

U.S. SYSTEMS SOFTWARE PRODUCTS MARKET

1992 - 1997

INPUT

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**U.S. Information Services
Market Analysis Program**
(MAMAP)

***U.S. Systems Software Products Market,
1992-1997***

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Abstract

This annual report provides an analysis and five-year forecast of the U.S. systems software products market for the period 1992-1997. The forecasts contained in this report divide the market into systems control products, applications development tools and operations management tools. The market is also segmented into three platform categories: mainframe, minicomputer and PC/workstation platforms.

The report considers the underlying trends and issues that impact the sale of systems software products in the information services market, and based upon these considerations, projects growth patterns for the next five years.

The report contains 78 pages and 33 exhibits.



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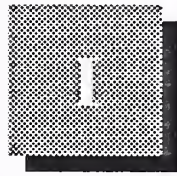
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Introduction

This report is one of a series of market analysis reports prepared each year by INPUT for the key segments (delivery modes) of the U.S. information services industry. These delivery modes are:

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

The first seven delivery modes are covered in reports included as part of INPUT's Market Analysis Program (MAP), a planning service for information services vendors. The last two delivery modes are covered in market analysis reports included in INPUT's Systems Integration and Systems Operations programs.

A

Purpose and Organization

1. Purpose

This report analyzes the systems software products delivery mode of the U.S. information services industry:

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

EXHIBIT I-1

Market Report Format

- I. Introduction
 - Introduction and definition of the delivery mode and its substructure or segments.
- II. Executive Overview
 - Synopsis of the entire report written at the end of the year.
- III. General Business Climate
 - An overview of the business climate within the information services industry as a whole and the particular market segment of each report.
- IV. Information Systems Environment
 - The information systems environment and user perspective as it relates to the specific delivery mode or market.
- V. Issues and Trends
 - An assessment of the significant issues and trends.
- VI. Information Services Market Forecast
 - Presentation of the information services market forecast by delivery mode and submode.
- VII. Competitive Environment
 - Discussion of the competitive environment for information services within the delivery mode—with vendor profiles.
- VIII. Conclusions and Recommendations
 - Summary of risks and opportunities.
- A. INPUT Definition of Terms
 - Definitions and descriptions of market structure and terms used throughout INPUT's reports.
- B. Forecast Data Base
 - A detailed forecast by delivery mode, submode, and industry/cross-industry sector. Contains a reconciliation to the previous year's Appendix B.

- The report assesses trends and events within the U.S. economy, the U.S. information services industry, and the systems software delivery mode to provide the reader with a comprehensive foundation for understanding this market sector and for anticipating future directions.

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

2. Organization

This report is organized as described in Exhibit I-1. Each delivery mode report within the Market Analysis Program follows this format. The industry and cross-industry sector reports, described below, follow a very similar format.

B

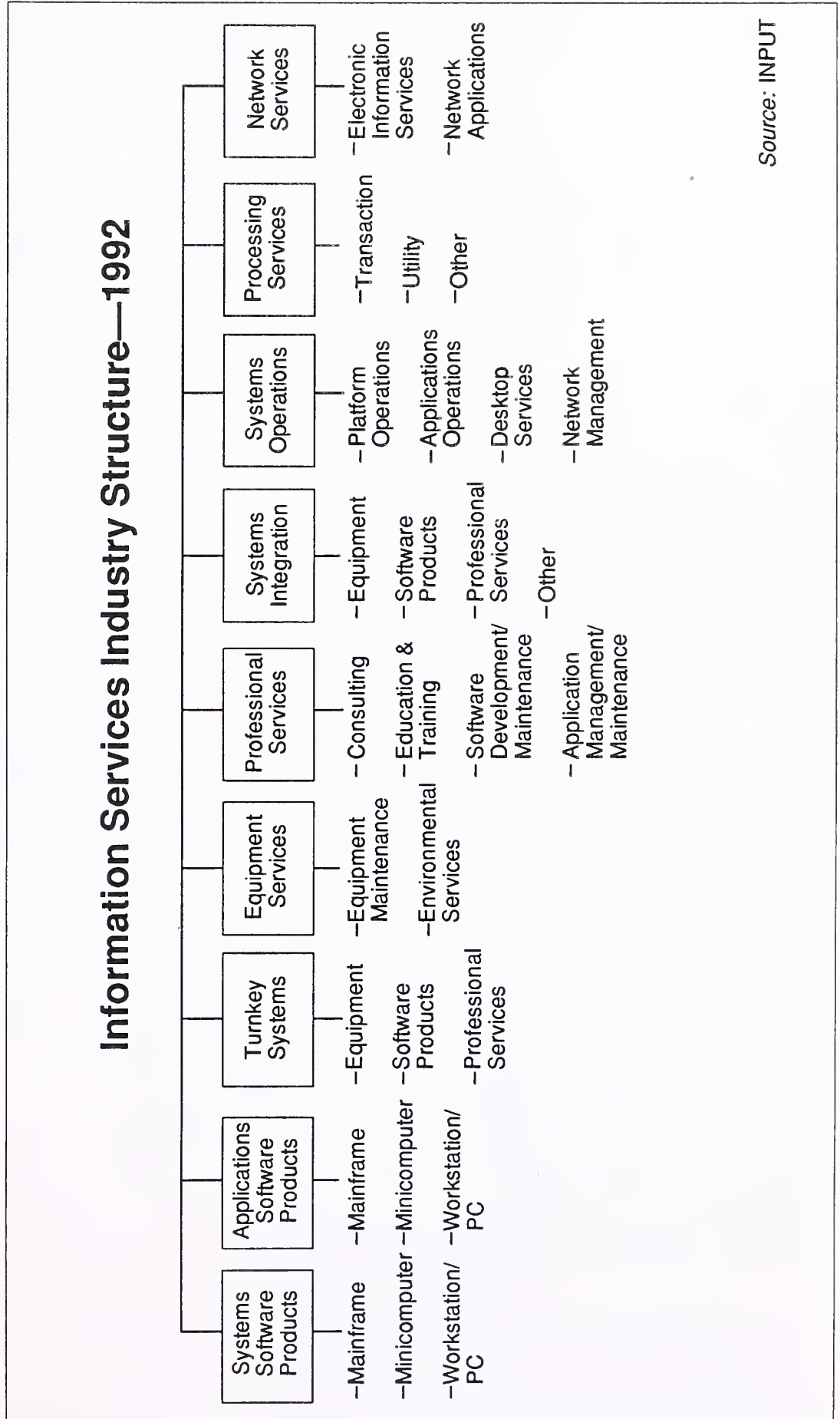
Scope and Methodology**1. Scope**

This report addresses the U.S. information services industry for the systems software sector (delivery mode). It includes user expenditures that are noncaptive and 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, *Definition of Terms*.

a. Information Services Industry Structure

Exhibit I-2 defines the structure of the information services industry as used by INPUT in its market analysis and forecasts. The industry consists of nine delivery modes, each of which contains a number of submodes.

EXHIBIT I-2



- *Delivery modes* are specific products and services that satisfy a given user need. *Market sectors* specify who the buyer is and *Delivery Modes* specify what the user is buying.
- INPUT develops a five-year forecast for the delivery mode and each of the submodes.

INPUT also publishes market sector reports analyzing 15 industry and 7 cross-industry market sectors. These reports, published annually by INPUT, analyze the information services opportunities in industry sectors such as insurance, transportation, and discrete manufacturing and in cross-industry sectors such as accounting, human resources and office systems.

The relationship between delivery mode forecasts and market sector forecasts is shown in Exhibit I-3. Equipment services will be added to this chart as a delivery mode in 1993.

EXHIBIT I-3

Delivery Mode versus Market Sector Forecast Content

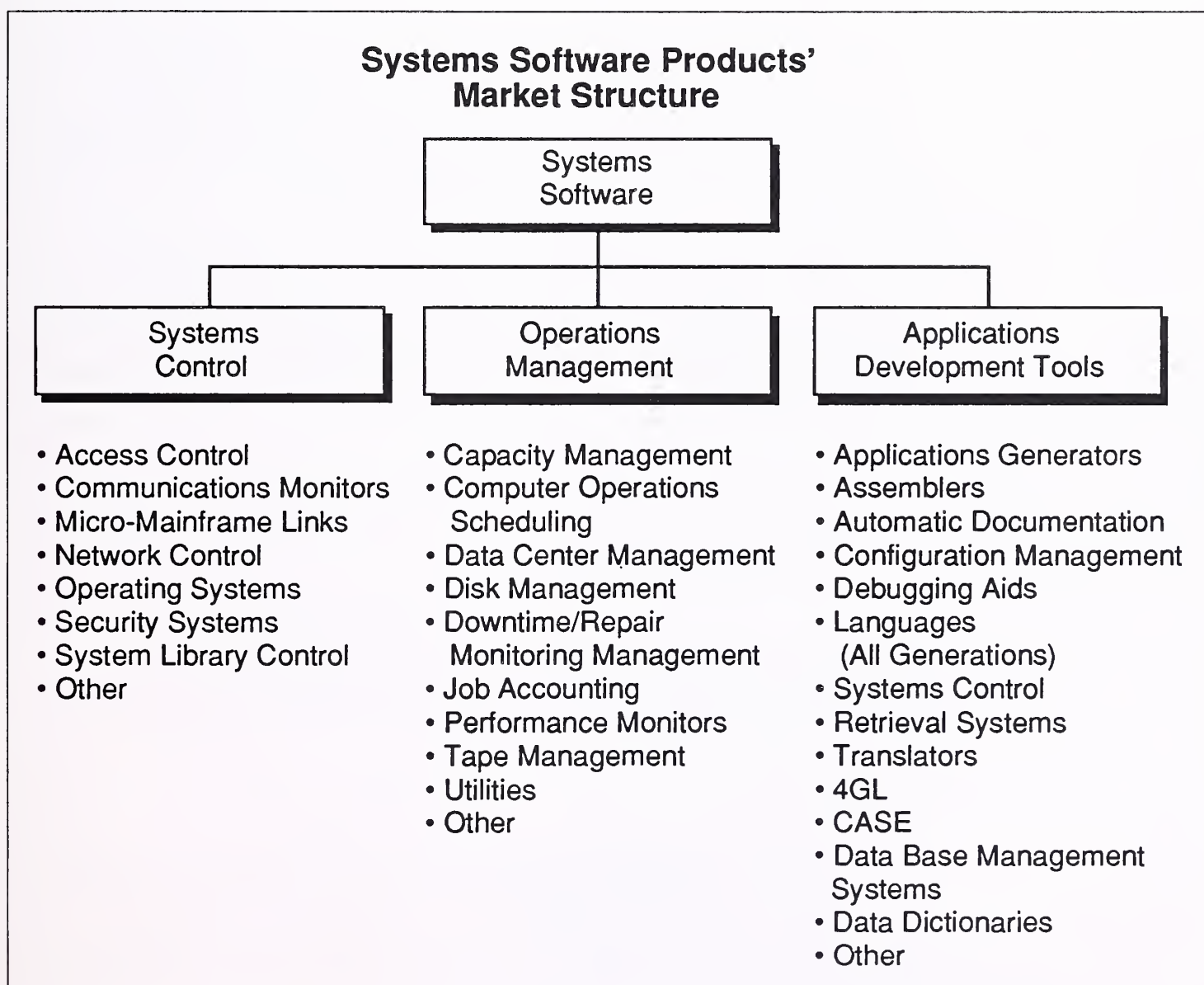
Delivery Mode	Submode	Market Sectors		
		Industry Sectors	Cross-Industry Sectors	Other
Processing Services	Transaction	X	X	
	Utility			X
	Other			X
Turnkey Systems		X	X	
Applications Software Products		X	X	
Systems Operations	Platform	X		
	Applications	X		
Systems Integration		X		
Professional Services		X		
Network Services	Network Applications	X		
	Electronic Information Services	X		X
Systems Software Products				X

For a more complete discussion of INPUT's information services industry structure and market sector definitions, please refer to INPUT's *Definition of Terms*.

b. Delivery Mode Description

Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. The systems software products delivery mode, as shown in Exhibit I-4, is composed of the systems control products, operations management tools, and applications development tools submodes.

EXHIBIT I-4



The attributes of each submode are described below:

- *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 systems, and other development productivity aids. Also included are system utilities (e.g., sorts) that are directly invoked by an applications program.

Systems software involves user purchases of software packages for in-house computer systems. Lease and purchase expenditures are included, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's site. Vendor-provided training or support in operation and use of the package, if bundled in the software pricing, is also included.

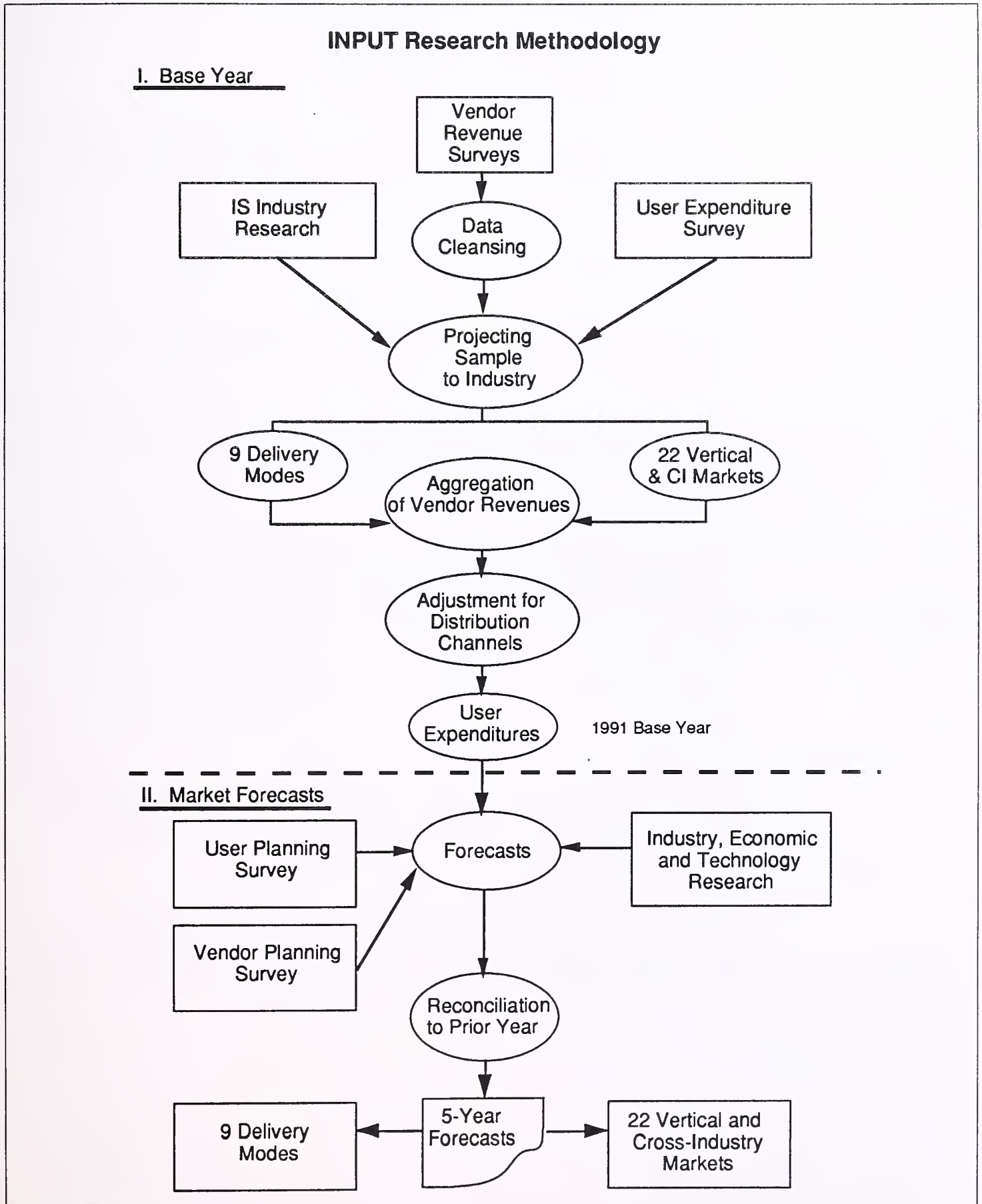
Systems software that is sold as part of other delivery modes turnkey systems, professional services, systems operations, and systems integration is not included with systems software purchases, but is considered with each of these other delivery modes.

