MARKET FORECAST

Federal Information Systems and Services Market

FY 1994-FY 1999

Federal Market Analysis Program

Federal Information Systems and Services Market: FY 1994-FY 1999

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Abstract

According to this report, *Federal Information Systems and Services Market: FY 1994-FY 1999*, the federal market demand for vendor-furnished information systems and services will increase from $18.3 billion in FY 1994 to $24.9 billion in FY 1999 at a compound annual growth rate (CAGR) of 6%.

The federal market will become increasingly competitive in response to a declining defense budget and major civilian program delays. Agencies need connectivity, data portability, database interchange and standardization at lower overall cost. Under the aegis of the Corporate Information Management initiative, the Department of Defense (DoD) will acquire fewer new systems, while downsizing, updating and reengineering business functions and the information systems that will support them. Many civilian agencies are poised to consider their own CIM approach, watching DoD's level of success with its implementation.

The entire federal government is developing a blueprint of new major directions following the National Performance Review initiatives identified by the Clinton Administration. Some of the major initiatives include:

- Health care reform

- National information infrastructure

- Procurement reform

- Law enforcement

- Service to the citizen

- Partnership with industry

At the same time, agencies will continue to support ongoing programs while facing reductions in operating capital and personnel.

Vendors in this market face a constantly changing schedule of priorities, especially in view of the growing difficulties experienced by the Administration in implementing budget reduction and fiscal reform.

This report analyzes the trends expressed in the FY 1995 information technology (IT) budget requests. Based on interviews with agency officials and recent long-range IT plans, the report forecasts likely trends in technology as well as acquisition processes and regulations. It also notes key program developments that will shape the size and direction of this important marketplace.

This report contains 169 pages, including 52 exhibits.

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

*Federal Information Systems and
Services Market: FY 1994-FY 1999*

Table of Contents

Exhibits

I

Introduction

This report, *Federal Information Systems and Services Market, FY 1994-FY 1999,* is produced by INPUT as part of the Federal IT Market Analysis Program. It forecasts information technology expenditures by the U.S. federal government for fiscal years 1994-1999 and includes analysis of the federal information technology budget submitted for fiscal year 1995.

The Federal IT Market Analysis Program was initiated by INPUT for information industry clients in the federal government market. Since the program began, INPUT annually asks interested clients to identify specific business areas, service modes and issues they consider essential for their federal market planning. Their suggestions were incorporated into INPUT's federal program and have led to the selection of this report and the service mode reports as appropriate vehicles for providing the information. During calendar year 1994, INPUT will continue the program it initiated in 1993 to publish profiles of federal agencies. These profiles provide one more level of analysis in the overall federal information technology spending.

INPUT does not detail the full spectrum of information systems and services opportunities in each fiscal year because there are more than 35,000 individual procurements annually. Instead, INPUT examines the driving factors and establishes the basis for forecasting individual service mode growth prospects. It selects major service modes for analysis based on client interest and major program initiatives of the Administration. Major initiatives of the Administration begun in 1993 have created interest in programs dealing with business process reengineering, high-performance computing, network management and E-mail.

The companion Federal Information Technology Procurement Program focuses on contract opportunities for significant new or recompete business potential for INPUT's vendor clients. More than 500 of these opportunities are provided in the *Procurement Analysis Report* database issued biweekly. A newsletter summarizing recent database updates and

procurement issues is distributed to INPUT's federal vendor clients monthly. However, the federal market analysis reports provide more strategic intelligence and trends within each product/service market and by agency.

A
Scope

This report covers only the U.S. federal government information technology market and includes only those expenditures expected of the executive branch agencies.

The major service modes included in this report are:

- Processing services

- Software and related services

- Professional services

- Systems integration

- Outsourcing (includes systems operations)

- Turnkey systems

- Hardware products (furnished without systems design, applications software or communications services) and maintenance

- Communications and network services

The service modes are defined in Appendix B. The definitions were revised in 1992 to clarify some subsets of the service modes, which are identified as special product/service markets, in response to client requests. The expenditures for the submarkets identified are part of the service modes listed above and, therefore, not additive to them.

- Electronic commerce/EDI

- Office information systems

- Computer equipment maintenance

- Computer security

Funding information in this report is rounded to the nearest $100 million, unless otherwise noted. In general, the funding information is initially derived from plans and budget requests not yet approved by the Congress nor confirmed by the Office of Management and Budget (OMB) and may change even after approval. Such changes may be dictated by the Administration or subsequent congressional action.

B

Methodology

The Office of Management and Budget (OMB)/General Services Administration (GSA)/National Institute of Standards and Technology (NIST) documents, *Current Information Technology Resource Requirements of the Federal Government: Fiscal Year 1993* and *Information Resources Management Plan of the Federal Government*, the *Budget of the United States Government*, and the federal agency OMB Circular A-11, Sections 43B&C Information Technology Budget Requests were analyzed to identify key expenditures in the service modes described above.

Because agencies are not required to submit supporting data for plans to OMB, additional documentation on their OMB A-11 submissions and long-range information resource management plans was requested from the agencies and reviewed for guidance on the forecast. Interviews with agency policy and procurement officials were conducted to identify technology trends, policy changes and issues associated with plans to improve federal information resources and the acquisition process. Additional information on published policies and regulations is included.

The section on market trends was prepared after the interviews and research on the current information technology budget submission were completed.

The INPUT forecast of five fiscal years' growth by service mode is based on the OMB A-11, Section 43 budget requests and off-budget plans covering various federal funds and public corporations.

The economic factors for the five years are established by INPUT under the commercial Information Services Market Analysis program and employed for all INPUT program forecasts. The growth guidelines are developed from annual INPUT surveys of users (including government), vendors and INPUT-developed models. The growth rates used for this forecast are indicated in Exhibit I-1.

