Services:	All

This reporting structure is intended to provide expenditures by industry sector. However, it is recognized that many of the services provided are not necessarily specific or unique to any of the individual sectors.

Vertical and Cross-Industry Market Sectors

The following delivery modes are reported by industry sector and cross-industry sector (vertical and horizontal markets):

<u>Delivery Mode</u>	<u>Applicable Submodes</u>
• Processing Services:	Transaction Processing
• Software	Applications
• Turnkey Systems	All

All of these delivery modes represent specific business application solutions.

Vertical and Generic Market Sectors

The following submode is reported both by industry sector (vertical market), and the generic market:

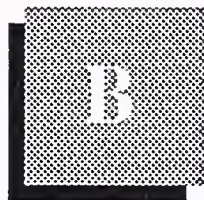
<u>Delivery Mode</u>	<u>Applicable Submodes</u>
• Network Services	Electronic Information Services

While some electronic information is industry-specific (e.g., farm crop reports), much of it is relevant to or may be used by any industry (e.g., data base services such as Dialog).

Generic Market Sector Only

The following delivery modes are so generic that they are not reported by industry or cross-industry sector (vertical or horizontal market):

<u>Delivery Mode</u>	<u>Applicable Submodes</u>
• Processing Services:	Utility Processing Other Processing
• Software	Systems (All)



Forecast Data Base

A

Forecast Data Base

Exhibit B-1 provides the top-level forecasts by year for turnkey systems and applications software products. More detailed forecasts are presented in the following exhibits.

- Exhibit B-3 - Turnkey Systems—User Expenditure Forecast by Market Sector, 1989-1995
- Exhibit B-5 - Applications Software Products—User Expenditure Forecast by Market Sector, 1989-1995

B

Forecast Reconciliation

Exhibit B-2 presents the top-level forecast reconciliation for the U.S. turnkey systems and applications software products markets. More detailed reconciliations are presented in the following exhibits.

- Exhibit B-4 - Turnkey Systems Market, 1990 MAP Data Base Reconciliation
- Exhibit B-6 - Applications Software Products Market, 1990 MAP Data Base Reconciliation

1. Turnkey Systems

Actual overall 1989 user expenditures for turnkey systems were 11% lower than had been forecasted. The key reason for the reduction in actuals is a redefinition of office systems turnkey systems; much of what was previously considered turnkey for this cross-industry sector was transferred to the applications software products delivery mode.

The 1989-1994 CAGR for turnkey systems is lowered slightly this year compared to last year's forecast. The primary reason for this 1% change in the forecast is the change in definition of what constitutes office systems turnkey systems. The turnkey systems forecast for the office

systems cross-industry sector has been lowered from an 11% CAGR to a 2% CAGR. Otherwise, the forecast remains essentially the same for this delivery mode.

Submode Analysis

Other than the reduction in turnkey systems overall, the submode analyses this year and last year remain essentially unchanged.

Market Sector Analysis

Expenditures by several of the vertical industry and cross-industry markets were noticeably lower:

- Retail distribution was 14% less in 1989 due to slower growth and a shift in emphasis to applications software products and workstation/PC-based solutions.
- Engineering and scientific was 73% less as a result of clarifying definitions. As INPUT defines this cross-industry sector, the majority of CAE and CAD is excluded. CAD that is integrated with CAM and/or is used by manufacturing sectors is not included.
- Human resources was 32% less due to increased use of PC-based applications software products as an alternative to the traditional packaged turnkey system.
- Office systems was 93% less due to definitional changes.
- Planning and analysis was 82% less due to the significant reduction, previously unrecognized, in the number of applications sold as turnkey systems.
- Actual 1989 expenditures were noticeably higher than forecasted for two industry sectors:
 - Transportation was 30% higher, reflecting a more accurate counting of user expenditures on rail equipment process control systems.
 - Utilities was over 100% higher, but for a modest market size of about \$75 million in 1989.

2. Applications Software Products

Actual overall 1989 user expenditures for applications software products were as forecasted.

The 1989-1994 CAGR for applications software products is lowered slightly this year compared to last year's forecast. The migration to new

technology-based products is slower than previously anticipated; on the other hand, the transfer of some applications software products that were previously bundled into turnkey solutions has made up for some of this slack.

Platform Size Analysis

Actual 1989 expenditures by platform size were essentially unchanged from what was forecasted. The 1989-1994 CAGR for workstation/PC-based applications software products has been adjusted slightly, from a 22% to a 19% CAGR.