Systems software products are not specialized by industry. Thus, the forecasts for the systems software products delivery mode and its submodes are provided in total rather than separately for each of the industry or cross-industry sectors.

2. Methodology

INPUT's methodology for market analysis and forecasting is summarized in Exhibit I-5. As in past years, INPUT has continued to survey information services vendors to determine their U.S. information services revenues, and to query information systems organizations about expenditures and outside services acquisition plans.

EXHIBIT I-5



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 9 delivery modes and 22 industry and cross-industry sectors for hundreds of vendors. Estimates rely upon interviews, public data, and INPUT's own estimates.
- The initial data are projected to represent the entire information services industry.
- Adjustments are made to eliminate duplications due to distribution channel overlap and to assure that captive information services expenditures are not included.
- The result is a base-year (1991) user expenditure for each of the 22 vertical and cross-industry sectors and the 9 delivery modes.

b. Market Forecasts

- In the forecasting step, INPUT surveys information systems executives to determine their projected expenditure levels, both in aggregate and for each of the outside information services categories.
- The result is a five-year forecast for each of the 22 vertical and cross-industry sectors and the 9 delivery modes. The delivery mode and market sector forecasts are correlated according to the diagram in 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 factors are explained. One may use these projections to track INPUT's forecasts from year to year.

INPUT forecasts are presented in current dollars (i.e., 1997 market sizes are in 1997 dollars, including inflationary forecasts). In developing the five-year forecasts, INPUT has incorporated economic assumptions for the U.S. economy as a whole.

The GDP and GDP Deflator growth rates used in INPUT's market projections for 1992 through 1997 are from the CONSENSUS™ forecast, a product of Blue Chip Economic Indicators of Sedona, Arizona. The Blue Chip CONSENSUS forecast is derived from a leading panel of economists representing leading financial, industrial, and research firms across the U.S. and has an impressive track record of balanced and accurate projections.

The 1992-1997 assumptions are contained in Chapter VI, Information Services Market Forecast.

C

Related Reports

Related reports of interest to the reader are:

1. U.S. Markets

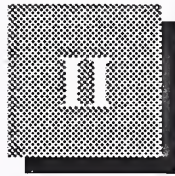
- *U.S. Applications Solutions Market Analysis Report, 1992-1997*
- *U.S. Processing Services Market Analysis Report, 1992-1997*
- *U.S. Professional Services Market Analysis Report, 1992-1997*
- *U.S. Systems Integration Market Analysis Report, 1992-1997*
- *U.S. Systems Operations Market Analysis Report, 1992-1997*
- *U.S. Industry Sector Markets, 1992-1997* (15 reports on all major industry sectors e.g., insurance, banking and finance)
- *U.S. Cross-Industry Sector Markets, 1992-1997* (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, 1992-1997*
- *Systems Software Products Western Europe, 1992-1997*
- *Trends in Processing Services Western Europe, 1992-1997*
- *Systems Integration Market Forecast Western Europe, 1992-1997*
- *Systems Operations Market Forecast Western Europe, 1992-1997*
- *Western European Network Services Markets, 1991-1996*

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

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Executive Overview

Systems software encompasses systems control products, operations management, and applications development tools.

In this Executive Overview, INPUT provides a summary of user issues, trends and driving forces that will impact systems software over the next five years. Furthermore, the summary presents an overall growth projections for systems software products, and draws conclusions about this fast-moving portion of the information services industry.

A

User Issues and Trends

Exhibit II-1 outlines key issues and trends below.

EXHIBIT II-1

Systems Software Products Key Issues and Trends

- Downsizing
- Standards
- Object technology
- Workgroup/workflow automation

Downsizing - INPUT's information systems (IS) model for the 90s calls for movement away from centralized processing towards a client/server environment with significant processing power and intelligence at both the client and server ends. Any platform will be able to function as a client or a server. Applications and the tools to manage them will run on mainframes, minis and workstation/PCs. Departmental applications and prod-

ucts will typically reside on minis, workstations and PCs at the desktop. Desktop users will be interested in personal productivity tools and application development tools, which take advantage of the trend toward more MIPS on the desktop, with better graphics, and higher bandwidth networks connecting the enterprise. End users are, and will continue to be, much more heavily involved in the purchase and requirements definition of downsized applications and tools. As a result of these trends, a new set of expectations is emerging in which users expect plug-and-play, scalable software products with built-in network support. Users are not interested or concerned with operating systems; however, current and future users will demand operating system transparency.

Standards - Standards in networking, operating systems, data bases, and the graphical user interface (GUI) look and feel, will become important determinants in which companies and products will be important players in the 90s. Downsized users will demand interchangeability of data, tools and applications. The current and future user community does not want to limit itself to a single vendor for solutions to its business needs. As standards develop and are accepted by the user community, sales volumes will increase dramatically. The movement towards operating system, GUI, networking, and data base management systems (DBMS) standards will propel the workstation/PC market to a much higher compound annual growth rate (CAGR) than corresponding minicomputer and mainframe platform software sales.

Object Technology - Object databases have immediate advantages over existing database technologies. They support complex data types, store procedures with the data, offer reusability to other data base modules, facilitate enterprise modeling, and provide a more natural fit for complex relationships among data types. Limiting the growth of this exciting new technology is a lack of standards, which inhibits the rapid adoption of object-oriented productivity tools. Once a critical mass of object standards has been accepted for the forecast period, OOPS, ODBMS, and object-oriented CASE tools will grow at a rate significantly greater than that of non-object-oriented tools.

Workgroup/Workflow Automation - There are a limited number of pivotal applications that will drive revenue growth in the workstation/PC area in excess of minicomputer and mainframe opportunities. Workgroup software, tools and programs that allow remote users on PCs and workstations to share data and programs, and to perform individual tasks, which are coordinated as part of a collective effort, is an example of such an application. Products such as Lotus Notes are driving demand for application development tools, and operations management tools, in the networked workstation/PC environment. INPUT predicts that key applications built with emerging technologies could very well drive this platform area into a growth spurt well in excess of the current expectations.

B**Driving Forces**

Exhibit II-2 summarizes the key driving forces for the systems software market.

EXHIBIT II-2**Systems Software Products
Driving Forces**

- Recovering economy
- Downsizing and client/server
- UNIX and software framework
- Integration/interperability efforts
- Emphasis on solutions

Recovering Economy - Recent economic indicators forecast a return to modest growth in 1993, followed by five years of steady growth in GDP. The CONSENSUS report, a respected economic compendium of major economic forecasts, and other economic forecasters, predict real GDP to average 2.5% to 3% over the next five years—a decent return to moderate growth after a lingering recessionary period.

Downsizing and Client/Server - Offloading the mainframe is a trend that is steadily gaining in popularity. INPUT research indicates that a growing proportion of system software users have already offloaded or are planning to offload some of the workload from the primary processor(s) during the next 18 months. Downsizing requires smaller platforms, many of which are already in place, and new or rewritten applications software products. Although movement to client/server architectures has been slow, respondents to INPUT's downsizing survey indicate that most have future plans to include client/server applications and architecture. Despite the slow implementation rate, INPUT believes that downsizing and client/server will be long-term growth promoters.

UNIX and Software Frameworks - In prior surveys, UNIX implementation over the next several years has been an IS objective for 32% of INPUT survey respondents. On the other hand, implementation of software frameworks such as SAA, NAS or CA90s is an objective for only 20% of respondents. Because UNIX and many software frameworks are still in a formative stage, there is some confusion regarding their implementation. Therefore, embryonic standards efforts tend to inhibit growth of systems software expenditures in the short term. Over the long term, however, and perhaps as early as 1994, standards will start to become a growth promoter as rules become more established, more people will feel comfortable working with UNIX or other software frameworks.

Integration/Interoperability - LAN and network integration is a major IS objective over the next several years. Thus, products and services that enhance multi-vendor and multi-platform computing solutions will be timely and popular. In fact, interoperability (of which LAN and networking solutions are a major part) will drive the use of other systems software products such as distributed DBMSs, client/server and cooperative processing models.

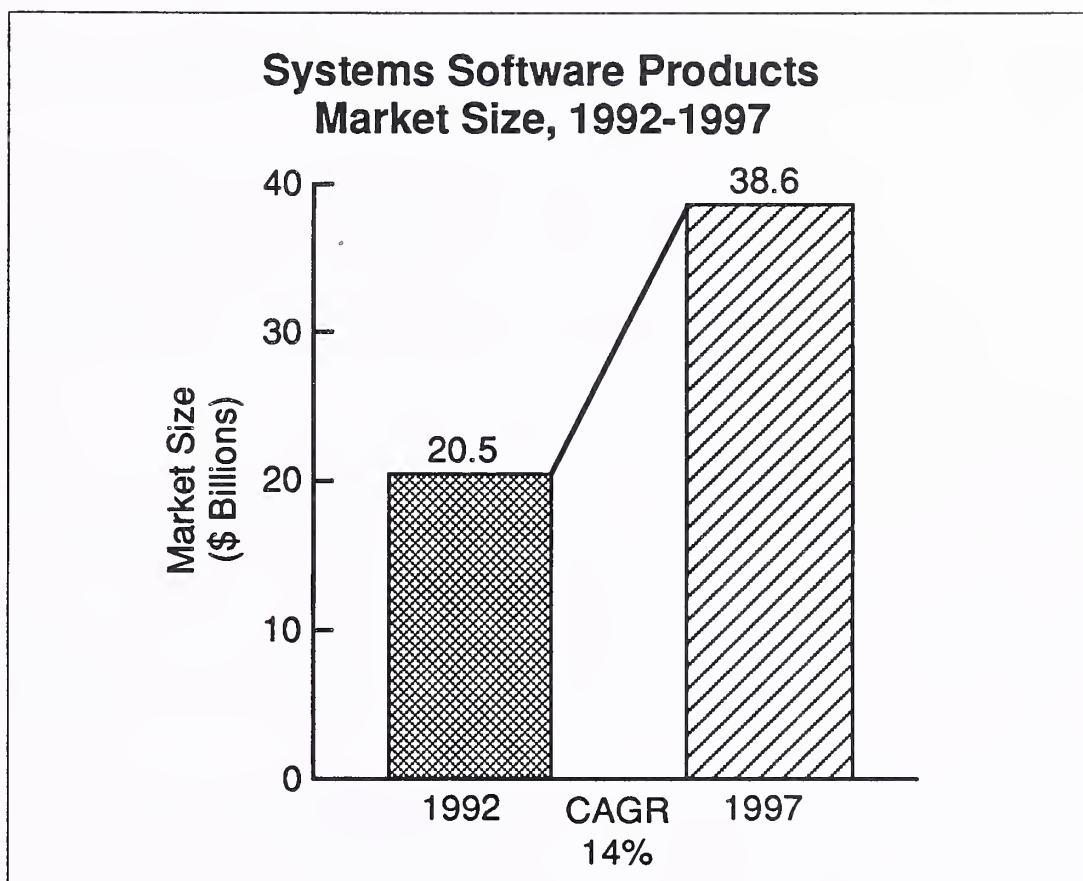
Emphasis on Solutions - Lower costs and improvement of overall productivity is the key technology goal in terms of applications software products. However, this goal is not among top systems software priorities. Since applications software products are viewed as a way to lower functional costs, systems software is viewed more as a background support product, necessary to efficiently and reliably run applications software. However, due to the confusion caused by conflicting standards, new technology approaches, and various stages of product readiness, many users may view systems software as part of the problem rather than part of the solution. Insofar as systems software can be viewed as part of the solution, its strong growth will be assured. This implies that systems software vendors will need to work closely with applications software products vendors from both a marketing and sales perspective.

C

User Expenditures

As noted in Exhibit II-3, the overall systems software market will grow from \$20.5 billion in 1992 to \$38.6 billion in 1997, at a CAGR of 14%.

EXHIBIT II-3



INPUT's forecast for systems software products—a 14% CAGR for the 1992-1997 period—compares to INPUT's applications software products forecast of 14% over this same five-year period. INPUT believes that the kinds of technology shifts that will have a positive impact on the applications software products market will also have a positive impact on systems software products.

In addition, an obvious and fundamental shift is occurring that makes the solution aspect of software the number-one priority. Whereas systems software products are considered supporting, and necessary products, applications software products are more synonymous with solutions.

The fastest growing submodes will be applications development tools and operations management tools. Emphasis on applications development efficiency and the trend towards multi-platform, multi-vendor networks and network integration, will fuel this growth.

Even though UNIX's share of the total systems software market will remain relatively small (at 16%), the U.S. market for UNIX-related systems software is growing almost twice as fast (25%) as the systems software market as a whole (14%). The U.S. market for UNIX systems software is forecast to reach \$6.1 billion by 1997.

D

Vendor Competition

Exhibit II-4 notes the largest systems software product vendors. The revenue used to calculate the market share for each company, which resulted in their placement on this list, was developed from a combination of INPUT interviews, public financial and product data, and information from INPUT's vendor files. Only non-captive U.S. dollars were considered.

EXHIBIT II-4

Systems Software Products Leading Vendors

Vendor	1991 Market Share (%)
IBM	15
Digital Equipment Corp.	3
Computer Associates	3
Microsoft	2
Hewlett-Packard	2
Novell	2
Oracle	1
Unisys	1

IBM continues to have a commanding lead, with a 15% market share, down slightly from 16% in 1990. Revenues for the other seven major vendors vary slightly from last year with the overall total for the group approximately 6% below their 1990 performance. INPUT attributes some of the slight dip in revenues for these leaders to the highly competitive 1991 (and 1992) PC marketplace. In this market, a bundling of systems software in both hardware and software packages proliferated. A growing population of software vendors with revenues of \$100 million or less also accounted for some revenue and market share changes.

Other than IBM, the largest software products vendors controlled no more than 3% of their market, and only six vendors held more than a 1% market share.

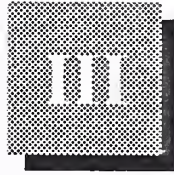
However, the big stayed big, and the vendors, noted in Exhibit II-4, accounted for 29% of the systems software products market.

E**Conclusions and Recommendations**

Conclusions - As a result of its analysis of the systems software product market, INPUT concludes that there will be moderate growth in this market during the mid-1990s at a CAGR of 14% through 1997. Novell's acquisition of ISL from AT&T will give a needed push to the UNIX marketplace. INPUT furthermore concludes that the smaller platform operating environment will become more competitive, with viable DOS, OS/2 and UNIX options competing for user acceptance in the general purpose commercial marketplace. Operations management tools will be the fastest growing delivery submode, followed by applications development tools. Mainframes will not disappear, as many anticipate, but they will assume new roles. In some cases, mainframes will grow even larger to serve complex enterprise-wide applications. Finally, as users retain and use preferred software products, maintenance and license fee renewals will continue to generate a significant portion of system software product revenues.

Recommendations - As with many markets with strong technical and market continuity, recommendations for success in the systems software products market are not revelatory, and essentially reflect a continuation of the successful practices of the last few years. Specifically, customer service, and all the aspects of product quality, will continue to be key determinants of the competitive advantage. Vendors ignore the service and support needs of their clients at their own risk. Systems environments tend to be slow-moving, standards-driven and subject to pressures from hardware manufacturers and established vendors. Be an active participant in standards-setting groups, (especially for UNIX) and recognize that change will slowly occur. Acquisitions have been common over the last few years, especially as the strong consumed the weak during depressed economic times. Alliances are also becoming more common. As a result, INPUT feels that those smaller public vendors who want to be independent will have to establish alliances in order to avoid being acquired by larger companies. Consolidations can be expected to continue throughout the decade; however, in most cases, they will reflect long-term positioning rather than just a desire to increase market share.

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General Business Climate

This chapter provides INPUT's overview of the current business climate for the U.S. information services industry and for the systems software products delivery mode.

A

Overview

Despite concern about the painfully slow growth rate in the U.S. economy in 1992, information services industry vendors report that the environment offers significant opportunities, together with challenges, as indicated in Exhibit III-1.