Exhibit I-1

1994 GDP and Inflation Growth Rate

Overall Percent	1994E	1995E	1996E	1997E	1998E	1999E	Average '94-'99
Nominal GDP	6.7	6.1	6.1	5.9	6.1	6.1	6.2
GDP Deflator	3.6	3.7	3.6	3.6	3.5	3.1	3.5
Real GDP	3.0	2.3	2.4	2.2	2.5	2.8	2.5

Source: INPUT

C

Report Organization

In addition to this introduction, this report has been organized as follows:

II.   Executive Overview

III.   Market Trends

IV.   Market Forecast

Appendixes

A.   Forecast Database and Reconciliation

B.   Definitions

C.   Glossary of Federal Acronyms

D.   Policies, Regulations and Standards

D
Related INPUT Reports

Related reports of interest to the reader are as follows:

- *Agency Recompete Practices in SETA and SO Contracts*

- *Defense CIM Information Services Market*

- *Federal Agency Recompete Practices*

- *Federal Computer Security Market, 1992-1997*

- *Federal Electronic Commerce/EDI Market*

- *Federal High-Performance Computing Market*

- *Federal Information Systems and Services Market, 1993-1998*

- *Federal Information Technology Procurement Program, Procurement Analysis Reports*

- *Federal Systems Integration Market, 1992-1997*

- *Federal Telecommunications Market, 1992-1997*

- *High-Performance Computing in the Federal Market*

- *Service to the Citizen Market*

- *Object-Oriented Technologies in the Federal Market - 1993*

- *Client/Server Trends in the Federal Market - 1994*

- *Business Process Re-engineering in the Federal Government*

- *Federal Imaging Market - 1994*

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II
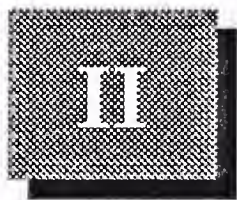
Executive Overview

A

Information Technology Budget, FY 1995

The proposed FY 1995 Federal Executive Branch Information Technology budget of $26.9 billion is an increase from $25.6 billion in the FY 1994 proposed budget. The contract portion of the IT budget is estimated to increase from $18.3 billion in FY 1994 to $24.9 billion in FY 1999, excluding classified systems and imbedded technologies. Exhibit II-1 illustrates the division of the budget among the four primary components: commercial services, personnel, capital investments and operating costs.

Exhibit II-1

Information Technology Budget, FY 1995

Capital Investments
22%

Commercial
Services
49%

Operating Costs
7%

Personnel
22%

Contracts - $19.4 billion

Obligations - $26.9 billion
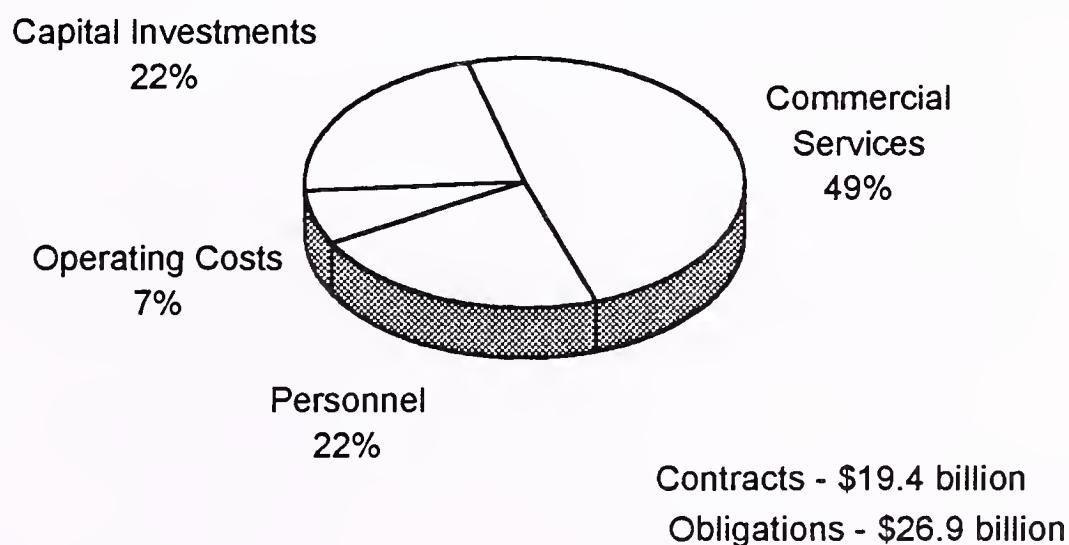
Source: INPUT

For FY 1995, 72% of the budget is proposed for expenditure on contracts for systems and services. This is the same level as proposed for FY 1994, and represents a strong continuing signal that the federal government will be contracting out most of its IT systems and services responsibilities.

- The commercial services segment will be spent on contracts for telecommunications and network services, processing, maintenance and professional services. This amount is an increase of $860 million over the government's estimate for FY 1994.

- Ninety-three percent of the proposed capital investment segment will be spent on ADP and communications hardware and software. In FY 1995, the amount budgeted is $240 million higher than estimated for FY 1994.

- Operating costs, which include equipment and software leases, space and supplies, are expected to drop by $4 million from FY 1994. It represents 7% of the total IT budget.

- Personnel costs for in-house staff salaries and other expenses are projected to hold at 22% of the overall IT budget in FY 1995, the same proportion as in FY 1994. This represents an increase of $155 million, some of it earmarked for purchasing early retirements.

This data is a summation and analysis of the individual executive branch agencies' budgets submitted under OMB Circular A-11, Section 43, including revisions through July 1994.

B

Information Technology Markets

INPUT reviewed the changes in budget request documentation to identify the key areas affected. FY 1995 budget figures show moderate growth reported in FY 1994. This level of growth is projected to continue through the outyears, although vulnerabilities exist from pressures to reduce overall spending and from oversight concerns that IT has not lived up to expectations that it can improve government operations and cost less.

Although a slight increase in spending for in-house personnel is reported for FY 1995, spending on personnel will probably experience a gradual decline through FY 1999, as a result of the Administration's promise to reduce the overall size of the federal work force, and after one-time payments to purchase early retirements.

The IT market available to vendors is expected to increase from $18.3 billion in FY 1994 to $24.9 billion in FY 1999, at a compound annual growth rate (CAGR) of 5%. This forecast includes the proposed IT budget estimates of agencies not required to file OMB Policy A-11, Section 43 and several off-budget expenditures of agencies such as the U.S. Postal Service, and other public corporations. It excludes classified systems, embedded systems, and legislative and judicial acquisitions.

The impacts of discretionary budget cuts, Defense Management Improvement Initiatives (Corporate Information Management) or cuts in the National Space Program, have not been considered in this forecast beyond those projected by the Congressional Budget Office and OMB. These changes could reduce out-year expenditures by $3-$4 billion per year. Current budget cuts by the House Appropriations Committee and the House Armed Services Committee may not be as severe as initially proposed, but they signal continued pressure to reduce overall defense spending. Programs in Agriculture, Transportation and Treasury are also under severe budget pressure. Congress is seeking demonstration that operating improvements follow from increased IT budget authority.

Several new initiatives of the Clinton Administration may revise the areas in which information technology spending will occur. Process reengineering and information infrastructure are areas which will receive the most favorable support. Nevertheless, overall spending levels are not expected to be impacted measurably by these initiatives as a result of the current deficit reduction emphasis. Some of the new initiatives include health care programs, law enforcement, field office consolidation, services to the citizen and restructuring government programs.