Sector Analysis

Expenditures by several of the vertical industry and cross-industry markets within the overall forecast were noticeably different than was forecasted. The major variances are:

- Telecommunications was 43% higher, reflecting the recognition of expenditures for the broadcast and cable TV industry subsectors.
- Office systems was 22% higher due to changes in INPUT's definition of office systems applications software products.
- Utilities was 22% less, reflecting some reclassification to turnkey systems and slower growth.
- Retail was 25% less, reflecting slower growth and a market shift to workstation/PC-based products with lower market value.
- Human resources was 29% less, reflecting slower growth and a clarification of the market size.

The 1994 forecast for practically all sectors has been lowered. Those that have been lowered the most are:

- **Transportation** - The largest reduction in this growth rate was made in the estimated growth of the workstation/PC market, based on the pattern of proportionately higher usage of CPUs in the transportation industry than was previously recognized.
- **Banking and finance** - The reduced growth is tied to the troubles in the savings and loan and the securities industries, and similar concerns about banking.
- **Federal government** - The effects of the federal government information technology budget cuts resulting from the suspension of research and development spending are evident in this lower forecast.

EXHIBIT B-1

Applications Software Products and Turnkey Systems Forecast by Platform Size and Submode, 1989-1995

Delivery Modes	1989 (\$)	Growth 89-90 (%)	1990 (\$)	1991 (\$)	1992 (\$)	1993 (\$)	1994 (\$)	1995 (\$)	CAGR 90-95 (%)
Turnkey and Applications Software Market	25,729	11	28,482	31,638	35,257	39,479	44,437	50,253	12
<u>Turnkey Systems</u>	9,522	9	10,339	11,271	12,222	13,242	14,351	15,553	9
- Equipment	4,549	6	4,830	5,194	5,519	5,852	6,199	6,563	6
- Software	3,471	11	3,847	4,240	4,670	5,138	5,658	6,230	10
• Applications Software	2,951	12	3,294	3,656	4,049	4,479	4,958	5,486	11
• Systems Software	519	6	552	584	620	659	700	744	6
- Professional Services	1,502	11	1,662	1,838	2,033	2,252	2,494	2,760	11
<u>Applications Software</u>	16,208	12	18,143	20,366	23,035	26,237	30,086	34,700	14
- Mainframe	4,751	6	5,054	5,353	5,730	6,175	6,702	7,305	8
- Minicomputer	5,081	10	5,575	6,102	6,680	7,318	8,036	8,845	10
- Workstation/PC	6,376	18	7,513	8,911	10,625	12,745	15,348	18,551	20

EXHIBIT B-2

Applications Software Products and Turnkey Systems 1990 MAP Data Base Reconciliation

Delivery Modes	1989 Market				1994 Market				89-94 CAGR per data 89 rpt (%)	89-94 CAGR per data 90 rpt (%)
	1989 Report (Fcst) (\$)	1990 Report (Actual) (\$)	Variance from 1989 Report		1989 Report (Fcst) (\$)	1990 Report (Fcst) (\$)	Variance from 1989 Report			
			(\$)	(%)			(\$)	(%)		
Turnkey and Applications Software Market	26,655	25,729	-926	-3	48,595	44,437	-4,158	-9	13	12
<u>Turnkey Systems</u>	10,705	9,522	-1,183	-11	16,820	14,351	-2,469	-15	9	9
- Equipment	5,098	4,549	-549	-11	7,011	6,199	-812	-12	7	6
- Software	3,886	3,471	-416	-11	6,889	5,658	-1,231	-18	12	10
• Applications Software	3,320	2,951	-369	-11	6,110	4,958	-1,152	-19	13	11
• Systems Software	566	519	-47	-8	779	700	-79	-10	7	6
- Professional Services	1,720	1,502	-218	-13	2,920	2,494	-426	-15	11	11
<u>Applications Software</u>	15,998	16,208	210	1	31,883	30,086	-1,756	-6	15	13
- Mainframe	4,869	4,751	-118	-2	6,932	6,702	-230	-3	7	7
- Minicomputer	4,938	5,081	143	3	8,361	8,036	-325	-4	11	10
- Workstation/PC	6,191	6,376	185	3	16,550	15,348	-1,202	-7	22	19