EXHIBIT III-1

Impact of the Economic Environment

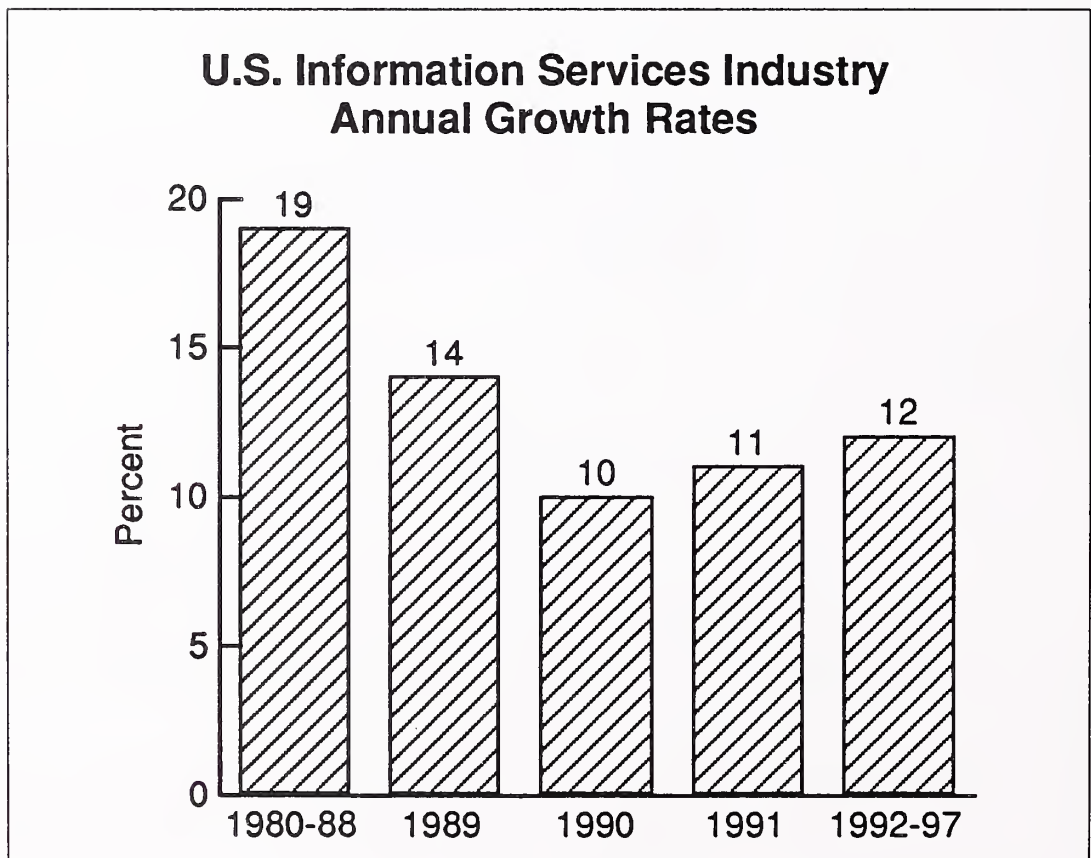
Factor	Impact on the Information Services Industry
Low level of growth in U.S. economy	Increasing need for application systems that can improve revenues and restructure business
Slower growth rate for U.S. information services industry	Likelihood of slower growth rates for vendors who pursue business as usual
Annual increase in information services business of over \$10 billion	Significant target for aggressive vendors
Foreign market opportunities and competition from foreign vendors in the U.S. economy	Need for information technology to increase product quality and customer services

Of note are:

- The annual increase of business volumes in the industry of over \$10 billion makes information services one of the more attractive areas of opportunity in the economy.
- Demands imposed by low level economic growth have led to vendor projects to want to increase revenues through improved geographical analysis of sales coverage. There is also a desire to improve service and product quality through the use of client/server systems that enable users to communicate between functions more effectively.

As Exhibit III-2 shows, the U.S. information services industry is growing at a slower rate in the 1990s than it did in the prior decade. Although the industry is rebounding slightly from the recession, it is not likely to return to the growth rates of the early 1980s. Vendors cannot rely upon a favorable growth climate to help many of their product and service initiatives.

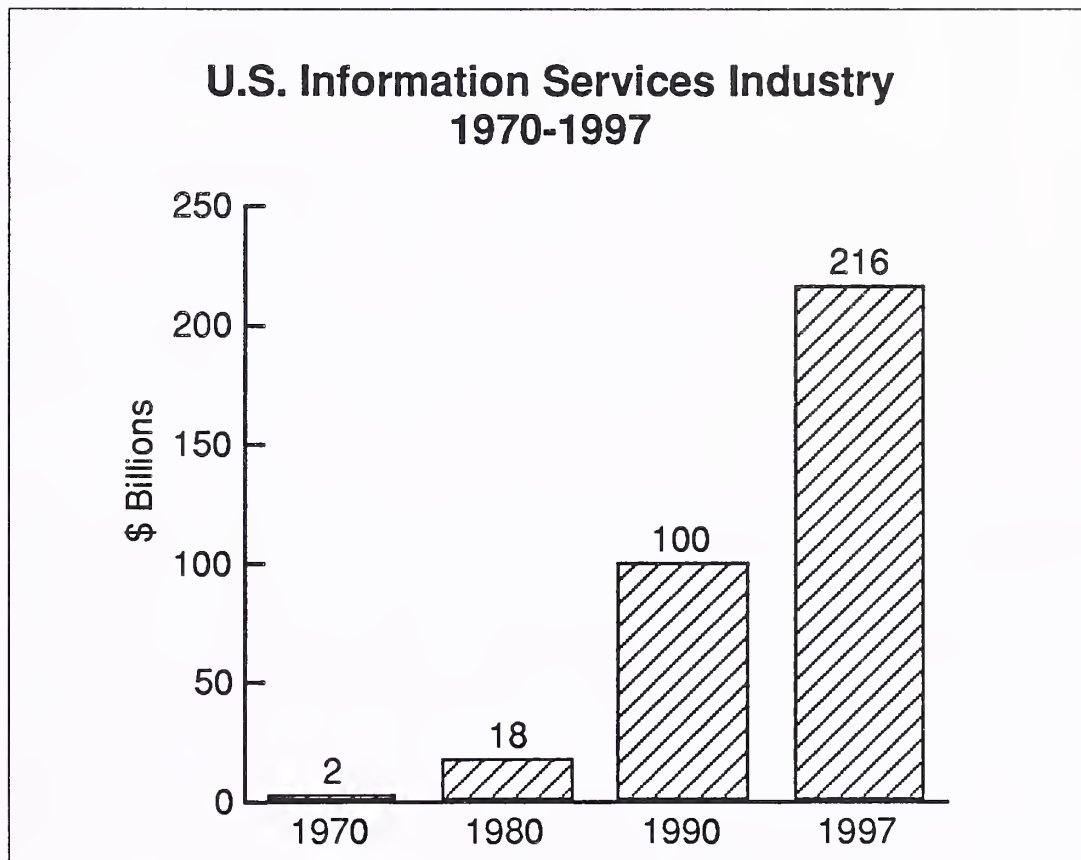
EXHIBIT III-2



The industry did reach a milestone during 1990, advancing beyond the \$100 billion level.

- As Exhibit III-3 shows, the industry increased in size over five times during the 1980s and is 50 times larger than it was in 1970 when the industry represented only \$2 billion in user expenditures.
- By 1997, the U.S. information services industry is expected to grow to almost \$216 billion, and the annual increase (in absolute terms) will be in the range of \$20-25 billion.

EXHIBIT III-3



High growth rates for the sale of software products and professional services provided the engine for expansion during most of the last decade. As rates for increases in sales of these delivery modes declined, there were concerns about the continuing vigor of the information services industry. However:

- Growth of U.S. information services expenditures has been reinvigorated by the strong interest in outsourcing, restructuring, downsizing business application systems, and by an increase in the use of network services. In addition, there has been a continuing growth in systems integration services.

- In effect, the information services industry has been shifting from sales of products and services for new application systems, to sales that will upgrade, manage, and outsource the use of information technology. Driven by business needs, this shift will continue to restructure in attempt to achieve greater effectiveness, productivity, and increased revenues.

On a global basis, the industry continues to experience higher growth rates—close to 20%. Many U.S. vendors are experiencing growth overseas that exceeds that of the U.S. industry as a whole.

- This growth is primarily due to the relative stage of automation in many foreign markets, but the focus on specific industry markets in some countries is also a strong factor.
- Inflation rates and somewhat stronger economies have also helped to drive the global use of information services in the last few years, but these factors may have less of an impact at this time.

B

1991 Results for the U.S.

1991 results in the U.S. are analyzed below on a delivery mode basis:

- Although systems integration, systems operations and network services are not among the top three delivery modes in size, their rapid rates of growth (16% to 19% CAGR) are a major factor in maintaining and increasing the rate of growth in the industry as a whole.
- The software products sectors maintain a rate of growth near or slightly above the industry average (about 12% CAGR).
- The industry averages are pulled down by the slower rates of growth in the large professional services and processing services sectors, and by the smaller turnkey systems sector (7% to 9% CAGR).

Exhibit III-4 summarizes the overall 1991 performance of the U.S. information services industry.

EXHIBIT III-4

**U.S. Information Services Industry
1991 Results Summary**

- Reached \$110 billion in 1991
- Growth 2 to 3 times that of the economy continues
- Growth of 11% in 1991; forecast to return to 12% in 1993
- Extremely slow economic growth is complicating user plans

C**Market Forces**

The market forces noted in Exhibit III-5 will continue to have an impact on the information services industry in the 1992-1993 time frame and will also have a measurable effect on the overall growth rate for the 1992-1997 period. Each force will affect the industry as a whole, as well as each of the nine delivery mode sectors used by INPUT to analyze the industry and its key trends.

EXHIBIT III-5

**U.S. Information Services Industry
Primary Driving Forces, 1992-1997**

- Slower economic growth
- Globalization
- Growing influence of large vendors
- Outsourcing (buy versus make)
- Shift in technology
- The changing buyer

Slower growth - The first of these forces, the interaction of the economy with the overall size of the industry, is a significant factor in user expenditure levels for information services, including software products, for the following reasons:

- Because economic growth has slowed and the rate of inflation remains relatively low, there is less growth in industry sales due solely to inflation-driven price increases.
- Real economic growth, which had been modest prior to the recession of late 1990, will continue to be low during the forecast period. Consequently, it may continue to defer plans for the expanded use of information services in many industry sectors.
- The shift of information processing to smaller computers, which has been encouraged by the economy as well as by the current cost and level of technology, has lowered the software products investment, based upon current pricing practices. Quantities of software products sold will increase. However, the revenue levels will grow at more modest rates unless software products are sold together with professional or systems integration services where their price might be increased in line with actual value.

1991 tended to follow the pattern of 1990. While there was little or no real growth in the overall economy, and a modest inflationary growth in the range of 3-4%, the information services industry grew at an annual rate of about 11%.

- While INPUT's 1990 and 1991 economic assumptions were for nominal GDP growth of 5.4%, real GDP growth was substantially less.
- At this point, the economy remains at a low level of growth, although a recovery—a slow-moving or, “sloth of a recovery” as described by *Business Week*—is underway. At the same time, inflationary pressures are modest. INPUT anticipates another year of modest growth in 1992 together with a slight rebound in information technology (IT) expenditures.

The expected slow upturn will have the following positive and negative impacts on the U.S. information services industry in the near term:

- Positive impacts:
 - Increased motivation to buy rather than make, in particular for larger systems requirements. Response time and impact on business operations are the key criteria supporting use of outside services.
 - The interest in outsourcing, which permits organizations to redeploy capital investments and lower direct head count, is being encouraged by slow economic conditions and the desire to lower costs.

- A tight economy is helping to develop interest in lower-cost solutions that come from client/server-based applications software products.
- Possible negative impacts:
 - Continuing uncertainties in decision processes, although not as severe as in 1990 and 1991, will cause some delays or deferrals of major information systems projects.
 - With tight constraints on external information services expenditures at some companies, management may decide to burden the internal IS staff with application maintenance, enhancement, and development assignments rather than use contracted professional services vendors. This would have a negative effect on a major segment of the industry.

Globalization - The second major market force, which INPUT has stressed for the past three years, is globalization. During that time more markets have opened, vendors have expanded their international focus, and users have begun to expect global capabilities.

The primary positive impact of globalization is that it enables the larger vendors to balance their businesses in multiple markets, which are less affected by market downturns.

The primary negative impact from globalization is that it may become more difficult for smaller vendors to grow and/or maintain independence.

Large Vendors - The third market force is the influence of larger information services vendors, which has increased significantly over the past three years.

- The newer, yet smaller, systems integration and systems operations sectors are growing faster than the traditional sectors, such as professional services and processing services, and are dominated by the larger vendors.
- A number of the larger vendors such as IBM, EDS, CSC, and DEC are growing faster than the overall market. These vendors have more opportunity, based on their resources, to enter (or acquire vendors in) desirable foreign markets.
- There are also numerous smaller firms that are growing faster than the general market, but larger vendors have a disproportionate opportunity to obtain bigger jobs and continue to add large amounts of revenue to their bottom line each year.

The influence of larger vendors is also increasing in other ways. Starting with IBM, many large services vendors are making minority and majority investments in IT firms to gain influence on technology, access to software products for remarketing, and market share.

The increasing use of business consulting linked to professional services provides a means for the large accounting, consulting, and some large information services firms, to gain a greater share of the industry. INPUT expects this trend to continue over the next few years.

The opportunity for the smaller, more specialized software product or services vendors is not disappearing, but it is changing in character:

- Alliances with larger vendors will be essential, at least as secondary sales and support channels.
- Specialization, in terms of the technology used or the industry served, will become more important and common.

The continuing increase in the strength and impact of the larger vendors will have the following positive impacts:

- The larger vendors have the financial strength to mobilize resources for very large jobs.
- The size of the vendors can help to minimize the risk of losing large contracts.
- The larger vendors have financial resources available to invest in new technologies, often through investment in smaller and specialized firms.

Smaller technology firms may need to form alliances in hopes to gain the same advantages previously discussed in order to survive. Larger firms, however, tend to move more slowly, which will hamper development and acceptance of new technology. This slowness will provide opportunity to small vendors that seize technology initiatives.

Outsourcing - The fourth market force to be reviewed is outsourcing. The recession has encouraged more companies to consider outsourcing. The interest in it stems from the outsourcing of the management of information systems (systems management) to other types of activity such as solutions buying, applications maintenance, and application management (Exhibit III-6).

EXHIBIT III-6

Outsourcing Trends

- Systems management
- Solutions buying
- Applications maintenance
- Applications management

- Applications maintenance, the-around-the-clock support of applications systems, and application management, contractual arrangements to manage the development and support of application systems, are new means for utilizing support from professional services vendors that provide more defined relationships and pricing.
- “Solutions” buying is support for client/server technology where a vendor will provide software products and customization to satisfy the needs of a distributed environment.

Technological Shift - An additional market force is the shifting technology foundation, as shown in Exhibit III-7. This influence is related to the developments that are adding complexity to, or shifting the technological basis for, the use of information systems and includes the following:

EXHIBIT III-7

New Technology Foundations

- International standards
- Graphical user interface (GUI)
- Client/server
- Networking and integration
- Distributed data
- Imaging
- Engineered/re-engineered software

- The international standards that must be considered when developing or buying software products in today's market.
- Graphical user interfaces, which are in increasing demand by users of software products.
- Client/server architecture, which is providing the technology to meet user needs. This is the vehicle for downsizing application systems, or portions of them, for user environments.
- Networking and integration, which provide the means for distributing application systems as well as linking company functions.
- Distributed data, a necessity for distributed user environments.
- Imaging, the inclusion of the entire source document in the information systems application.
- Engineered/reengineered software products that will change the approach to the maintenance and enhancement of application systems.

These shifts will make it possible for solutions to be more tailored to user environments and company situations. They will also create a number of opportunities for vendors.