The major enabler of the spending increases that INPUT is forecasting over the next five years has been the National Performance Review. NPR states that agencies can reinvest in their programs based on savings gained through improved use of IT. This statement is partially misleading. Most of any savings that result will go toward deficit reduction. This use of savings has not yet reduced deficit, but it appears to be reducing its rate of growth. The primary impact of NPR will be through the nature of change in plans and programs already defined. In reality, some programs will be terminated, some programs adjusted downward, but few, if any, new programs are expected to emerge.

The overall IT market is expected to grow at 6%. The mix of the three principal components of the contract portion of the proposed federal agencies' IT expenditures are shown in Exhibit II-2. While commercial services will continue to represent the highest spending level (39%), telecommunications will gradually gain market share from computer systems. Telecommunications represents 24% in FY 1994, but will grow to 29% in FY 1999.

Exhibit II-2

IT Markets, FY 1994-1999

Market	1999	1994	CAGR
Computer Services	9.7	7.1	6%
Computer Systems	7.9	6.7	3%
Telecommunications	7.1	4.5	10%

Market Size ($Billions)

■ 1999
■ 1994

Source: INPUT
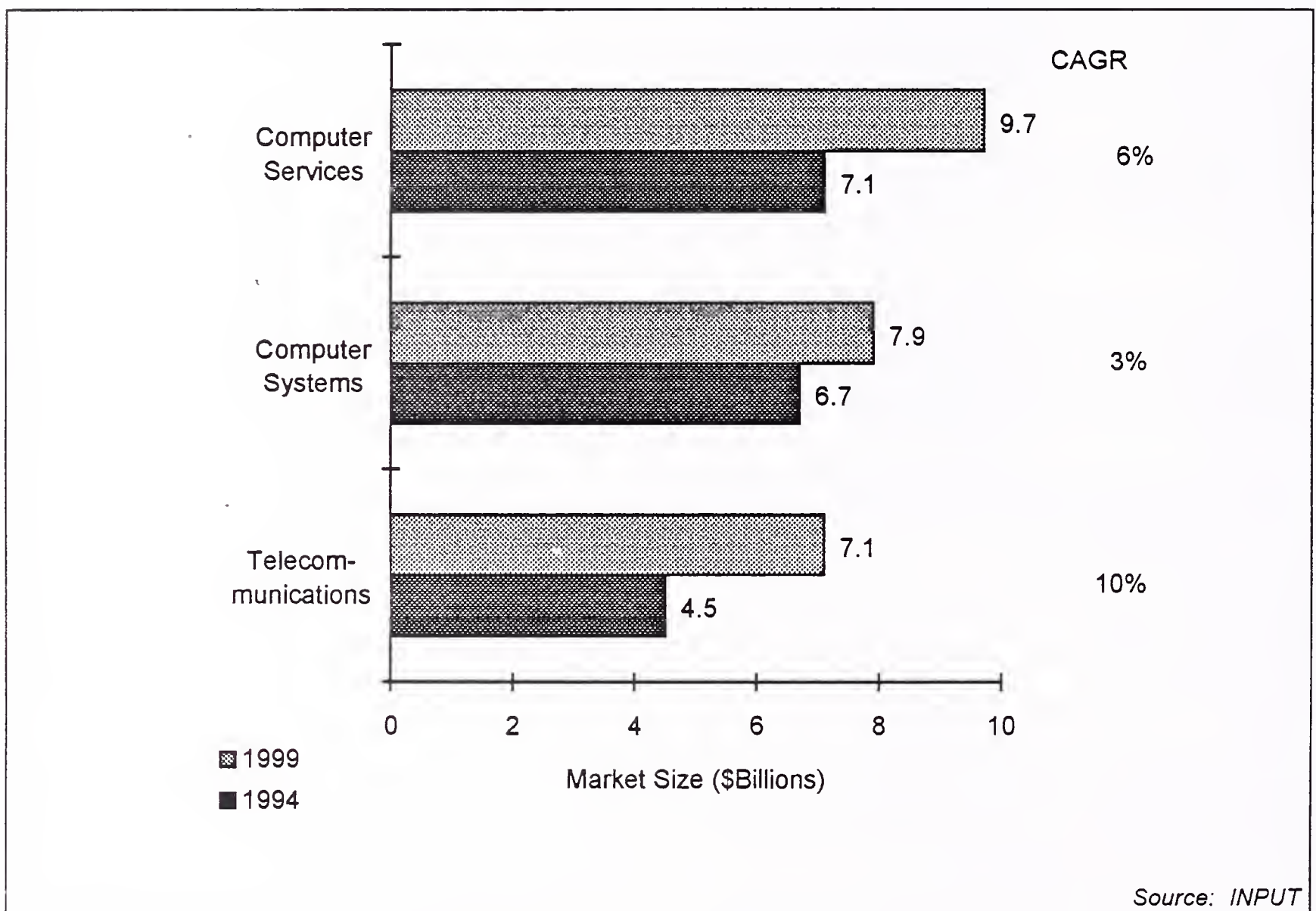
- The commercial services market is experiencing an increase. Actual spending anticipated in FY 1994 is higher than estimated, and outyear spending is forecast to increase at 6% CAGR. The requests for FY 1995 are $550 million more than estimated for FY 1994, with gradual increases in expenditures through FY 1999 expected.

- Expenditures for computer systems, including hardware and systems software, will increase by $280 million in FY 1995 from estimates for FY 1994. Future spending is expected to increase steadily, growing to $7.9 billion in FY 1999 at a CAGR of 3%. This growth reflects lower hardware costs and an increased number of system upgrades rather than complete replacements.

- Communications and network services expenditures are projected to increase from $4.5 billion in FY 1994 to $7.1 billion in FY 1999 at a CAGR of 10%. Telecommunications continues to grow rapidly as projected. Reporting of telecommunications outlays is improving, and more accurate numbers for forecasting are emerging; however, some agencies are still not accurately reporting their communication spending. The lower rates due to price readjustments of the FTS2000 contract continue to reduce actual dollars spent. Recompetition of the FTS2000 and proposed integration of the Defense Information Systems Network will drive prices and spending further downward, although demand for voice and data will increase.

Several factors are driving the demand for commercial services: loss of in-house capability due to pressure to reduce the size of the federal workforce, the requirement to redesign business functions of the federal government and loss or lack of expertise needed to integrate legacy systems in emerging client-server environments. Industry is demonstrating an interest and expertise in conducting necessary commercial services. Pressures to downsize the federal workforce are strong. However, other pressures to enhance the in-house performance of government agencies continue, especially in the House of Representatives, and are not likely to permit significant growth in contracts much beyond 72% of the IT budget.