EXHIBIT B-3

Turnkey Systems—User Expenditure Forecast by Market Sector, 1989-1995

Market Sector	1989 (\$M)	Growth 1989- 1990 (%)	1990 (\$M)	1991 (\$M)	1992 (\$M)	1993 (\$M)	1994 (\$M)	1995 (\$M)	CAGR 1990- 1995 (%)
Delivery Mode Total	9,522	9	10,338	11,271	12,222	13,242	14,351	15,553	9
Vertical Industry Markets	8,252	9	9,000	9,861	10,730	11,658	12,657	13,731	9
Discrete Manufacturing	2,240	10	2,460	2,798	3,097	3,404	3,727	4,084	11
Process Manufacturing	455	12	509	568	634	709	793	889	12
Transportation	227	10	250	275	302	332	366	402	10
Utilities	78	8	85	93	104	116	129	145	11
Telecommunications	373	13	420	473	533	602	680	770	13
Retail Distribution	610	9	664	707	754	804	858	915	7
Wholesale Distribution	415	10	456	487	522	559	604	653	7
Banking and Finance	865	9	939	1,008	1,083	1,181	1,289	1,408	8
Insurance	270	8	292	311	331	349	366	380	5
Medical	860	8	928	994	1,060	1,116	1,161	1,192	5
Education	200	8	216	231	247	265	283	303	7
Business Services	505	10	554	602	655	706	761	813	8
Consumer Services	175	8	189	208	232	260	300	346	13
Federal Government	415	3	427	448	469	493	518	545	5
State and Local Government	135	12	151	167	186	206	229	255	11
Miscellaneous Industries	428	8	462	491	522	556	593	632	6
Cross-Industry Markets	1,269	5	1,338	1,410	1,491	1,584	1,694	1,822	6
Accounting	410	3	422	435	447	461	474	489	3
Education and Training	161	6	170	182	196	213	239	275	10
Engineering and Scientific	100	12	112	123	134	144	153	159	7
Human Resources	80	2	82	83	85	86	88	90	2
Office Systems	64	2	65	66	67	69	70	72	2
Planning and Analysis	50	0	50	50	50	50	50	50	--
Other Cross-Industry	405	8	437	471	512	561	619	687	9

EXHIBIT B-4

Turnkey Systems Market, 1990 MAP Data Base Reconciliation

Market Sector	1989 Market				1994 Market				1989-1994 CAGR per Data 1989 Report (%)	1989-1994 CAGR per Data 1990 Report (%)
	1989 Report (Fcst) (\$M)	1990 Report (Actual) (\$M)	Variance from 1989 Report		1989 Report (Forecast) (\$M)	1990 Report (Forecast) (\$M)	Variance from 1989 Report			
			(\$M)	(%)			(\$M)	(%)		
Total Turnkey Systems Market	10,704	9,522	-1,183	-11	16,821	14,351	-2,470	-15	9	9
Vertical Industry Markets	7,989	8,252	263	3	12,792	12,657	-135	-1	10	9
Discrete Mfg.	2,240	2,240	0	0	3,608	3,727	119	3	10	11
Process Mfg.	465	455	-10	-2	800	793	-7	-1	11	12
Transportation	175	227	52	30	284	366	82	29	10	10
Utilities	39	78	40	103	62	129	67	109	10	11
Telecomm.	319	373	54	17	614	680	66	11	14	13
Retail Distribution	711	610	-101	-14	1,095	858	-237	-22	9	7
Wholesale Dist.	416	415	-1	0	670	604	-66	-10	10	8
Banking & Finance	865	865	0	0	1,393	1,289	-104	-7	10	8
Insurance	271	270	-1	-1	440	366	-74	-17	10	6
Medical	860	860	0	0	1,395	1,161	-234	-17	10	6
Education	196	200	4	2	288	283	-5	-2	8	7
Business Svcs.	504	505	1	0	812	761	-51	-6	10	9
Consumer Svcs.	--	175	175	--	--	300	300	--	--	2
Federal Govt.	413	415	2	0	479	518	39	8	3	5
State and Local Government	134	135	1	0	237	229	-7	-3	12	11
Misc. Industries	380	428	48	13	615	593	-22	-4	10	7
Cross-Industry Markets	2,715	1,269	-1,446	-53	4,029	1,694	-2,335	-58	8	6
Accounting	412	410	-2	-0	478	474	-4	-1	3	3
Education and Training	161	161	0	0	197	239	42	21	4	8
Eng. & Scientific	376	100	-276	-73	663	153	-510	-77	12	9
Human Resources	118	80	-38	-32	150	88	-62	-41	5	2
Office Systems	961	64	-897	-93	1,619	70	-1,549	-96	11	2
Planning & Analysis	284	50	-234	-82	329	50	-279	-85	3	0
Other Cross-Ind.	403	405	2	0	593	619	26	4	8	9

EXHIBIT B-5

Applications Software Products—User Expenditure Forecast by Market Sector, 1989-1995