Changing Buyer - The final market force to consider is the changing nature of the buyer. The decision maker for the purchase of information services remained relatively constant until the late 1980s. It was the information systems executive and key staff (systems development and data center operations managers) who decided when to go outside and with which company to contract.

This role changed significantly in the past few years and promises to change even more. As the information services vendor moves to provide a long-term service or a full solution, the executive (in user functional areas) is becoming the buyer. The results are significant:

- Technology becomes less important and the business or operational result becomes more important.
- The impact of the information systems function becomes more consultative and less direct.
- There is an increase in the ability to try new ideas and approaches.

D

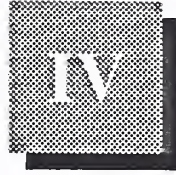
Summary

1991 and 1992 have been a period of significant changes from the 1980s. The changes suggest more modest rates of growth, but a sizable amount of growth in absolute terms. In addition, a number of opportunities and challenges could have a positive effect on vendors who opt to play a proactive role in the changes taking place. For example:

- A 1991 market of \$110 billion that is growing at a 12% CAGR over the next five years offers major opportunities.
- The increasing tendency of larger organizations to turn to vendors for services who have significant elements of systems management and a solutions orientation that will lead to larger, longer term decisions for vendor business.
- The shift in the underlying technology foundation will create more valuable and productive applications solutions, but this shift will also necessitate re-engineering, reinvestment, and retraining, and require time and money.

The role of the executive (in user functional areas) concerning the deployment of information technology continues to increase and will become more important in regard to vendor selection over the planning period.

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Information Systems Environment

In order to understand the dynamics of the contemporary information systems environment, INPUT interviewed product developers, users, financial analysts, and other industry participants. The following discussion provides an overview of the current information systems environment, as related to systems software products.

The results of this data-gathering effort and related analysis tend to support the forecast contained in the 1991 U.S. Systems Software Products annual report—overall reasonable growth (11%) in the system software products market in general, with higher growth in the areas of desktop, operations management, and GUI-based applications development tools.

This chapter examines current factors in the IS marketplace and notes user concerns that will influence market demand over the next 12 months. Chapter V deals with issues and trends that INPUT feels will influence vendors and systems software products during the forecast period.

INPUT defines three major sub-categories (or delivery submodes) of systems software products as follows:

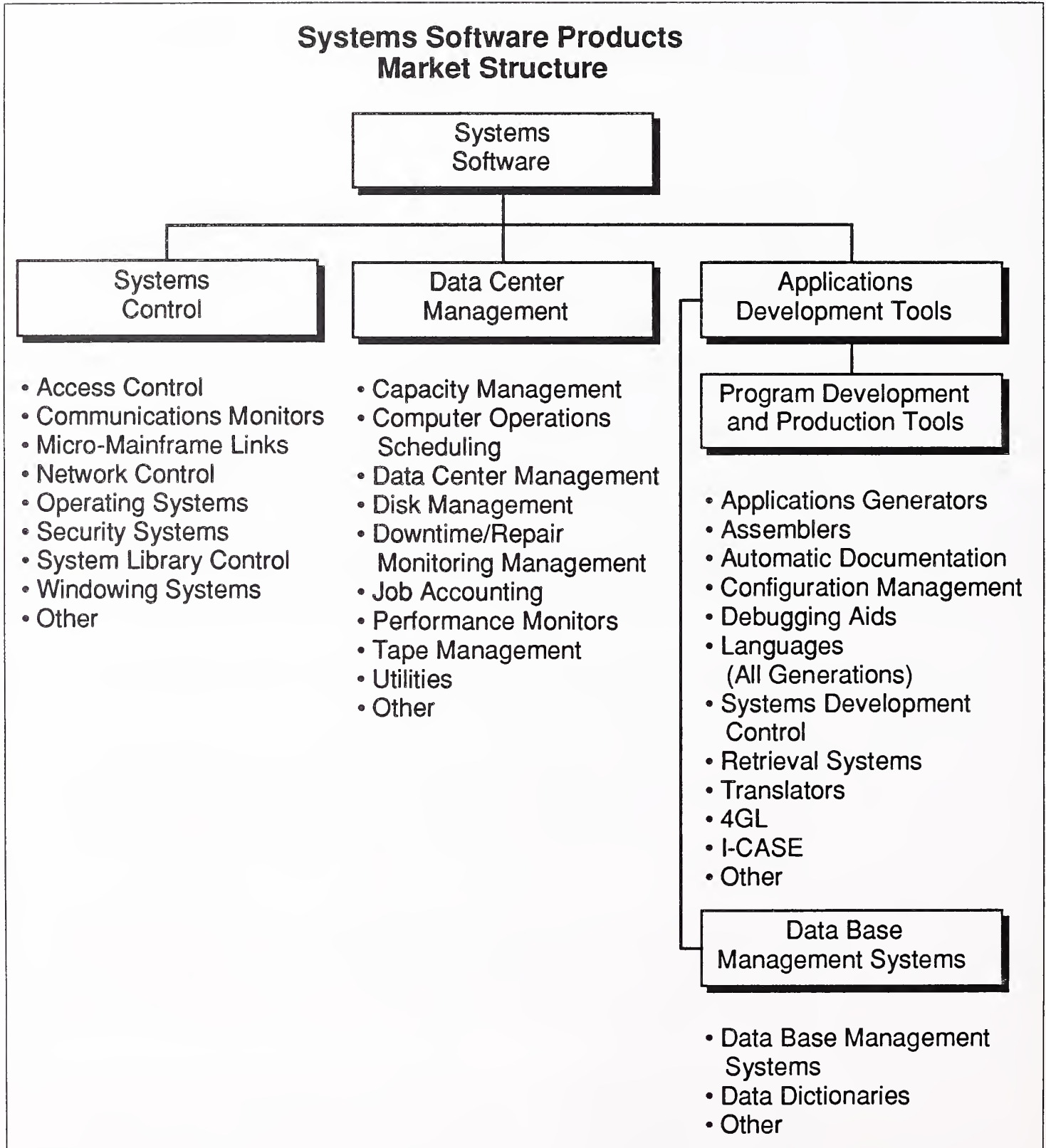
Systems Control Products - Programs that function during application program execution to manage computer system resources and control the execution of the application program. Examples are operating systems, emulators, network control, library control, windowing, access control, and spoolers.

Operations Management Tools - Programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Examples are performance monitors, job accounting systems, computer operations scheduling, disk management utilities, and capacity management.

Applications Development Tools - Programs used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples are CASE tools, DBMSs, languages, assemblers, high-level language processors, application generators, report writers, and source-level debuggers.

These delivery submodes and an expanded set of functional examples, are diagrammed in Exhibit IV-1.

EXHIBIT IV-1



A

Market Direction

1992 will be remembered by vendors and customers as a year marked by the “3 Rs”—restructuring, reorganization, and rightsizing. As organizations struggled to maintain service levels and compete effectively, they found that they had to frequently do more with less.

Contrary to some pessimistic expectations, the enterprise-wide mainframe DP environment did not dramatically shrink in 1992. In fact, for 1992, INPUT estimates that 45% of all system software product dollars will go for mainframe-resident control products and tools. While reflecting the distributed processing pressures of the marketplace, recessionary economic conditions, and uncertainty about investment tax policy, mainframe budgets grew at a respectable rate for tools and mainframe system control products, as large organizations sought to automate the production environment with “lights-out” operation support products.

Vendors and customers are reorganizing, and DP shops must scramble to accommodate the absorption of new systems and resources by end-user departments, and the distribution of data and applications to the desktop.

B

Downsizing—Open System Technologies

While mainframe DP budgets for system software products remained robust, a considerable focus and emphasis were placed upon the distribution of data and applications to the department and the desktop. The pendulum has definitely swung back from “PC chaos” to rational networked distribution, with the concomitant emphasis upon operations management and applications development tools built from the ground up with desktop and distributed functionality in mind.

A case in point is DHL Airways, Inc., re-engineering its mission-critical package tracking system (5,000 desktops worldwide) to run on UNIX Servers with the IBM ES/9000 mainframe as a data base repository. The UNIX servers will be connected in multiple Token Ring local-area networks, servicing PCs, MACs, and WYSE terminals. Each server will have access to other servers on the ring as well as the ES/9000 repository.

Rather than invest in mainframe tools and technologies to solve the expanding customer service requirement, DHL pursued the distributed client/server strategy, adopting a flexible networked solution with support for high-productivity GUI-based desktop applications. The resulting

competitive advantages are achieved with lower communications costs because local terminals do not have to connect to a distant mainframe, and lower mainframe expense because processing power and redundancy are distributed throughout the network.

Industry surveys support INPUT's perception of the growing interest in "open" technologies, rather than single-vendor proprietary product offerings. Economies of scale, and a fear of leaving key corporate IT assets in the hands of a single hardware or software vendor, have motivated organizations to invest in UNIX-based systems and applications tools, standardized connectivity options such as Netware and TCP/IP, and standardized Graphical User Interfaces such as Windows.

The ever-expanding client lists of vendors such as Oracle, Sybase, Novell, Microsoft, Computer Associates, Dun & Bradstreet, etc., bear witness to the demand by major U.S. corporations as these newer, more cost-effective technologies mature and become realistic vehicles to power U.S. Information Technology in the 90s. A similar effect can be observed in the system software revenue streams of such hardware vendors as Sun Microsystems (Solaris), Hewlett-Packard (HP9000, HP-UX), IBM (RS/6000, AIX), Sequent, and Pyramid.

Downsizing made its presence felt in a very tangible manner as major mainframe suppliers Amdahl and IBM announced layoffs, R&D budget cuts, and enormous accounting charges against earnings. Analysts and industry observers attribute these negative developments to an over-reliance on central IS-oriented technologies and large systems in a period when users are clearly choosing open system, distributed desktop solutions for their application requirements. INPUT draws a parallel with Detroit automakers' disregard for the threat of Japanese automakers' incursions in the U.S. new car market and the subsequent performance of Chrysler and General Motors.

It should be noted, however, that the mainframe installed base continues to represent an enormous market opportunity, with erosion occurring slowly, over time.

C

Graphical User Interfaces (GUIs)

GUIs allow users to treat data and programs as "objects," represented by icons, and are a key attribute of the *Windows* environment. The growing popularity of GUIs is such that 1992 might be described as the year of *Windows*. Virtually every popular application development tool is shipping a *Windows*-compatible version. Most of the popular UNIX tools support client access through a *Windows* interface. *Windows* functionality

is also supported under UNIX by Motif and X-Windows in a standard fashion, so applications written for one machine environment can be easily ported to other machines, thus preserving and protecting the customers' investment in a powerful new way of delivering applications.

Windows is also the most visible manifestation of object technology. Objects, represented on the screen as icons, can be created and manipulated using object languages, stored in object data bases, maintained with object tools, and communicated with through object communication protocols. Object-oriented application development has been proven more productive than existing technologies in terms of initial development investment, and in ongoing maintenance expense. Object-oriented applications, which are more flexible than legacy application technologies by design, empower developers with a high degree of responsiveness to changing business conditions.

D

RDBM Growth

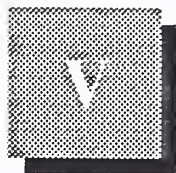
1992 was also a year of increased penetration and adoption of Relational Data Base technologies. Oracle exceeded \$1 billion in revenues, shipping Version 7.0 of the Oracle RDBMS with significant new functionality. IBM's DB2 exceeded 8000 installations worldwide. Acceptance of relational technologies by mainstream IS organizations continues to fuel INPUT's above-average growth expectations for the Application Development Tools sector of the Systems Software Products universe.

E

CASE

While CASE techniques are widely discussed, and CASE tools *are* being adopted on a piece-by-piece basis, the major CASE products are not achieving expected performance levels. Companies like KnowledgeWare, Texas Instruments, and GCI Systems have made steady progress, but the initial glow of the market has faded somewhat. What is emerging is evidence of a cautious customer base, using more of a plug-and-play approach, comprised of interchangeable tools, rather than the anticipated monolithic, integrated CASE environment.

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Issues and Trends

This chapter notes the issues and trends that INPUT feels will have a major impact upon Systems Software Products revenues during the next 5 years. The key topics are summarized in Exhibit V-1.

EXHIBIT V-1

Systems Software Products Key Issues and Trends

- Downsizing
- Standards
- Object technology
- Relational Data Base Management Systems
- Workgroup/workflow automation

A

Downsizing

Background - The trend to downsizing has multiple origins. The principal forces include: alternatives for lower-cost computer systems; the increasing adoption of relational data base architectures; and the movement towards support of open systems and other standards.

Improved decision support using relational data base report generation tools, and reduced hardware and software costs from lower-priced computer platforms, are significant driving forces for IS downsizing. However, to date, cost-savings benefits for many companies have proven to be elusive. This has probably caused the implementation pace (to date) of corporate IS downsizing to be evolutionary and somewhat tentative.

INPUT's earlier IS executive surveys indicated that IS management is not totally convinced of the cost benefits resulting from downsizing, and that much of the current pressure for IS downsizing is probably coming from non-IS management, who favorably regard the cost-savings argument.

Trend - An acceleration in the pace of downsizing will occur with the development of more secure distributed data base systems technologies. This should allow for the distribution of more mission-critical, on-line transaction and complex data base processing applications to lower cost server platforms with enhanced data security through centralized systems and network management solutions. In turn, these steps will facilitate the offloading of data base processing from the mainframe.

To date, much of the data base and file transfer technologies have remained on centralized platforms because of significant security issues. Once these data bases can be distributed, mainframe usage can be reduced. Under many current downsizing scenarios, the mainframe continues to be a costly factor because of the necessity to retain the dual IS architectures that maintain data integrity.

Analysis - INPUT's IS Model for the 90's calls for movement away from centralized processing towards a client/server environment with significant processing power and intelligence at the client and server ends. Any platform will be able to function as a client or a server. Applications and the tools to manage them will run on mainframes, minicomputers and workstation/PCs. Departmental applications and products will typically reside on minicomputers, workstations, and PCs at the desktop. Desktop users will be interested in personal productivity tools and application development tools, which take advantage of the trend toward more MIPS on the desktop, with better graphics, and higher bandwidth networks that connect the enterprise.

Decentralized applications call for distributed data bases. Data must be shared across multiple platforms and operating environments. Problems such as referential integrity (the requirement that indexes remain in synch with data) and two-phase commit (a necessary ingredient for the integrity of distributed data bases) must be addressed for data base vendors to be successful in this market.

End users are much more heavily involved in the purchase and requirements definition of downsized applications and tools. A new set of expectations is emerging in which users expect plug-and-play, scalable software products with built-in network support. Users are not interested or concerned about operating systems—current and future users will demand operating system transparency.

As the market shifts towards the desktop, a shrinkwrap orientation is emerging. Users want products to install easily and run in a non-IS supported environment. Complex client/server environments will emerge, demanding sophisticated electronic licensing support and operations management tools.

B

Standards

Standards in networking, operating systems, data bases, and the GUI look and feel will become important determinants of which companies and products will be important players in the 90s. Downsized users will demand interchangeability of data, tools and applications. The current and future user community does not want to be limited to a single vendor for solutions to their business needs.

However, a recent INPUT vendor survey noted that an increase in software implementation costs is partly attributable to the current need to support many existing alternative standards. Logically, a greater industry consensus on standards would reduce the current additional costs associated with supporting multiple *de facto* standards alternatives — an issue that is extremely important when implementing downsizing programs.

The same INPUT survey noted that future standards (or standards to be supported) showed a directional shift away from a broad range of alternatives and towards specific standards (e.g. DCE, RPC, ODBC, Posix, OSI, X.500) representing such standards categories as:

- Distributed architectural standards
- Object-oriented standards
- Messaging standards

Support for scalable-computer architectures and fewer alternatives for operating systems across the corporate enterprise will also be required to make downsizing most cost effective.

As standards develop and are accepted by the user community, sales volumes will increase dramatically. The movement towards operating system, GUI, networking, and DBMS standards will propel the workstation/PC market to a much higher CAGR than corresponding minicomputer and mainframe platform software sales. One of the newer standard's bodies, the Object Management Group (OMG), is made up of 20+ hardware and software vendors in the rapidly emerging field of object technology. The group's first standards effort, the Object Request Broker (ORB), details a methodology for the transfer of objects between various disparate systems and applications environments. Soon to follow will be language (C++ and Smalltalk) standards and object data base standards.