The distribution of IT spending has changed in FY 1995 from the distribution in FY 1994. Out of the top ten agencies with the largest IT budgets, seven changed rankings. Exhibit II-3 shows the ranking of these agencies with their FY 1994 and FY 1995 budget amounts. This change demonstrates the shifting of program priorities in the federal government, and specifically in the Department of Defense (DoD), the transfer of spending authority from the military services to the Department. All three military services fell in ranking for IT spending in FY 1995. Treasury represents the most significant increase from seventh position in FY 1994.

A look at the agency ranking for the contracted portion of the IT budget (Exhibit II-4) shows a slightly different distribution. Notably, Treasury is lower in the rankings than for total IT budget because of the large in-house IT support capability. The military services, on the other hand, are experiencing reduced staffing (as well as reduced program spending).

Exhibit II-3

Top 10 IT Budgeted Agencies

Agency	FY 1995	FY 1994	CAGR
OSD	4.6	4.2	7%
Army	2	2	
Navy	1.9	1.9	9%
Energy	2	1.9	
Transportation	2.1	1.9	11%
Treasury	2.1	1.8	
NASA	1.7	1.7	12%
Air Force	1.4	1.6	
HHS	1.5	1.6	8%
GSA	1.5	1.5	

Market Size ($Billions)
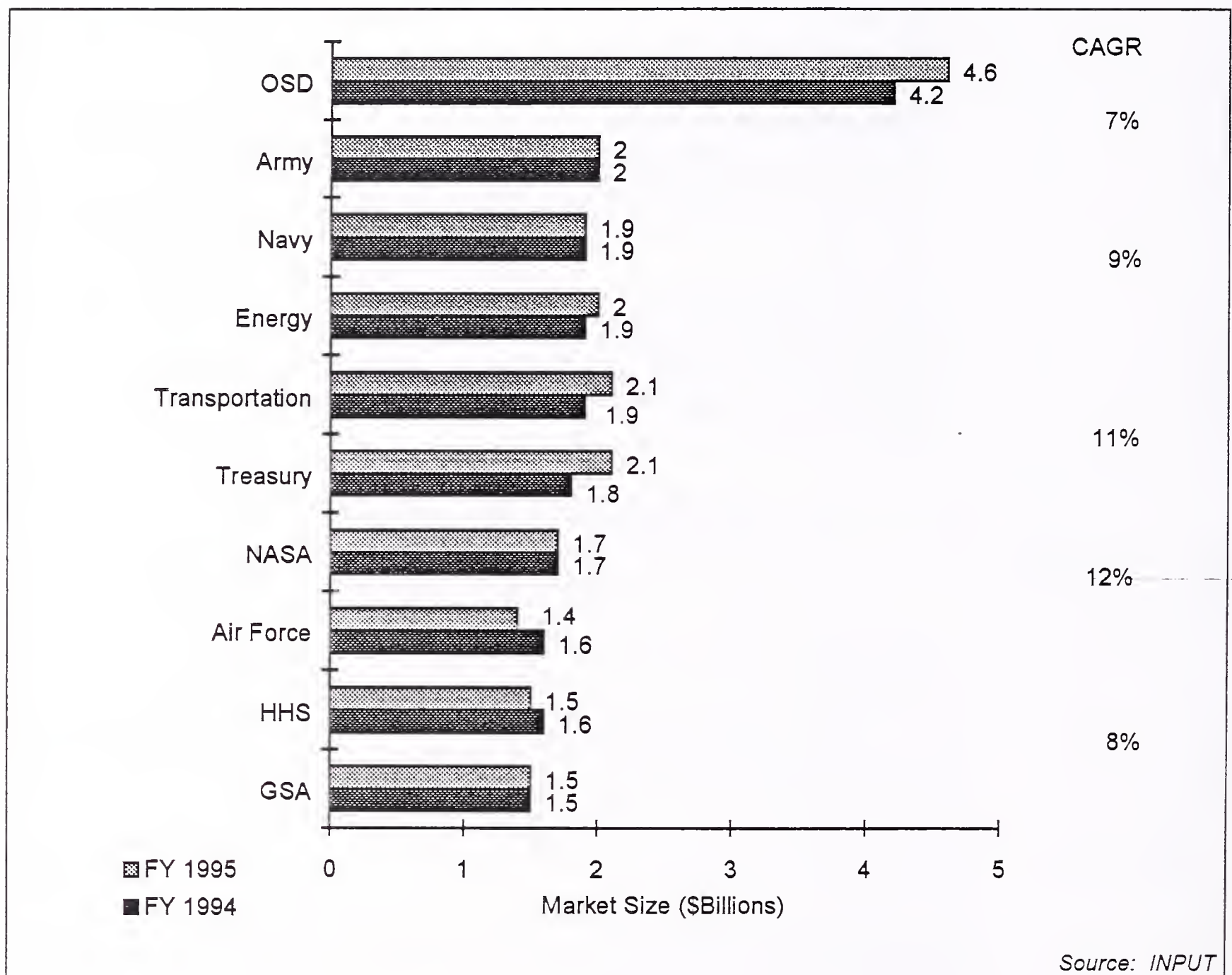
Source: INPUT

Exhibit II-4

Top 10 IT Contracting Agencies
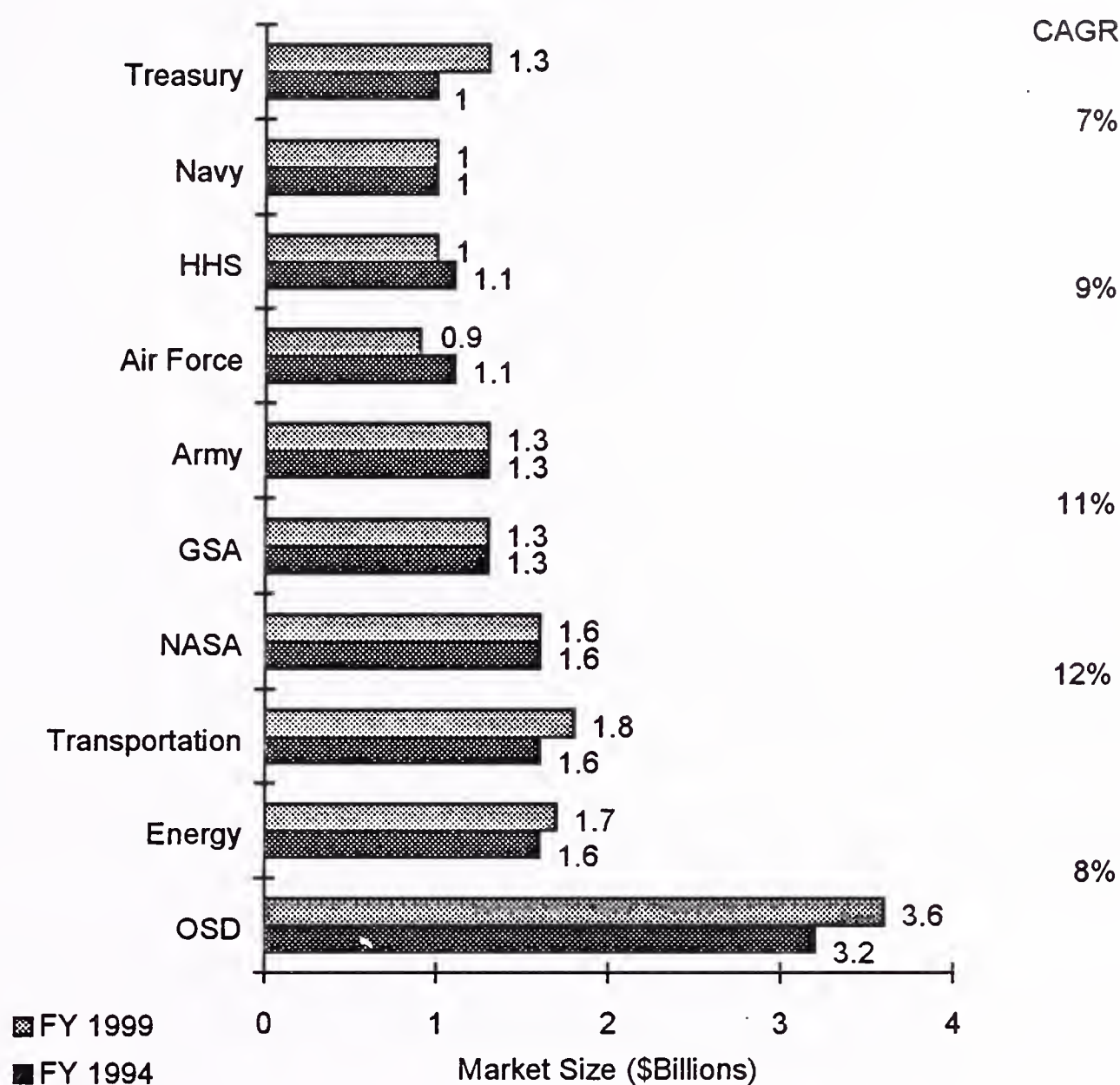
Source: INPUT

C

Federal Market Segmentation

One difficulty in collecting and interpreting federal IT budget numbers lies in the different terminology applied by operating personnel, administrators, legislators and budget specialists. INPUT avoids this confusion by employing service modes to describe market conditions. INPUT added system modes to comply with OMB/GSA-derived budgetary information, as indicated in Exhibit II-5. Individual mode funding trends are discussed in Chapter III. Some modes are subsets of the primary modes to clarify expected spending patterns. The funding details of the principal modes are described in Chapter IV.

Exhibit II-5

Federal Market Segmentation

Source: INPUT
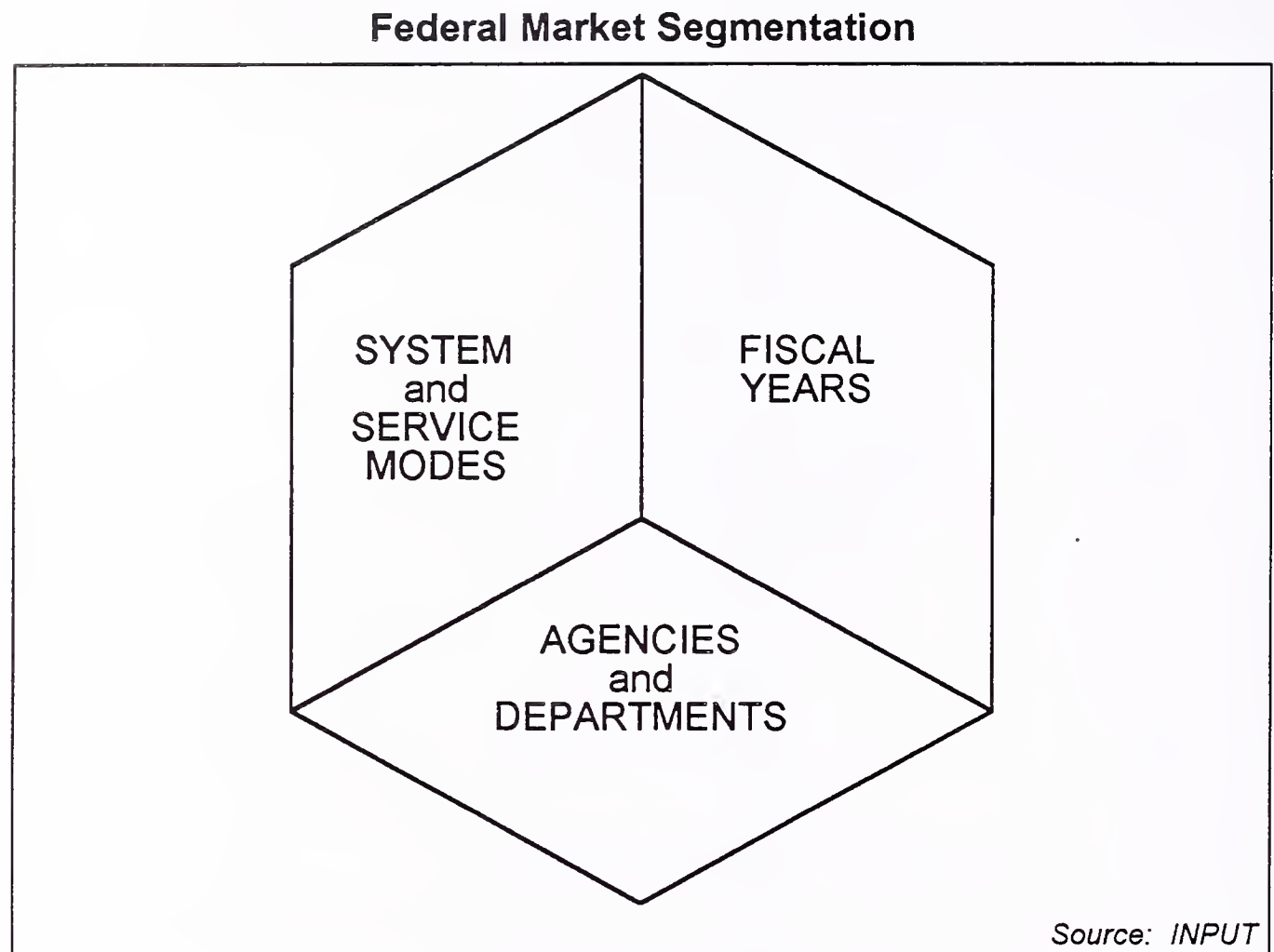
Both service/system modes and user-functional modes identify the requested budget in the fiscal years of proposed obligation, which permit development of a common base of proposed outlays for either set of modes by fiscal year.