Market Sector	1989 (\$M)	Growth 1989- 1990 (%)	1990 (\$M)	1991 (\$M)	1992 (\$M)	1993 (\$M)	1994 (\$M)	1995 (\$M)	CAGR 1990- 1995 (%)
Delivery Mode Total	16,208	12	18,143	20,366	23,035	26,237	30,086	34,700	14
Vertical Industry Markets	8,984	14	10,075	11,244	12,665	14,386	16,467	18,961	13
Discrete Manufacturing	1,597	14	1,828	2,040	2,301	2,613	2,979	3,412	13
Process Manufacturing	470	11	535	610	699	802	925	1,069	15
Transportation	324	8	359	398	442	490	543	603	11
Utilities	171	19	185	206	232	262	295	333	12
Telecommunications	266	19	317	378	451	539	646	774	20
Retail Distribution	210	19	249	280	315	355	403	459	13
Wholesale Distribution	432	12	484	535	596	672	764	872	13
Banking and Finance	2,000	8	2,150	2,333	2,584	2,915	3,339	3,860	12
Insurance	706	10	779	862	967	1,110	1,295	1,538	15
Medical	793	12	891	1,009	1,155	1,333	1,559	1,843	16
Education	558	11	619	685	760	844	938	1,043	11
Business Services	419	17	491	573	670	782	912	1,063	17
Consumer Services	250	13	284	322	366	416	474	540	14
Federal Government	469	17	546	617	692	767	852	945	12
State and Local Government	116	14	132	150	172	199	230	268	15
Miscellaneous Industries	204	11	226	244	264	287	312	340	9
Cross-Industry Markets	7,224	12	8,068	9,123	10,370	11,851	13,620	15,739	14
Accounting	1,825	11	2,028	2,250	2,519	2,848	3,255	3,763	13
Education and Training	182	16	210	244	287	338	402	480	18
Engineering and Scientific	507	15	582	668	768	884	1,019	1,180	15
Human Resources	600	7	643	694	758	843	952	1,097	11
Office Systems	1,878	10	2,059	2,356	2,700	3,097	3,556	4,088	15
Planning and Analysis	1,837	14	2,100	2,406	2,760	3,171	3,651	4,208	15
Other Cross-Industry	395	13	446	504	579	670	784	923	16

EXHIBIT B-6

Applications Software Products Market 1990 MAP Data Base Reconciliation

Market Sector	1989 Report (Forecast) (\$M)	1990 Report (Actual) (\$M)	Variance from 1989 Report		1989 Report (Forecast) (\$M)	1990 Report (Forecast) (\$M)	Variance from 1989 Report		1989-1994 CAGR per Data 1989 Report (%)	1989-1994 CAGR per Data 1990 Report (%)
			(\$M)	(%)			(\$M)	(%)		
Total Applications Software Market	15,996	16,208	212	1	31,776	30,086	-1,690	-5	15	13
Vertical Industry Markets	8,867	8,984	117	1	17,854	16,467	-1,387	-8	15	13
Discrete Mfg.	1,597	1,597	0	0	3,241	2,979	-262	-8	15	13
Process Mfg.	470	470	0	0	985	925	-60	-6	16	14
Transportation	327	324	-3	-1	678	543	-135	-20	16	11
Utilities	218	171	-47	-22	426	295	-131	-31	14	12
Telecomm.	186	266	80	43	438	646	208	47	19	19
Retail Distribution	279	210	-69	-25	563	403	-160	-17	15	14
Wholesale Dist.	453	432	-21	-5	920	764	-156	-18	15	12
Banking & Finance	2,069	2,000	-69	-3	4,095	3,339	-756	-18	15	11
Insurance	706	706	-0	-0	1,416	1,295	-121	-9	15	13
Medical	793	793	0	0	1,535	1,559	24	2	14	14
Education	572	558	-14	-2	987	938	-49	-5	12	11
Business Svcs.	419	419	0	0	913	912	-1	-0	17	17
Consumer Svcs.	--	250	250	--	--	474	474	--	--	14
Federal Govt.	469	469	-0	-0	1,053	852	-201	-19	18	13
State and Local Government	116	116	-0	-0	229	230	1	0	15	15
Misc. Industries	193	204	11	6	375	312	-63	-17	14	9
Cross-Industry Markets	7,129	7,224	95	1	13,922	13,620	-302	-2	14	14
Accounting	1,825	1,825	-1	-0	3,230	3,255	25	1	12	12
Education and Training	182	182	-1	-0	388	402	14	4	16	17
Eng. & Scientific	507	507	0	0	1,125	1,019	-106	-9	17	15
Human Resources	845	600	-245	-29	1,219	952	-267	-22	8	10
Office Systems	1,539	1,878	339	22	3,595	3,556	-39	-1	18	14
Planning & Analysis	1,837	1,837	0	0	3,647	3,651	4	0	15	15
Other Cross-Ind.	394	395	1	0	718	784	66	9	13	15