C

Object Technology

“Objects” were first brought to the IS community’s attention by the use of icons in graphical-user interfaces. Developers and users quickly realized the utility of icons in the representation of programs and data. Design, implementation, documentation, training, and maintenance were often much easier when a GUI was employed as the user interface.

Concurrent with the introduction of object-based GUIs was the development of object-oriented languages. C++ is an extension of the C language designed to support classes and methods, while Smalltalk was designed from the ground up to deal with object concepts. At the same time, a number of vendor companies were established that provided object data base support for applications built with object languages and GUIs.

Object data bases had immediate advantages over existing data base technologies:

- *Complex data types* - ODBMSs can easily accommodate anything that can be digitized and stored within the bounds of today’s disk units.
- *Stored Methods* - Procedures are stored with the data, allowing a level of modularity unheard of in most other DBMS technologies.
- *Reusability* - Objects and methods can be inherited by subobjects or simply reused by other modules.
- *Enterprise Modeling* - Object systems more closely model paper and human systems behavior than rows, columns, fields, records, and indexes. Hence, the transfer of user requirements to an operational system is much easier to manage.
- *Complex Relationships* - Object data bases provide a more natural fit for complex relationships among data types. System performance in these situations usually exceeds RDBMS performance.

What is limiting the growth of this exciting new technology? At this time, the most significant limitation is a lack of standards, which inhibits the rapid adoption of object-oriented productivity tools. Once a critical mass of object standards has been accepted, INPUT believes that OOPS, ODBMS, and object-oriented CASE tools will grow at a rate significantly greater than that of non-object-oriented tools for the forecast period.

Many of the largest vendors have mounted serious campaigns to address this emerging technology. Apple and IBM have partnered in Taligent (OO operating systems and future platforms) and Kaleida (multimedia). Microsoft is providing object-oriented functionality in Windows, ODE, Windows/NT and Access. Borland is addressing object requirements with C++, Interbase and Paradox.

D

Relational Data Base Management Systems

An important precursor of downsizing has been the success of the relational data base management system technology. This technology has been key to allow the dispersion of applications vertically and horizontally, throughout an enterprise, while facilitating the integration of applications and data base resources.

An acceleration in the pace of downsizing will be driven by improvements in distributed data base management software. Current functional areas of weakness are in data base synchronization and security capabilities. Improvement in these areas is allowing for greater usage of dispersed data base platforms/servers for OLTP (on-line transaction processing) applications. This should lead to a greater offloading of mainframe applications (with a heavy data base component) to the smaller platforms, which will directly address the reduction of total information systems costs.

The operating systems software and hardware platforms, which predominate as distributed data base server platforms, will determine the dominant enterprise-wide IS architecture for the 1990s. A move to standardized operating systems and hardware architecture across enterprises should also help to reduce the total IS cost structure. While it is anticipated that mainframes will lose ground to other data base platforms, they are still projected to remain the dominant platform for financial/accounting, transaction, and archival data bases in over 60% of IS installations in 1995.

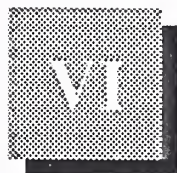
Vendor-projected data base platforms for 1995 also reflect the pro-RISC and anti-minicomputer bias of IS management, as noted by their projections of predominant applications platforms.

E

Workgroup/Workflow Automation

INPUT believes that there are a limited number of pivotal applications that will drive revenue growth in the workstation/PC area, in excess of mini-computer and mainframe opportunities. Workgroup software, tools and programs that allow remote users on PCs and workstations to share data and programs, and to perform individual tasks, which are coordinated as part of a collective effort, is an example of such an application.

Typified by products such as Lotus Notes, such products are driving demand for application development tools and operations management tools in the networked workstation/PC environment. INPUT feels that key applications built with emerging technologies could very well drive this platform area into a growth spurt well in excess of the current expectations.



Market Forecast

A

Market Overview

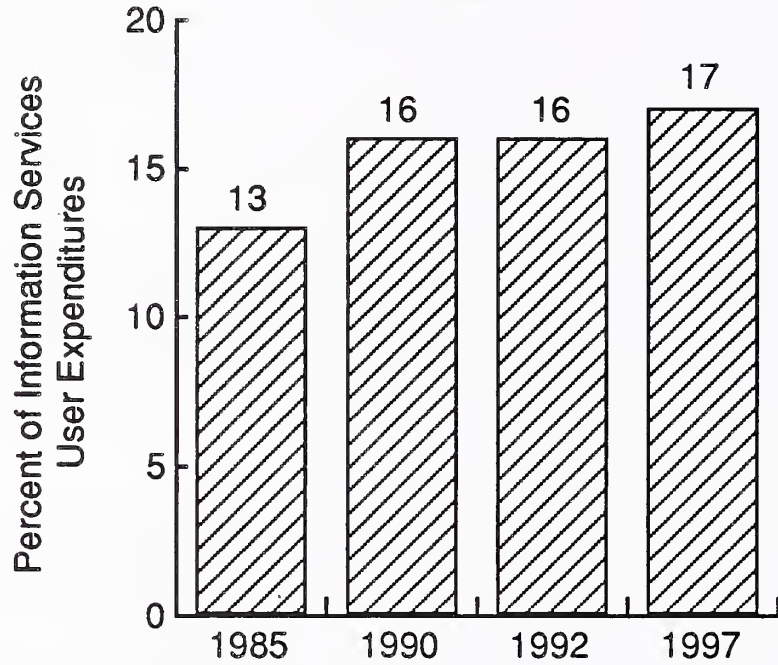
1. Historical Perspective

Exhibit VI-1 indicates systems software products as a proportion of the total information services industry from an historical perspective as well as projections for 1997. System software products has consistently, albeit modestly, increased as a portion of the whole, from 13% in 1985 to 16% in 1992. The systems software products sector is expected to remain at roughly 16-17% of overall IS expenditures through the 1990s.

User expenditures on systems software grew from \$6.3 billion in 1985 to \$18.4 billion in 1991 (Exhibit VI-2). User expenditures reached a peak annual growth rate of 30% in 1987, due in large part to the strong growth of departmental/minicomputer systems (AS/400 introduction) and also the strong growth in personal computer shipments. As indicated in Exhibit VI-3, annual growth since then has declined and will remain at 10% for 1991 and 1992, then pick up to 14% at the end of the 1993-1997 time period.

EXHIBIT VI-1

System Software Products' Portion of Information Services 1985-1997



\$ Billions

System Software Products	6.3	16.4	20.4	38.6
Total Information Services	48.6	100.4	120.8	215.8

EXHIBIT VI-2

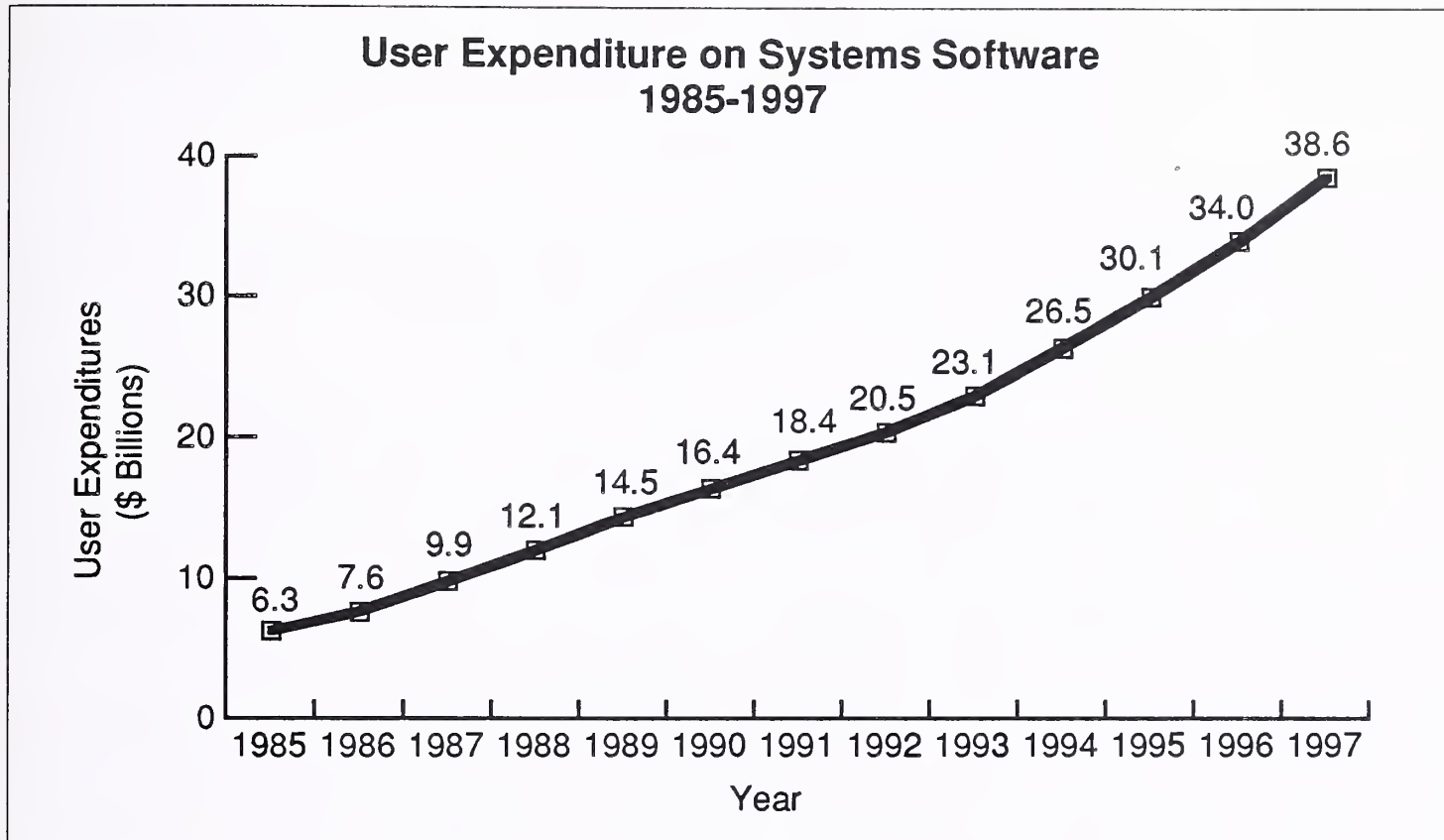
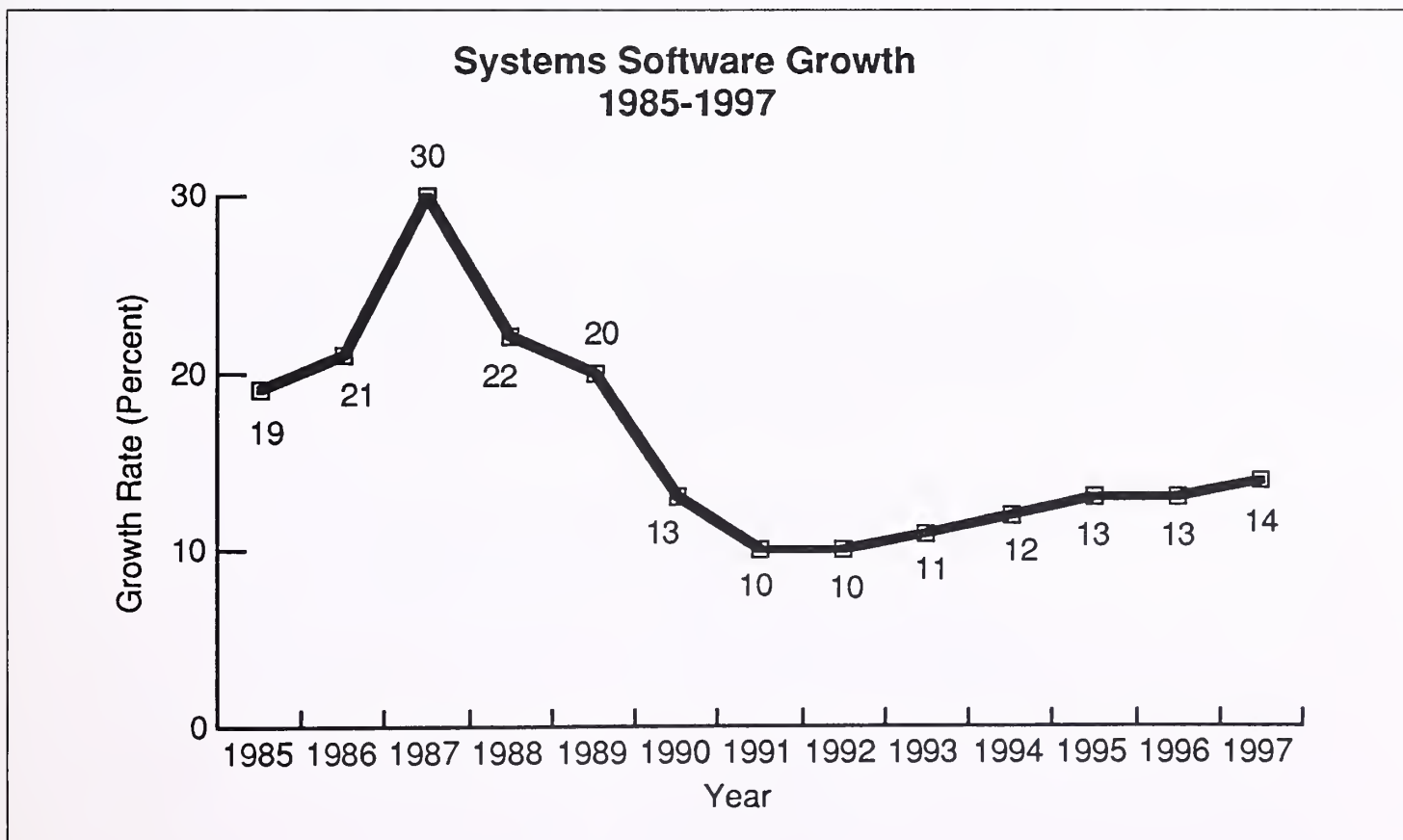


EXHIBIT VI-3



2. Systems Software Forecast

Actual reported revenues for 1990 and 1991 are depicted in Exhibit VI-4. In 1991, actual expenditure on systems software products grew 12%, reaching \$18.4 billion. Actual 1991 expenditures are in line with INPUT's forecast 1991 expenditures.

EXHIBIT VI-4

	1990	1991	Growth (Percent)
Total	16.4	18.4	12
Sys. Control	6.2	6.4	3
Op. Mgmt.	3.7	4.4	19
Appl. Development	6.5	7.6	17

- During 1991, the fastest growing systems software product area was the operations management tools sub-sector, including programs to manage network resources, system resources and personnel. Representing 24% of the system software revenue base, operations management tools posted an impressive 19% growth rate as users struggled to bring order to the sometimes chaotic world of multivendor networks.
- Applications development tools—especially RDBMS and CASE tools—experienced strong growth in 1991 due to the ongoing need to improve software development productivity. A growing emphasis on solutions, rather than pure technology, is driving demand in this market sector.

The change in outlook for systems software in last year's report and this year's report is shown in Exhibit VI-5.

- The systems software products forecast has been increased slightly for all products and platform sizes.
- Products whose forecasts have changed the most are workstation and PC-based products for all three submodes. In this year's report, INPUT forecasts these products to grow at 22% compounded annually through 1997. In last year's report, INPUT forecast workstation and PC-based systems software products to grow at a compound annual rate of 19%.