The 1994 series of INPUT services and systems modes are defined in detail in Appendix B of this report.

D

Federal Budget Issues

Although some improvements in the overall financial situation have been reported in various economic indexes, signs are continuing that the economy cannot support constantly expanding government discretionary expenditures, in opposition to out-of-control entitlement spending. The reduction in near-term military threat and fading space challenge lent themselves to demands that the deficit and its debt implications be controlled. As a result, slower overall budget growth and the resultant reduction in outlays for goods and services can be expected throughout the remainder of the decade as noted in Exhibit II-6.

Exhibit II-6

FY 1995 Budget Factors

- Sustained low-level growth
- Commercial services growing
- Capital investment down
- Personnel spending reduction

Source: INPUT

Several factors are influencing the level of IT spending in FY 1994 and projected spending in the outyears, beginning with FY 1995.

- The Administration's drive through the National Performance Review to improve government services and to reduce spending will result in much lower overall growth of the IT budget unless Congress can be convinced that increased IT spending will result in lower operating costs.

- Commercial services are increasingly in demand, although there is a possible impact from federal union efforts to protect government staffing in face of shrinking operations budgets.

- Capital investment is slightly down, partly because of lower budgets and partly because price competition is driving down unit costs.

Defense IT spending will continue the decline that began in FY 1988. For FY 1995, another percent of the overall IT budget has shifted to the civilian agencies. INPUT expects that even with pressures to support sustained base capabilities, the decline of the Defense IT budget should continue. Any significant international crisis could reverse that pattern, but most spending would go toward expendables (ammunition) rather than additional IT equipment. In contrast, the civilian agencies are expected to increase IT outlays steadily during the next five years.

E

Information Technology Market Factors

The principal market factors influencing how IT will be procured have some relationship to the budget deficit and to the Administration's focus

on improving service and efficiency. These factors are shown below in Exhibit II-7:

- In the face of personnel limitations, IT productivity of existing and future information processing will be emphasized.

- Business process reengineering is increasing and seeks to improve operating effectiveness. Vendors will be expected to contribute to the process with appropriate expertise.

- Budget cuts are expected to continue as the Congress and the Administration compromise on ways to reduce the federal deficit.

- Continued use of indefinite quantity procurements can be expected, as the agencies try to get the best prices for hardware and software. Commercial products will continue to be obtained because of anticipated lower prices and implement interoperability.

Exhibit II-7

Information Technology Market Factors

- IT productivity gains
- Business process reengineering
- Budget cuts in operations and commodity pricing continue
- Use of IDIQ contracts

Source: INPUT

There are no signs of diminished public demand for improved service from federal programs. In order to avoid the high expense of additional staff, agencies are looking to substantial improvements in IT productivity. This means faster throughput, reduced or the same personnel levels and a shifting of information services to those interfacing the public and Congress. Improved connectivity, data interchange and functionally reengineered agency programs are being emphasized.

Principal among several initiatives to improve public services is the development of a national information infrastructure. The sharing of information and data resources over a national network architecture is expected to provide efficiency and improved productivity. Storage, access and transfer standards can be expected to play a large roll in supporting shared resources. The cost of such an endeavor will be burdensome on existing programs, which would have to dedicate development dollars to such an undertaking.

Improvements in procurement are receiving more attention among congressional staffs than during the prior term. The government expects to have major procurement reform by the end of FY 1994. This reform will feature greater promotion of small business opportunities, improvements in simplified purchasing, less expensive and faster procurement through electronic ordering, and reduced overhead in the authorization process. Agencies are already taking steps to improve the process by issuing smaller contracts and by breaking up the larger ones into more manageable segments. Performance measures are being developed jointly with the General Services Administration to assure improved results from contracts, and Past Performance is being piloted to determine effective ways to assure continued high-quality performance from contractors.

Although agencies will continue to impose requirements for across-the-board standards such as GOSIP and POSIX, there is diminishing attention in the marketplace on these issues. Interest in digital standards and encryption is growing because of concerns for network access control. Standards for Electronic Data Interchange, as part of an overall thrust toward electronic commerce, will receive the most attention in the next several years. Defense has pioneered the development of standards in these areas, and civilian agencies are moving toward these changes.

F
Conclusions

Government-wide IT priorities continue to shift as agencies attempt to improve performance at lower cost, with the prospect of significant impacts on the way information resources will be acquired and on the response of the industry. Some of the more significant conclusions are listed in Exhibit II-8.

The beginning of the 1990s saw a gradual decline in the growth rate of IT acquisition. The growth rate has held steady for the last two years, with the FY 1995 budget request demonstrating the same rate. The FY 1992 and FY 1993 budgets addressed greater near-term expenditures. The FY

1994 budget demonstrated increased interest in reducing capital expenses while seeking more commercial services contracts. Several key contracts were awarded with significant outyear spending, and revised or postponed programs will influence actual spending levels in later years. Overall, IT spending will increase at the same level as improved performance can be measured and demonstrated.

Exhibit II-8

Conclusions

- Mission-refocusing emphasis
- Shift in agency priorities
- Civilian market prospects
- Move toward commercial products
- New technology initiatives

Source: INPUT

Under severe pressure to reduce the federal deficit, cost-reduction measures are being investigated for agency programs. The National Performance Review initiative is generating new emphasis on agency missions, government services, procurement reform and the use of IT to assist in reengineering the government. As a result, service programs are being emphasized, existing programs are being examined for possible downsizing or termination, and performance measures for government and contractors are being developed.

As an operational improvement, and to gain from inherent efficiencies, client/server architecture is increasingly the basis for systems design. Legacy systems are still very much evident in the federal government, but as a second phase of the client/server approach, integration of these outdated, but still operational, systems is anticipated. Although not as much in the public consciousness as in previous years, modification of existing systems is needed to meet standards that improve connectivity, software and data portability, and flexible database interchange. Many unsolved integration issues remain, such as the conflict in protocols for different communications products, lack of effective management in the use of different, but connecting networks, software validation and reuse, software development productivity tools and standardized applications packages.

As the trend in low growth rates increases, more attention will be paid to improving the efficiencies in operating civilian agency programs, particularly those with a heavy emphasis on service. Nearly two-thirds of

IT outlays are now in the civilian sector, and there is a strong likelihood that this proportion of total IT spending will increase in future year budgets.