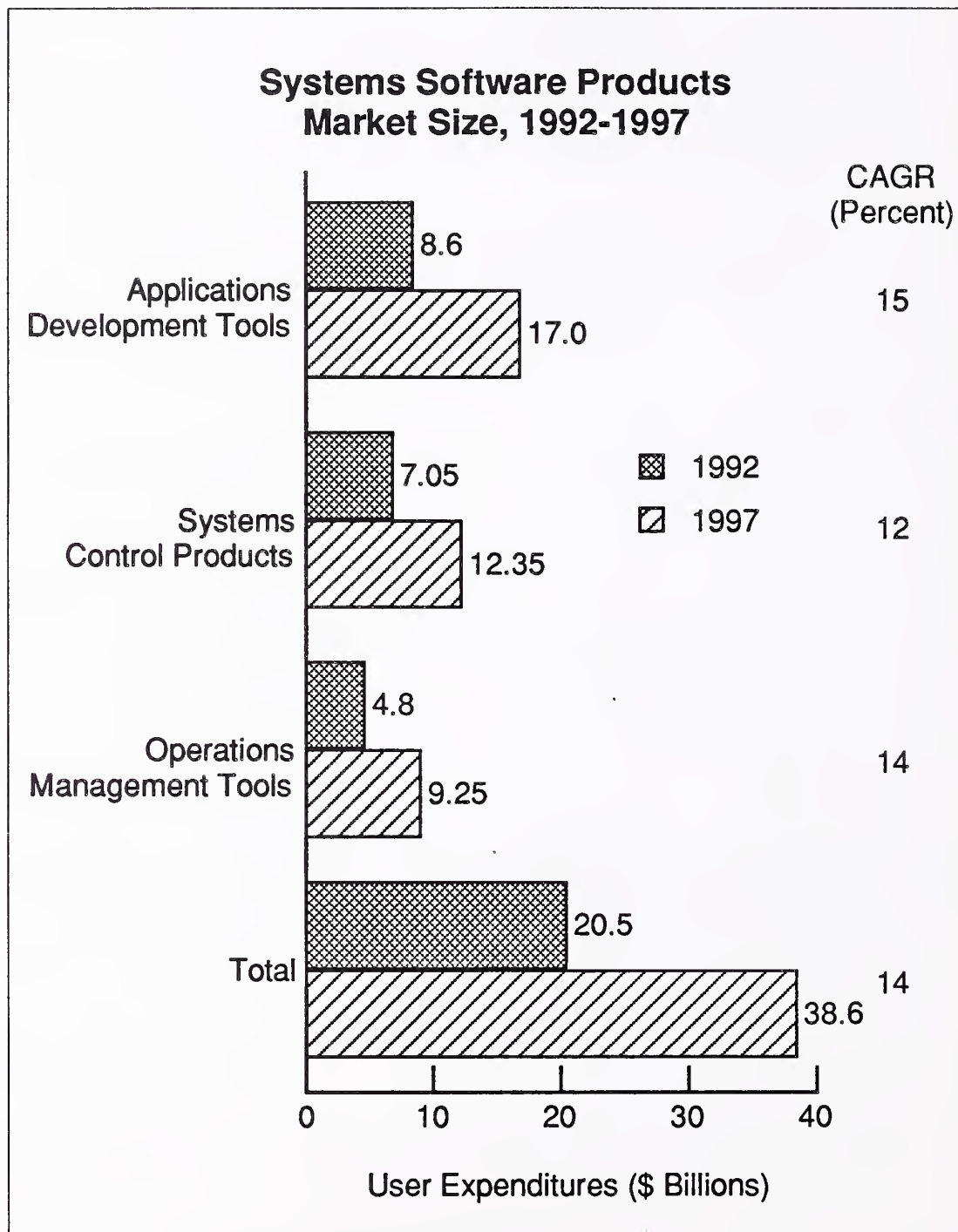
EXHIBIT VI-5

Systems Software Products 1991 versus 1992 Forecast		
	1991-1996 CAGR	1992-1997 CAGR
<i>Product Category (Submode)</i>		
Systems control products	10	12
Operations management products	14	14
Application development tools	12	15
<i>Platform Size</i>		
Mainframe	8	10
Minicomputer	10	11
Workstation/PC	19	22

The upward revisions in forecasts are due mostly to higher-quality economic indicators forecasting slow-growth recovery for 1992-97, increased optimism among technology buying authorities, and the combined trends of downsizing and desktop computing.

As shown in Exhibit VI-6, the overall systems software market will expand from \$20.5 billion in 1992 user expenditures to \$38.6 billion by 1997—a CAGR of 14%.

EXHIBIT VI-6



INPUT's forecast for systems software products—a 14% CAGR for the 1992-1997 period—compares to INPUT's applications software products forecast of 14% over this same five-year period. INPUT believes that the kinds of technology shifts that will have a positive impact on the applications software products market will also have a positive impact on systems software products.

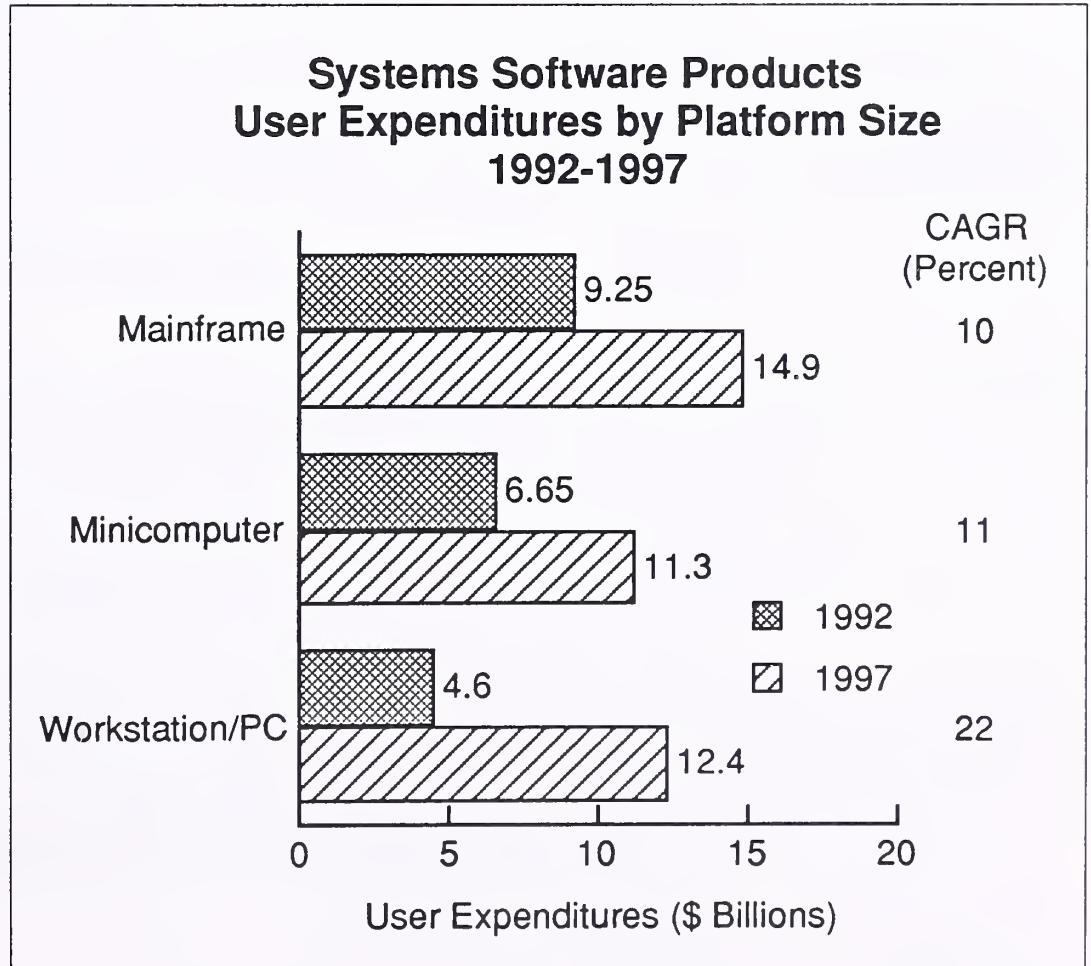
In addition, an obvious and fundamental shift is occurring that makes the solution aspect of software the number-one priority. In this respect, applications software products are more synonymous with solutions, whereas systems software products are considered supporting, albeit necessary products. To the extent that systems software products are presented as solutions, they will be eagerly embraced.

Submodes - The fastest growing submodes will be applications development tools and operations management tools. Emphasis on applications development efficiency and the trend towards multiplatform, multivendor networks and network integration, will fuel this growth.

Even though UNIX's share of the total systems software market will remain relatively small (at 16%), the U.S. market for UNIX-related systems software is growing almost twice as fast (25%) as the systems software market as a whole (14%). The U.S. market for UNIX systems software is forecast to reach \$6.1 billion by 1997.

Platforms - Exhibit VI-7 provides INPUT's forecast of systems software products by platform size. As would be expected, the bulk of expenditures are for systems software products that run on mainframes because of the generally greater per-unit software product cost.

EXHIBIT VI-7



With the downsizing trend, and also due to continually increasing prices, mainframe-based expenditures will continue to increase at a slowing rate, with emphasis on products that enhance efficiency. Existing mainframes will continue to be used for large OLTP applications and as large data repositories. However, as vendors such as IBM and Amdahl have recently learned, sales of major, large-scale mainframes and associated system software products are lagging the rest of the industry by a significant margin.

Vendors are beginning to introduce systems control and operations management products for minicomputers. UNIX will eventually gain momentum at the workstation/PC and minicomputer level.

A noticeable shift is underway toward operations management and applications development tools that run on workstations and personal computers. Systems control products are more heavily entrenched on the mainframe because of the high mainframe-based operating systems licensing fees. In addition, graphical user interfaces (GUIs) will enhance the migration of software to the PC level.

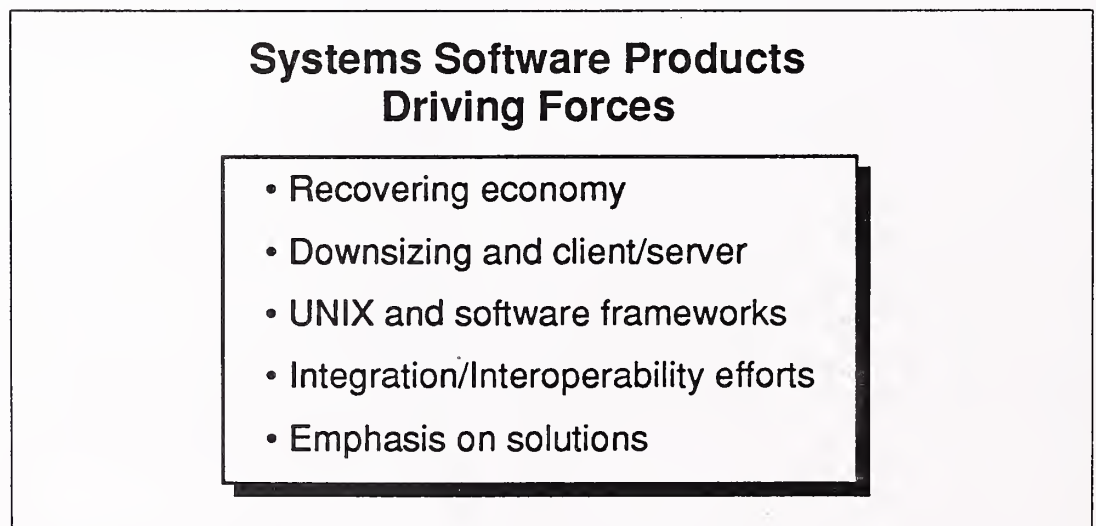
By 1997, user expenditures on systems software for workstations and personal computers will have increased to \$12.4 billion, while expenditures for midrange computers, at \$11.3 billion, will begin to lag the desktop environment.

B

Driving Forces

The key driving forces for the systems software market are listed in Exhibit VI-8 and described in this section.

EXHIBIT VI-8



All of these driving forces act as growth promoters and as inhibitors to varying degrees and during different time frames. In this section, INPUT describes the timing of each driving force and discusses whether it is an inhibitor or a promoter. These fundamental assumptions drive INPUT's systems software products forecasts.

1. Recovering Economy

INPUT uses the CONSENSUS™ economic forecast published by Blue Chip Economic Indicators to provide baseline economic assumptions for U.S. information services market forecasts. This service, combined with a growing array of real data points collected by the U.S. government, forecast a modest return to growth in 1993, followed by five years of steady growth in GDP. The CONSENSUS report, and other economic forecasters, predict real GDP to average 2.5% to 3% over the next five years—a decent return to moderate growth after a lingering recessionary period.

2. Downsizing and Client/Server

Offloading the mainframe is a trend that is steadily gaining popularity. INPUT research indicates that a growing proportion of system software users have already offloaded or are planning to offload some of the workload from the primary processor(s) during the next 18 months.

Downsizing requires smaller platforms, many of which are already in place, and new or rewritten applications software products. It does not, however, *require* client/server frameworks. Nor does it, in its elemental form, require an abundance of new systems software. Though survey respondents in INPUT's *Downsizing Program* indicated that client/server implementations are being considered, little actual implementation has taken place.

One could argue that downsizing is a software products growth inhibitor. Users' expectations are that products, which run on smaller platforms, will have smaller price tags than software products for mainframes. Thus, it is unclear if lower priced platforms can sustain high-priced software. However, there are indications that the pricing structure of many systems software will change from platform- to usage-based. What, if any, impact this will have on the user expenditure forecasts remains to be seen.

One could also argue that downsizing will open the systems software market to a variety of new product needs and opportunities. As a result, the kinds of systems software products that reside on mainframes will become increasingly necessary (in some fashion) on minicomputers, workstations and personal computers.

INPUT believes that the latter viewpoint will overshadow the effects of the first argument, and that downsizing and client/server models will be long-term growth promoters. In addition, INPUT takes the position that, even though applications will increasingly be offloaded from the mainframe, mainframes will not disappear, and in some cases, they will get larger. Their role will change to that of corporate data repositories, and applications will shift to emphasize very large transaction processing and enterprise data base functions. As the mainframes get bigger, systems software products will continue to increase in price.

3. UNIX and Software Frameworks

In prior surveys, UNIX implementation over the next several years has been an IS objective for 32% of INPUT survey respondents. On the other hand, implementation of software frameworks such as SAA, NAS or CA90s is an objective for only 20% of respondents.

Because UNIX and many software frameworks are still in a formative stage, there is some confusion regarding their implementation. Therefore, embryonic standards' efforts tend to inhibit growth of systems software expenditures in the short term. Over the long term, however, and perhaps as early as 1994, standards will start to become a growth promoter, and as rules become more established, more people will feel comfortable working with UNIX or other software frameworks.

The questions that need resolution include:

- When will frameworks such as SAA and NAS, and open systems become growth promoters rather than confusion promoters?
- How fast will UNIX *really* be adopted?

In early 1992, INPUT's research concluded that, by 1996, UNIX would still only account for a relatively small percentage of user expenditures on systems software. INPUT estimated that the UNIX share of the total spent on systems software in 1992 is 8%, and that this share would only grow to 16% of the total by 1997. Adoption of software frameworks can be expected to be a slow evolution as well.

4. Integration/Interoperability

LAN and network integration is a major IS objective over the next several years. Thus, products and services that enhance multivendor and multiplatform computing solutions will be timely and popular. In fact, interoperability (of which LAN and networking solutions are a major part) will drive the use of other systems software products such as distributed DBMSs, client/server and cooperative processing models.

Yet, integration and interoperability solutions remain elusive. With some 20 DOS networks available today, for instance, integrating and administering an enterprise solution becomes incredibly complex. Answers will again come in an evolutionary fashion. As new network management and control products become available, they will be evaluated, purchased and installed—at an evolutionary, rather than revolutionary, pace.

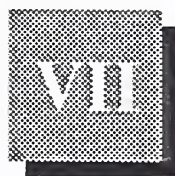
5. Emphasis on Solutions

Lower costs and improvement of overall productivity is cited as the key technology goal in terms of applications software products. However, this goal is not among top systems software priorities. As applications software products are viewed as a way to lower functional costs, systems software is viewed more as a background support product, necessary to efficiently and reliably run applications software.

However, due to the confusion caused by conflicting standards, new technology approaches, and various stages of product readiness, many users may view systems software as part of the problem rather than part of the solution. Insofar as systems software can be viewed as part of the solution, its strong growth will be assured. This implies that systems software vendors will need to work closely with applications software products vendors from a marketing and sales perspective.