The cost of a narrowing range of opportunities is more competitively bid, contracts, exacerbated by the melding of vendor resources through continuing mergers, acquisitions and alliances. With the growth in use of contract performance metrics and emphasis on contractor past performance, prospective vendors will be re-evaluating their competitiveness. Teaming relationships will be expanded, and changes in vendor alliances will increase. With lower profit margins available on commodity-type contracts, service vendors will find the most opportunities for profitability. The contract dollars are not diminishing in the federal government, but competition is heating up. Even recompeted contract opportunities do not assure any higher probability for success to the incumbent than for any other qualified provider.

The operational demands of federal programs require application of the latest technologies, primarily to take advantage of improved price/performance. But, unlike the past, the government is making it clear that it will not pay for development, unless it is a cooperative venture (as in the High Performance Computing and Communication initiative).

Instead, industry is being asked to participate more as a partner with the government. This partnership will occur in the form of dual acceptance of the cost of investment in new technologies, participation in performance-based contracts and relaxed inclination to protest an action that results from an agency decision in pilot procurement activities. In return, the government is working out improved means of communicating its requirements to prospective vendors without compromising the integrity of the procurement process. There has already been an increase in federal R&D budgets to develop improved technologies.

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III
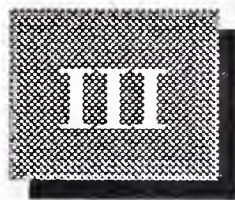
Market Trends

Many factors operate concurrently to influence the federal IT market. There is no one factor that acts alone in influencing budget and spending levels. This chapter identifies and discusses the major factors influencing the market today and over the next five years. These factors include, but are not limited to, the following:

- Attempts to reduce the federal deficit

- Targeted increases in IT spending

- Influences toward the use of commercial services

- Pressures to downsize

- National Performance Review recommendations

- Growing dependency on commercial off-the-shelf products

A

Federal Market Overview

1. Economic Factors

The nation is addressing a number of highly visible and sensitive operational issues as it continues to address deficit reduction. The rising federal deficit has been the most significant driver in refocusing federal agency missions and national programs during the Clinton Administration. While many technology initiatives have been implemented during the first two years of this Administration, functional restructuring of programs has been the more prominent budget reduction force.

On the other side of the balanced budget agenda, increases in receipts for FY1995 are anticipated. These are attributable to the enactment of the

Omnibus Budget Reconciliation Act of 1993 (an extension of the Gramm-Rudman-Hollings legislation), effects of the Health Care Security Act, and other adminstrative platforms.

The final report of the National Performance Review (NPR), released to the public September 7, 1993, posed a number of new directions for federal agencies. The two most significant ones from the perspective of federal information technology systems and services vendors were procurement reform and the "re-invention" of government through more effective use of IT. The NPR report mandates improved service at lower cost. Improved service is coupled with the requirement of related federal program's to "inter-operate." Business process reengineering, client/server architecture, acquisition of commercial products have all been identified as enablers of improved performance at lower cost.

Procurement reform in this Congress is undergoing major review, with often conflicting focuses. Nevertheless, it is likely that some procurement reform language will satisfy both houses of Congress and will result in legislative changes for FY 1995. Although the more effective use of technology emphasis of NPR also faces troubled times because of multiple focuses, a final report of the NPR working group on IT was issued in June 1994. Any benefits from this plan will occur only through specific actions that result from agency recommendations. These actions will be seen in agency plans for FY 1996 and beyond.

Economic stability at the national level has been declared by most economists. With only a slight inflation rate increase expected over the next few years, the nation is in an improved position to reduce its national debt. On the international level, monetary problems continue to confound the nation's ability to settle its foreign trade imbalance and to compete on a broader, worldwide base.

Other national programs, such as law enforcement, health care reform, and social reform, face major political conflict related to definition of service and cost of implementation. These political conflicts can have a significant negative impact on the current deficit crisis if not resolved within the final years of this Administration. Lack of clear resolution may also reduce the likelihood that the current officials will be re-elected. A turnover in Administration would likely call for a redesign and spending adjustment of many of the major national programs.

Several structural adjustments have already occurred in national programs as a result of slow economic recovery. Massive layoffs of workers in the industrial complex, further downsizing of the defense program and closings of military bases, federal attention to address growing weaknesses of the thrift industry, and spiraling costs of entitlement programs are among the issues driving the adjustments.

Spending reductions, joined with tax increases, head up activities that will influence the rate of economic recovery over the next two years. Added to fiscal uncertainty are the concerns that the president's economic recovery program and his health care package continue to have problems in Congress and have resulted in a growing lack of public confidence in the Administration's programs. The passing of the crime bill represents a gain for the president, but even this package was reduced significantly from its initial draft.

a. FY 1995 Federal Budget

Reported spending for FY 1993 was at the same levels estimated last year. Estimates for FY 1994 are slightly higher than forecast in FY 1993, and levels for FY 1995 and outyears continue spending increases at modest levels. While the FY 1994 budget process was impeded by an uncertain energy policy, inadequate services to citizens, re-established questions about what programs government should be administering, and delays in establishing executive department leadership, the FY 1995 budget process was marked with concerns for spending reductions and improved government services.

The budget and the economy operate together, each influencing the other as changes occur. A slack in economic growth tends to increase the size of the deficit. Increasing unemployment rates influence lower GDP growth. This, in turn, increases federal outlays for programs such as food stamps and unemployment compensation. The significant factors affecting the spending are the deposit insurance payments and increases in the recession-driven benefits programs. The Congressional Budget Office (CBO) does not expect federal spending to decline from its current rate of 25% of GDP to 22% until at least FY 1997, when spending will be similar to the late 1970s.

b. *User Fees and Other Collections*

The collection of fees from the private sector for government services and use of government facilities and resources is referred to as offsetting collections. Essentially, such revenues offset outlays for various programs that generate services or maintain resources and facilities. More and more, with the aid of the Congress, agencies are turning to collection of fees in order to offset their program costs. The Administration has reported that offsetting collections of discretionary user fees would yield $1.5 billion in FY 1995, up from $1.3 billion expected in FY 1994. For the five-year period ending FY 1999, collection of user fees should amount to $8.4 billion. The major distribution of receipts from user fees by departments are listed in Exhibit III-1. Departments of Health and Human Services and Interior show an increase in collections. The Food and Drug Administration (HHS) began collections two years ago, and the rate of collection is expected to increase due to the growing number of new applications and petitions submitted for market approval. For several years, the Department of Interior has been criticized for its inability to collect fees for the commercial use of federal properties. The Congress has indicated that it expects Interior to pay for all departmental program and administration costs through the collection of fees and penalties. In both agencies, fewer operating dollars will be necessary through the appropriations process.

c. *Entitlements versus Discretionary Funds*

Under the Budget Enforcement Act of 1990 (BEA), the budget is divided into two exclusively separate categories: discretionary and direct (entitlement). Discretionary spending refers to programs in the Administration's operating plan. Spending for such programs is limited through FY 1998 to receipts such as tax collection and service fees. Spending on discretionary programs that exceed appropriated outlays trigger a sequester to eliminate overspending.