Users can and will continue to purchase existing (traditional) systems software as needed to run applications solutions. INPUT estimates that existing licenses and maintenance accounts for about 70% of overall systems software expenditures, leaving only 30% for new product purchases. At least half of these new product purchases will be for incremental additions to already existing ways of doing things, e.g., with no new technology content.

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Competitive Environment

A

Competitive Trends

1. Large Systems and Software Vendors

It should come as no surprise that in the systems software industry, just as in most other industries, the big are getting bigger and, for the next few years, can be expected to continue to dominate their industry. Although this year's list of leading vendors notes two slight declines in market share, the major systems software players are expected to maintain or gain market share overall.

INPUT has chronicled the steady movement of major hardware vendors as they positioned themselves to better address the software marketplace. Of note are IBM's stated desire to receive 50% of its revenues from software and services by the year 2000, and Ceridian's (successor to Control Data) president's statement that the company was pleased to move from the Fortune Industrial 500 to the Fortune Service 500 listing. This emphasis on software products (and services) is not lost on other major hardware vendors—of the eight leading vendors noted in Exhibit VII-1, half are hardware vendors that derive significant revenues from systems software products.

Limiting the growth of the thousands of smaller systems software companies are:

- *Capital Limitations* - Resulting from the recent economic slowdown and related fiscal conservatism.
- *Standards Requirements* - Forcing compliance with established standards in order to sell products into a highly structured market. For the moment, there don't seem to be any new Microsoft's on the horizon, with either the technology or clout to establish a new set of systems standards.

- *Customer Support Needs* - Which is a tangible reaction to the almost universal business perception that, in the 1990s, customer service (coupled with quality products) is a mandatory ingredient in the client/vendor relationship. This includes such support areas as hotline, trouble-number and help-desk capabilities, and problem resolution and escalation standards. All of these support activities require resources, and tend to be people-intensive.
- *International Market Presence* - In the global marketplace, the most successful vendors will offer global products and offer a global image to their clients. Such a broadened base is difficult to achieve for smaller companies, although some niche vendors have successfully penetrated the global market.

EXHIBIT VII-1

Systems Software Products Leading Vendors' 1991 Market Shares

Vendor	1991 U.S. Rev. (\$ Mil)	Market Share (%)
IBM	2.800	15
Digital Equipment Corp.	570	3
Computer Associates	500	3
Microsoft	360	2
Hewlett-Packard	350	2
Novell	320	2
Oracle	251	1
Unisys	175	1

2. Alliances and Acquisitions

Sometimes the big get bigger through increased sales. In 1991, many got bigger through acquisitions and alliances. Computer Associates, for instance, which at last count had acquired some 22 businesses between 1982 and 1990, went through another acquisition spurt and in 1991 acquired Manageware, Inc., OnGuard, Information Science, On-Line Software International, Pansophic and Realia.

Novell and Digital Research, Inc. merged and in late December 1992, Novell and AT&T announced Novell's plan to buy AT&T's UNIX subsidiary, UNIX System Laboratories (USL) based in Summit, New Jersey. AT&T owns 77% of USL, and the balance is owned by a number of other computer makers, including Novell, which already has a 5% stake in USL. Novell will purchase USL for about \$360 million in stock, giving AT&T a 3% interest in the second-largest supplier (after Microsoft) of PC software. Good for AT&T, but better for Novell, which now is in an excellent position to marry UNIX and its own PC network software, Netware, into a formidable opponent for Microsoft's long-anticipated Windows NT, a product targeted at UNIX users.

Under most reasonable competitive scenarios, it appears that UNIX users will benefit, regardless of whether Novell/USL or Microsoft/NT dominates. With Novell guiding UNIX implementation and integration with its established network products, it is reasonable to assume that some of the fragmentation that has plagued the UNIX operating system will diminish. In addition, PC users may consider that an aggressive, software industry leader is a viable UNIX champion, giving it the structure and stability that a more relaxed AT&T did not seem inclined to seek.

In any case, users of operating systems, at the smaller platform end, will now have DOS, Windows, UNIX and OS/2 (and variations) to consider, and the verdict on the winner (if one is really needed) is still unknown.

Intents to merge were announced in 1992 by Legent and Goal Systems International, Computer Associates International and Nantucket Software, and Fox Software and Microsoft.

3. Services

In a reflection of the migration of IS function away from a centralized corporate resource and towards departmental or end users, and the growing end users' needs for software support from vendors who offer all types of software products, systems software product vendors are expanding their services activities and offering more professional and systems integration services to their customers. INPUT expects this trend to continue, as downsizing and outsourcing change the traditional structure of software products companies and, to some degree, as they start to look more like services companies.

B

Market Shares and Leading Vendors

The eight largest systems software product vendors are noted in Exhibit VII-1. Revenues for each company have been developed from a combination of INPUT interviews, public financial and product data, and information from INPUT's vendor files. Revenues are noncaptive U.S. revenues only.

IBM continues to have a commanding lead, with a 15% market share, down slightly from 16% in 1990. Revenues for the other seven major vendors vary slightly from last year with the overall total for the group approximately 6% below their 1990 performance. INPUT attributes some of the slight dip in revenues for these leaders to the highly competitive 1991 and 1992 PC marketplace. A growing population of software vendors with revenues of \$100 million or less also accounted for some revenue and market share changes.

Other than IBM, the largest software products vendors controlled no more than 3% of their market, and only six vendors held more than a 1% market share.

All in all, however, the big stayed big, and the vendors noted in Exhibit VII-1 accounted for 29% of the systems software products market.

C

Company Profiles

This section contains a representative selection of six profiles of software products vendors.

**1. BMC Software, Inc., P. O. Box 2002, Sugarland, TX 77487-2002
(713) 240-8800**

BMC Software develops, markets and supports systems software products to enhance IBM mainframe data base management, network management and data communications software, principally IMS/DB, IMS/TM, DB2, and CICS.

Founded in 1980, BMC has based its product strategy on developing systems software that will ensure the availability, performance, integrity and control of mainframe data base and data communications systems.

Although BMC's growth strategy is based on internal product development, BMC has made some acquisitions in the past three years. Of note are:

- In December 1991, BMC acquired the mainframe systems software products of Schumann Unternehmensberatung AG, a German-based software and marketing organization, for about \$5.6 million.
- In November 1990, BMC acquired the outstanding stock of Integrity Solutions, Inc. (ISI). ISI's journal management and data recovery products were enhanced and repackaged as the CICS Integrity Series.

During 1992, BMC announced a DB2 technology development agreement with Bachman Information Systems to trade technology in order to develop products that facilitate synchronization of the data model design with physical data base implementation.

BMC currently markets more than 50 products, in nine product groupings. The MasterplanTM for DB2 products address change management, administration, performance monitoring, DASD data compression and utility management. IMS Database Utilities products streamline the recovery and reorganization of large, structured IMS data bases. IMS/TM enhancements Series products expand the capabilities of the IMS communication product. IMS Application Enhancement Series products improve the performance of batch applications. The Trimar Fast Path Series, for the IMS/VS Fast Path subsystem, is used in very large, transaction-intensive data centers. The CICS Integrity Series allows access to batch applications and provides data integrity and recovery functions for CICS/VSAM data.

In addition, the BMC product line also includes the Network Performance Series products used with 3270 and PC terminals, the DASD Data Compression Series products, and the VSE Series products for DL/1 data bases.

As of March 1992, BMC had licensed 14,000 copies of its products to more than 5,000 customers worldwide. Through BMC's 1992 fiscal year (3/92), revenues reached \$185 million, with approximately 57% of the dollars coming from product licenses.

2. Computer Associates International, Inc., 711 Stewart Ave., Garden City, NY 11530-4787 (516) 227-3300

Computer Associates International, Inc. (CA) has historically grown through acquisitions of mainframe software companies. CA, between 1982 and 1991, acquired more than 25 companies, with its three largest acquisitions: UCCEL in 1987, Applied Data Research in 1988, and

Cullinet Software in 1989. Although CA's strategy is clearly multivendor and multiplatform, CA continues to be primarily interested in acquiring mainframe-based software companies.

CA posted U.S. revenues of \$791 million in 1991, and worldwide sales of \$1.4 billion, up 10% from 1990.

CA90s, introduced in 1990 as the technical foundation for Computer Associates' "Enterprise Software Solutions," will continue to be the underpinning upon which CA integrates software product offerings.

CA will support IBM's SystemView and DEC's Polycenter operations management platforms as well as offer its own multivendor product line, and CA is already beginning to provide some degree of integrated management across IBM and DEC systems.

UNIX will operate within the CA90s foundation: CA90s will provide service layers for UNIX-based products as well as other operating-systems-based products. CA's direction for UNIX is to provide interoperability as well as UNIX-only products. UNIX products will be integrated closely with all other CA offerings across IBM mainframes, DEC VAX/VMS systems, PCs, and other platforms. Actual implementation of this large undertaking, however, is still several years away.

CA is also developing Hewlett-Packard HP-UX systems management software, which eventually will be integrated with the DEC and IBM products. The goal is to manage, control, and monitor all system-related activities across IBM MVS, VSE, and VM; DEC VMS; HP-UX; Tandem; PC-DOS; OS/2; AS/400; and eventually other UNIX systems. The company is also pursuing DBMS and applications development tools across all platforms.

3. Intersolv, Inc., 3200 Tower Oaks Boulevard, Rockville, MD 20852 (301) 230-3200

Intersolv provides software development tools for workstations and LANs. These products provide capabilities for desktop/workgroup development environments and address the areas of analysis, design, generation, maintenance, re-engineering and software configuration management.

Intersolv was formed in March 1991 with the merger of Sage Software and Index Technology. Sage acquired all the outstanding capital stock of Index in exchange for approximately 5.1 million shares of Sage common stock valued at \$50 million. The acquisition was characterized as a pooling of interests.

Intersolv's desktop software development product strategy emphasizes open architecture that permits its products to be used separately, with its other products, and with software development products offered by other companies. In addition, Intersolv's products are designed to enable software developers to use a variety of design methodologies.

In August 1992, Intersolv left from its marketing relationship with IBM and from IBM's AD/Cycle CASE partnership, but will continue to ensure IBM compatibility with its products. Numerous development relationships still exist with IBM, and Intersolv will support AD/Cycle as an architecture and industry standard for as long as the marketplace deems AD/Cycle to be a strategic resource.

Intersolv's products include:

- Excelerator, a LAN-based toolset for planning, analysis, design, documentation and redevelopment of MIS-oriented systems. Excelerator offers a LAN-exploitive repository architecture for IBM's OS/2 and Microsoft's Windows development platforms.
- APS, a full-function application generator for high-impact information systems that target SAA environments.
- Design Recovery for Excelerator, released in January 1992, an integrated set of reverse-engineering tools that scans COBOL programs, and recovers data, procedural codes and screen maps and stores them for later use.
- The PVCS Series family of configuration management products for developers on PCs and LANs.

Intersolv's revenue for the fiscal year ending April 1992 was \$79 million—a 10% increase over 1991 revenues of \$72 million.

4. KnowledgeWare, Inc., 3340 Peachtree Road, Atlanta, GA 30326 (404) 231-8575

KnowledgeWare, Inc., develops and markets computer-aided software engineering (CASE) tools that automate the information systems development life cycle. KnowledgeWare's tools are used by corporations and government agencies to help data processing professionals automate the planning, analysis, design construction and maintenance of information systems.

KnowledgeWare was founded in 1979 as Database Design, Inc. by James Martin. It changed its name in December 1985. The company exemplifies alliances with IBM, the trend toward smaller platforms, and CASE industry consolidation.

The company's strategic product line, the Information Engineering Workbench, is a set of three PC-based diagramming products to capture and analyze specifications information, a PC-based COBOL application generator, and a mainframe-based COBOL application generator.

The distinguishing characteristic of the product line is its integration around a central, intelligent encyclopedia. This integration supports automatic transitions between the planning, analysis, and design stages of the development life cycle, as well as 100% automated generation of code from diagrammatic specifications.

KnowledgeWare's new generation of CASE products, Application Development Workbench, uses OS/2 Presentation Manager and will conform to SAA's AD/Cycle as it evolves. KnowledgeWare is an IBM business partner for AD/Cycle.

The company has several other agreements with IBM:

- In June 1989, KnowledgeWare entered into a license agreement and a development agreement with IBM, whereby KnowledgeWare licensed a portion of its intelligent encyclopedia technology to IBM, and agreed to jointly develop an application development product for incorporation into the applications development environment announced by IBM.
- In August 1989, IBM purchased approximately 1.1 million shares of KnowledgeWare common stock for \$10.5 million.
- KnowledgeWare also established marketing relationships with IBM in the U.S. and Canada. Under the Cooperative Software Supplier Program, IBM will market KnowledgeWare's Information Engineering Workbench/Workstation CASE diagramming tools. Under the Industry Application Specialist program, KnowledgeWare will market IBM's Cross System Product, DB2 and SQLK.

KnowledgeWare's primary focus has been microcomputer-based front-end CASE tools for IBM's mainframes, and in 1992, claimed that 95% of sales were on OS/2-based products. KnowledgeWare's revenues for 1991 were \$125 million, of which \$68 million was attributable to U.S. sales of packaged software products.

**5. LEGENT Corp., 8615 Westwood Center Drive, Vienna, VA
22182-2218 (703) 734-9494**

LEGENT Corporation develops, markets and supports a wide range of systems software products designed to improve the enterprise-wide management of the data processing, network and applications resources of corporate information services (IS) functions.

In 1991, LEGENT's worldwide revenues were \$215 million, with \$133 million coming from U.S. sales. Overall, 1991 revenues were 17% greater than in 1990.

LEGENT is an example of a company that has diversified away from strictly operations management products for IBM mainframes to address heterogeneous environments managed from any IBM mainframe host. Now, in addition to software and services for IBM mainframe and network operations, LEGENT's systems software technologies can manage other associated information platforms from Digital Equipment Corp., Tandem, and IBM (MS-DOS and OS/2). Legent was formed by the merger of Duquesne Systems Inc. and Morino Inc. in March, 1989.

LEGENT's software product offerings include the following technology platforms:

- *IS Management* - The focal point of LEGENT's IS Management (resource management) technology is the MICS IS Management Support System, which assists in managing the use, cost, and performance of processor, network, and application resources.
- *Performance Management* - Performance Management products are NetSpy, Program Management Optimizer, and AccuMax for DB2, ASTEX, and TSO/MON. NetSpy, a network performance monitor, is LEGENT's top-selling product. In 1990, LEGENT contracted Network Intelligence Inc. to add LAN management capabilities to NetSpy.
- *Operations Productivity* - Operations Productivity products automate key aspects of data center operations and include the Automate product line.
- *Change Management Software* - ENDEVOR is LEGENT's automated software management technology. It operates in 3GL, 4GL, CASE, and PC environments.
- *Network Productivity* - TPX session manager and L-Comm for enterprisewide communications make up the company's network productivity products.

6. Systems Center, Inc., 1800 Alexander Bell Drive, Reston, VA 22019 (703) 264-8000

Systems Center, Inc., founded in 1981, markets and supports systems and network management software. The company's products assist in the automation and control of mixed computing environments that include DEC, Fujitsu, IBM, Microsoft, Tandem and UNIX.

Starting life as VM Software, Systems Center developed a family of products to improve the ease of use and performance of IBM's VM operating center. By the end of 1988, the product line had begun to expand beyond VM to the MVS area and—following acquisition of Systems Center, Inc.—the company's name became Systems Center. Since 1988, Systems Center has broadened its business by acquiring products and development personnel from smaller independent firms rather than incurring heavy R&D expenses.

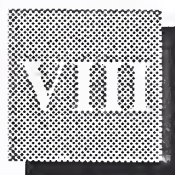
Acquisitions and alliances in the last few years include the following:

- The acquisition of marketing rights to NetMaster, the leading competitor to IBM's network management product, NetView, from Cincom Systems, and the acquisition of the developer of NetMaster, Software Development International. This acquisition provides the foundation for Systems Center move to become a major player in the network integration and network management market.
- The acquisition of Systems Center, Inc. in 1988. The key product in the acquisition is Network DataMover, which facilitates the movement of files among multiple computer-operating environments.
- An agreement with International Business Link, Inc. whereby Systems Center purchased products and technology that allow data centers to simplify administration of SNA networks by using object-oriented graphic definitions of the elements making up a network.
- The acquisition of automated management software for IBM's AS/400 midrange line. In a transaction the companies said was worth \$2.4 million, Systems Center purchased the AS/400 software and related assets from Informed Management Environments, Inc. of Houston.
- The acquisition of Unitech Software, Inc. for \$43 million of stock. Unitech provides systems utilities and network administration software for UNIX environments.

In 1990, the company divested productivity enhancement and utility software products for users of IBM's SQL/DS and DB2 relational data base management systems and sold these products to On-Line Software International.

Systems Center's strategy is to expand into diverse operating environments, and it now has a family of more than 50 products. Its goal has shifted from providing all IBM-compatible products to being a leading independent software company that's not tied to a single hardware vendor or platform.

Revenues for 1991 totaled \$126 million, with \$56 million coming from U.S. sales.



Conclusions and Recommendations

This chapter summarizes INPUT's conclusions regarding the systems software products market, and offers recommendations for vendors in this market.

A

Conclusions

Conclusions are outlined in Exhibit VIII-1 and described below.

EXHIBIT VIII-1

Systems Software Products Conclusions

- Moderate growth rates for 1992-1997
- Better outlook for UNIX
- Operations management tools has highest growth rate
- Mainframes won't disappear
- Maintenance and annual license fees still high

Moderate Growth - During the five-year period of 1985-1990, user expenditures for systems software products grew at a rate of 21% compounded annually, and reached a peak annual growth rate of 30% in 1987, due in large part to the strong growth of departmental/minicomputer systems (AS/400) introductions and also the strong growth in personal computer shipments. 1990 to 1991 growth, as a partial result of recessionary economic pressures, slowed to 10%. In 1991, however, systems software product revenues grew at 11%, and INPUT forecasts a 1992-1997 CAGR of 14% for this delivery mode.

Reasons for this slower growth in the mid-1990s include an economy that is just starting to resume a very sedate growth rate, the shift in technological foundations (including a painfully slow transition to standards), fundamental changes in vendor product and marketing strategies, and marketplace confusion, especially in the UNIX area.

UNIX - There is some speculation, however, that with Novell's impending (in December, 1992) acquisition of AT&T's UNIX System Laboratories (USL), and Novell's ability to unite UNIX and LANs into a viable alternative to DOS, Windows, and NT, that the PC environment will now have a viable UNIX competitor for Microsoft. Time will tell, but the fragmented UNIX market could benefit from some consistent guidance at the PC/workstation level, and Novell, with AT&T's support, is in a position to provide it. INPUT looks to the smaller platform operating environment to become more competitive in the mid-90s, with viable DOS, OS/2 and UNIX options competing for user acceptance in the general purpose, commercial marketplace.

Submode Growth Opportunities - The fastest growing submode within systems software products—and still the smallest—will be operations management tools, which INPUT forecasts to grow from \$4.8 billion in 1992 to \$9.2 billion in user expenditures by 1997. Operations management tools include network management, configuration, fault, performance, accounting, administration, and security products. Tools of this type are becoming increasingly important as corporations consider and implement downsized and client/server solutions.

Applications development tools is the largest submode at \$8.6 billion in 1992, and includes CASE tools, DBMSs, and 3GL and 4GL tools. Even though users have significant applications development backlogs, the tools on the market today are not being used as effectively as they could be, and many still feel that a true integrated CASE environment is still a long way off.

The third submode is systems control products, with approximately \$7.1 billion in 1992. The majority of expenditures on systems control products, currently a \$6.8 billion market, are for operating systems, many of which are combined with hardware in the recent "feeding-frenzy" of PC sales. The growth of 12% (CAGR) for this submode is due more to the high volumes of PC/workstation sales with bundled operating systems, which will tend to offset the lower per unit costs of the software.

Mainframes-based Products - In 1992, 45% of IS systems software budgets was still for mainframe-based products, up a small 1% from 1991. INPUT expects this proportion to decline to 39% by 1997, but not as rapidly as trade publications would have one believe, nor does INPUT expect the mainframe to disappear in favor of minicomputers, microcomputers or workstations. Instead, the mainframe will assume a new role as

a super-server in a client/server environment or manage enterprisewide massive storage applications. In fact, even though a noticeable shift is under way toward operations management and applications development tools that run on workstations and personal computers, many IS managers still are planning to increase the capacity of their mainframes.

Maintenance and License Fees - INPUT surveys continue to indicate that expenditures on existing systems software products—maintenance and ongoing license fees—could account for a significant portion of systems software product expenditure (as much as four times the expenditures on new systems software products). At this level, user expenditures for new product purchases could be as little as \$4 or \$5 billion of the total \$20.5 billion 1992 market.

B

Recommendations

INPUT's overall recommendations are outlined below and in Exhibit VIII-2.

EXHIBIT VIII-2

Systems Software Products Recommendations

- Provide exceptional service and customer support
- Take the long view
- Support standards and get them implemented
- Make careful strategic alliances

Service, Service and more Service - Given that so much is spent on developing and marketing existing products, the ongoing relationship that a vendor develops with its customers is critically important for long-term vendor success. A great deal of the relationship has to do with provision of exceptional service and support. In fact, INPUT surveys indicate that (for comparable products) of all vendor selection criteria, a strong reputation for support is viewed by buyers as most important. This criterion ranked higher than price, ease of use, and ease of installation. It is a vendor attribute that is consistent with the growing awareness of American industry that a reputation for quality and service are necessary for success in the U.S. and global marketplace. Offer a good product and exceptional service, and buyers will come.

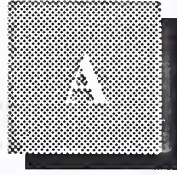
Take the Long View - Systems software products vendors cannot afford to be short-sighted. Key product transitions—client/server, migration to standards, data base interoperability, integrated CASE—are all in their infancy and will take time from the vendor development perspective and the customer adoption perspective. Providing a total solution to what customers really need (i.e. a stable, useful and implementable standards environment) should be put on hold. In the meantime, vendors can seek ways to maintain and enhance the loyalty of their existing customers, and solidify their business relationships.

Standards - Regarding standards, a product strategy that endorses and adheres to standards as they become available and viable will be successful. Vendors will need to continue to make a fundamental transition from differentiation based upon proprietary product attributes to differentiation that also includes service. As part of a standards-based strategy, vendors must provide UNIX, along with other systems software product architectures. In the long term, the large systems and software vendors will increase their market shares because they are the only vendors that can truly drive standards—other medium-sized and small companies must sooner or later follow. In the meantime, however, numerous smaller systems software companies are establishing product niches. These smaller vendors, however, must also prove themselves in the support arena if they are to become and remain viable.

Smart vendors will also be active and aggressive participants in standard-setting activities. This will allow them to influence the standards process, and also be in a position for early adoption of new standards as they are approved.

Alliances - Alliances have become a way of life for small as well as large vendors. In fact, many small vendors need to establish alliances for long-term viability or risk being acquired. However, vendors need to ensure that their alliances are strategic. For most successful alliances, each partner must strategically complement the other, and for the long term, the challenge is to maintain that complementary relationship as management teams and objectives inevitably change.

As is true in the applications software products industry, the trend toward standards and integration will continue to cause industrywide consolidation of vendors of systems software products. However, consolidation should reflect long-term positioning rather than just a desire to increase current market share. Consolidation also tends to cause short-term chaos and inefficiencies as management teams become used to each other and product lines merge, but for well-positioned companies, the long-term benefits far outweigh the short-term perturbations.

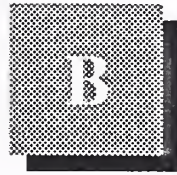


Definitions

No industry-specific definitions have been used in this report.

See the separate volume, INPUT's *Definition of Terms*, for the general definitions of industry structure and delivery modes used throughout INPUT reports.

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Forecast and Data Base Reconciliation

Exhibits B-1 and B-2 offer the 1991-1997 market forecast by submode and platform.

EXHIBIT B-1

Systems Software Products Market Forecast by Submode, 1992-1997

Delivery Modes	1991 (\$M)	Growth 91-92 (%)	1992 (\$M)	1993 (\$M)	1994 (\$M)	1995 (\$M)	1996 (\$M)	1997 (\$M)	CAGR 92-97 (%)
Delivery Mode Total	18,370	11	20,480	23,140	26,470	30,075	33,987	38,580	14
<i>Systems Control Products</i>	6,405	10	7,062	7,823	8,837	9,924	11,045	12,340	12
- Mainframe	2,810	3	2,894	2,995	3,135	3,285	3,441	3,604	4
- Minicomputer	2,050	10	2,255	2,480	2,728	3,000	3,300	3,632	10
- Workstation/PC	1,545	24	1,913	2,358	2,974	3,639	4,304	5,104	22
<i>Operations Management Tools</i>	4,350	11	4,820	5,457	6,257	7,130	8,125	9,260	14
- Mainframe	2,334	10	2,573	2,897	3,300	3,680	4,114	4,690	13
- Minicomputer	1,485	7	1,593	1,738	1,915	2,103	2,314	2,637	11
- Workstation/PC	531	23	654	822	1,042	1,347	1,697	1,933	24
<i>Applications Development Tools</i>	7,615	13	8,598	9,850	11,376	13,021	14,817	16,980	15
- Mainframe	3,385	11	3,770	4,220	4,720	5,280	5,910	6,615	12
- Minicomputer	2,535	11	2,818	3,185	3,681	4,123	4,507	5,010	12
- Workstation/PC	1,695	19	2,010	2,445	2,975	3,618	4,400	5,355	22

EXHIBIT B-2

Systems Software Products Market Forecast by Platform, 1991-1997

Delivery Modes	1991 (\$M)	Growth 91-92 (%)	1992 (\$M)	1993 (\$M)	1994 (\$M)	1995 (\$M)	1996 (\$M)	1997 (\$M)	CAGR 92-97 (%)
<i>Mainframe</i>	8,529	8	9,237	10,112	11,155	12,245	13,465	14,909	10
- Systems Control Products	2,810	3	2,894	2,995	3,135	3,285	3,441	3,604	4
- Operations Management Tools	2,334	10	2,573	2,897	3,300	3,680	4,114	4,690	13
- Applications Development Tools	3,385	11	3,770	4,220	4,720	5,280	5,910	6,615	12
<i>Minicomputer</i>	6,070	10	6,666	7,403	8,324	9,226	10,121	11,279	11
- Systems Control Products	2,050	10	2,255	2,480	2,728	3,000	3,300	3,632	10
- Operations Management Tools	1,485	7	1,593	1,738	1,915	2,103	2,314	2,637	11
- Applications Development Tools	2,535	11	2,818	3,185	3,681	4,123	4,507	5,010	12
<i>Workstation/PC</i>	3,771	21	4,577	5,625	6,991	8,604	10,401	12,392	22
- Systems Control Products	1,545	24	1,913	2,358	2,974	3,639	4,304	5,104	22
- Operations Management Tools	531	23	654	822	1,042	1,347	1,697	1,933	24
- Applications Development Tools	1,695	19	2,010	2,445	2,975	3,618	4,400	5,355	22

Exhibits B-3 and B-4 provide INPUT's reconciliation of the 1991 and 1996 U.S. market forecasts noted in the 1991 and 1992 Systems Software Product reports.

EXHIBIT B-3

Systems Software Products Market Forecast, 1992 Data Base Reconciliation by Submode

Delivery Modes	1991 Market				1996 Market				91-96 CAGR per data 91 Rpt (%)	91-96 CAGR per data 92 Rpt (%)
	1991 Report (Fcst) (\$M)	1992 Report (Actual) (\$M)	Variance from 1991 Report		1991 Report (Fcst) (\$M)	1992 Report (Fcst) (\$M)	Variance from 1991 Report			
			(\$M)	(%)			(\$M)	(%)		
Total Systems Software Products Market	18,100	18,370	270	1	31,700	33,987	2,287	7	12	13
<i>Systems Control Products</i>	6,800	6,405	-395	-6	11,100	11,045	-55	-1	10	12
-Mainframe	3,000	2,810	-190	-6	4,400	3,441	-959	-22	8	4
-Minicomputer	2,200	2,050	-150	-7	3,500	3,300	-200	-6	10	10
-Workstation/PC	1,600	1,545	-55	-3	3,200	4,304	1,104	35	15	23
<i>Operations Management Tools</i>	4,100	4,350	250	6	7,900	8,125	225	3	14	13
-Mainframe	2,200	2,334	134	6	4,000	4,114	114	3	13	12
-Minicomputer	1,400	1,485	85	6	2,250	2,314	64	3	10	9
-Workstation/PC	500	531	31	6	1,650	1,697	47	3	27	26
<i>Applications Development Tools</i>	7,200	7,615	415	6	12,700	14,817	2,117	17	12	14
-Mainframe	3,200	3,385	185	6	4,950	5,910	960	19	9	12
-Minicomputer	2,400	2,535	135	6	3,750	4,507	757	20	9	12
-Workstation/PC	1,600	1,695	95	6	4,000	4,400	400	10	20	21

EXHIBIT B-4

Systems Software Products Market Forecast, 1992 Data Base Reconciliation by Platform

Delivery Modes	1991 Market				1996 Market				91-96 CAGR per data 91 Rpt (%)	91-96 CAGR per data 92 Rpt (%)
	1991 Report (Fcst) (\$M)	1992 Report (Actual) (\$M)	Variance from 1991 Report		1991 Report (Fcst) (\$M)	1992 Report (Fcst) (\$M)	Variance from 1991 Report			
			(\$M)	(%)			(\$M)	(%)		
<i>Mainframe</i>	8,400	8,529	129	2	13,300	13,465	165	1	10	10
- Systems Control Products	3,000	2,810	-190	-6	4,400	3,441	-959	-22	8	4
- Operations Management Tools	2,200	2,334	134	6	4,000	4,114	114	3	13	12
- Applications Development Tools	3,200	3,385	185	6	4,900	5,910	1,010	21	9	12
<i>Minicomputer</i>	6,000	6,070	70	1	9,500	10,121	621	7	10	11
- Systems Control Products	2,200	2,050	-150	-7	3,500	3,300	-200	-6	10	10
- Operations Management Tools	1,400	1,485	85	6	2,250	2,314	64	3	10	9
- Applications Development Tools	2,400	2,535	135	6	3,750	4,507	757	20	9	12
<i>Workstation/PC</i>	3,700	3,771	71	2	8,900	10,401	1,501	17	19	22
- Systems Control Products	1,600	1,545	-55	-3	3,200	4,304	1,104	35	15	23
- Operations Management Tools	500	531	31	6	1,700	1,697	3	0	27	26
- Applications Development Tools	1,600	1,695	95	6	4,000	4,400	400	10	20	21

Market Forecasts - The total market for 1991 and 1992 have been adjusted slightly upward, as has the 1992-1997 five year forecast. Growth from 1991 to 1992 was 11%, up 1% from the 1990-1991 figures, and the 1992-1997 five year forecast now indicates a 14% CAGR, as opposed to the 12% noted for the period 1991-1996. These changes reflect the anticipated beneficial effects of an improved economy and a return to modest growth in the business sector.

Platform figures show the mainframe system software products market holding steady at a 10% 5-year CAGR, while the minicomputer market has grown slightly at 11% (versus 10% in the 1991 report) and the workstation/PC market is now at a 22% CAGR versus a 19% in the 1991 document—both 10% increases over the 1991 numbers.

Forecast Reconciliations - The market reconciliations noted in Exhibits B-3 and B-4 indicate variances for platform and submode values for the 1991 market from 2% to 7%, with the systems control products running 6% below and both other submodes running 6% greater than 1991 estimates. The figures projected for 1996 show a greater range in variances from last year's report, and reflect the cumulative effect of a return to moderate domestic economic growth. Although 1996 yearly values in the two reports vary from -22% to 35%, the five year CAGR (1991-1996) shows variations of only 1% to 4%, a result of the larger percentage variations expected from changes to smaller base values.

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