Exhibit III-1

Distribution of Agencies Collecting User Fees

	FY 1995	FY 1999
Agriculture	176	179
Commerce	88	88
HHS	338	389
Interior	27	33
Justice	18	18
Transportation	2	2
Treasury	681	681
TOTAL	1,329	1,384

Source: Budget of the United States Government, Fiscal Year 1995   *$ Million*

Entitlement programs include guaranteed payments to congressional programs such as food stamps, social security, and medicare/medicaid. Entitlement spending continues as the largest category of federal spending. It represents 59% of outlays in FY 1995 and is expected to grow to 62% by FY 1997. This upward trend will continue unless Congress drastically curtails the eligibility formulas (not under the control of the Administration). Unlike the annually authorized and appropriated discretionary expenditures, entitlements are defined by eligibility, not population size, taxes nor Administration initiatives.

d. Federal Aid to State and Local Governments

Many of the congressionally legislated government services are administered at the state and local level with "flow through" funds provided by federal programs. Public education, road construction, water supply and sewage treatment and law enforcement are among many services delivered at state and local levels. Grants, loans and tax subsidies are the forms which revenue relief takes for these programs. The functions with the largest amount of grants and loans are health and income security. Together they total $148.5 billion for FY 1995. Exhibit III-2 shows the distribution of federal grants by function. While social

programs continue growing at a rapid rate, law enforcement (Justice) emerges as a significant market segment.

Exhibit III-2

Federal Grants By Function

	FY 1993 (actual)	FY 1994 (estimated)	FY 1995 (estimated)
Defense	0.2	0.2	0.1
Energy	0.5	0.5	0.6
Resources & Environment	4.5	4.3	4.3
Agriculture	1.1	1.0	0.9
Transportation	26.8	24.7	26.3
Regional Development	7.1	5.8	6.9
Education & Social Services	32.5	36.0	38.7
Health	86.7	93.5	95.7
Income Security	51.4	52.0	52.8
Veterans Benefits	0.2	0.2	0.2
Justice	1.2	1.1	2.9
General Government	2.2	2.3	2.2
TOTAL	214.2	221.6	231.6

Source: Budget of the United States Government, Fiscal Year 1995   *$ Billion*

e. Defense Spending and DoD-Corporate Information Management

The Department of Defense is faced with conflicting requirements to both scale down and to be able to support two simultaneous regional wars. The concept of a two simultaneous regional wars capability grew out of the Bush Administration. The "bottom-up review" that was associated with preparation for such a capability is still in place but is running up

against conflicting views regarding its likelihood. The Pentagon's estimate of $1.2 trillion in five-year costs is inconsistent with deficit reduction targets and is even underestimated by $150 billion, according to the General Accounting Office. Nevertheless, President Clinton is holding to the plan to further reduce the military by 200,000 troops and further reduce spending by $104 billion over the next five years and still be able to provide adequate defense. Many Pentagon officials and members of Congress considered this goal to be unachievable. At a minimum, the military must be better prepared technologically. This requires more modernization of equipment and technologies than has been implemented to date.

Beginning in FY 1991, Congress relegated to Corporate Information Management (CIM) primary control over Defense general-purpose computing and communications. The plans being published in the form of Defense Management Review Directives (DMRD) have not completely defined the impact on industry. The savings postulated by the creation of CIM was presumed to come in the form of fewer systems, consolidated communications, and less dependence on industry assistance. Continuous changes in senior personnel in Defense Information Systems Agency and major reshuffling of CIM programs leaves the full success of this program in doubt.

f. Research and Development

Research and development (R&D) spending has been on a gradual decline in defense-related areas. Today, defense R&D spending is below the level of FY 1990. R&D for nondefense programs has been on a slight increase over the same period of time. Exhibit III-3 shows the different directions these two budgets have taken over the last five years. Transportation demonstrates the greatest five-year growth rate (14%), but Health represents the greatest real growth (with 7% CAGR).

Exhibit III-3

Research & Development Spending Trend

	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95
Science & Space	7.9	8.7	9.1	9.5	9.7	9.8
Energy	2.3	2.5	2.6	2.5	2.5	2.7
Transportation	1.0	1.1	1.3	1.5	1.8	1.9
Health	8.3	8.5	9.7	10.4	10.9	11.5
Agriculture	0.9	1.0	1.1	1.1	1.1	1.2
Resources/ Environment	1.2	1.3	1.6	1.8	1.8	2.0
All Other	1.1	1.1	1.1	1.2	1.3	1.3
National Defense	41	38	38	40	39	40

Source: Budget of the United States Government: Fiscal Year 1995   *($ billion)*

g. *Other Budget Restrictions*

NASA's string of technology setbacks continues. The status of its space shuttle program is still unresolved. White House and Congress investigations have created more uncertainty and substantial funding delays. New management initiatives at NASA may improve the agency's budget situation, and more certainty with new procurements for major programs should result.

Several major programs are currently threatened by budget cuts. The Department of Agriculture's massive modernization effort (INFO SHARE) to consolidate support to its vast offices and local programs is under serious review to determine if the department is ready to implement such an aggressive program. The Internal Revenue Service Tax System Modernization program is also under review with the likely outcome that as much as 25% of appropriated funds will be withheld. While program performance is not the serious concern behind these proposed cuts, the size of the programs makes them easy targets to a Congress eager to attain deficit reduction goals.

The outlook for deficit reduction over the next five years has improved. Overall discretionary spending levels have dropped, and the rate of deficit growth has diminished. Nevertheless, deficit spending remains a major impediment to full economic recovery. In a continuing effort to improve the deficit position, IT-supported improvements are voiced by Administration officials and Congress. Any productivity gains expected in the federal sector will depend on reengineering processes and replacing inadequate systems.

2. Information Technology Budgets

The one-time increase in IT spending proposed by the FY 1992 budget brought about an increase in actual outlays in that year, but since then spending has leveled off and will continue slow growth through FY 1999.

The IT budget request of $26.9 billion for FY 1995 is an increase of 5% from the $25.6 billion estimated for FY 1994. The addressable portion of the IT budget, shown in Exhibit III-4 as $19.4 billion, is a 6% increase over FY 1994. This portion of the IT budget is for contracted goods and services and shows a growing federal government dependency on the private sector for support.

Exhibit III-4

Federal IT Budget Categories (FY 1995)

Operations 7%
Capital Investment 22%
Personnel 22%
Commercial Services 49%

Obligations - $26.9 billion
Contracts - $19.4 billion

Source: INPUT
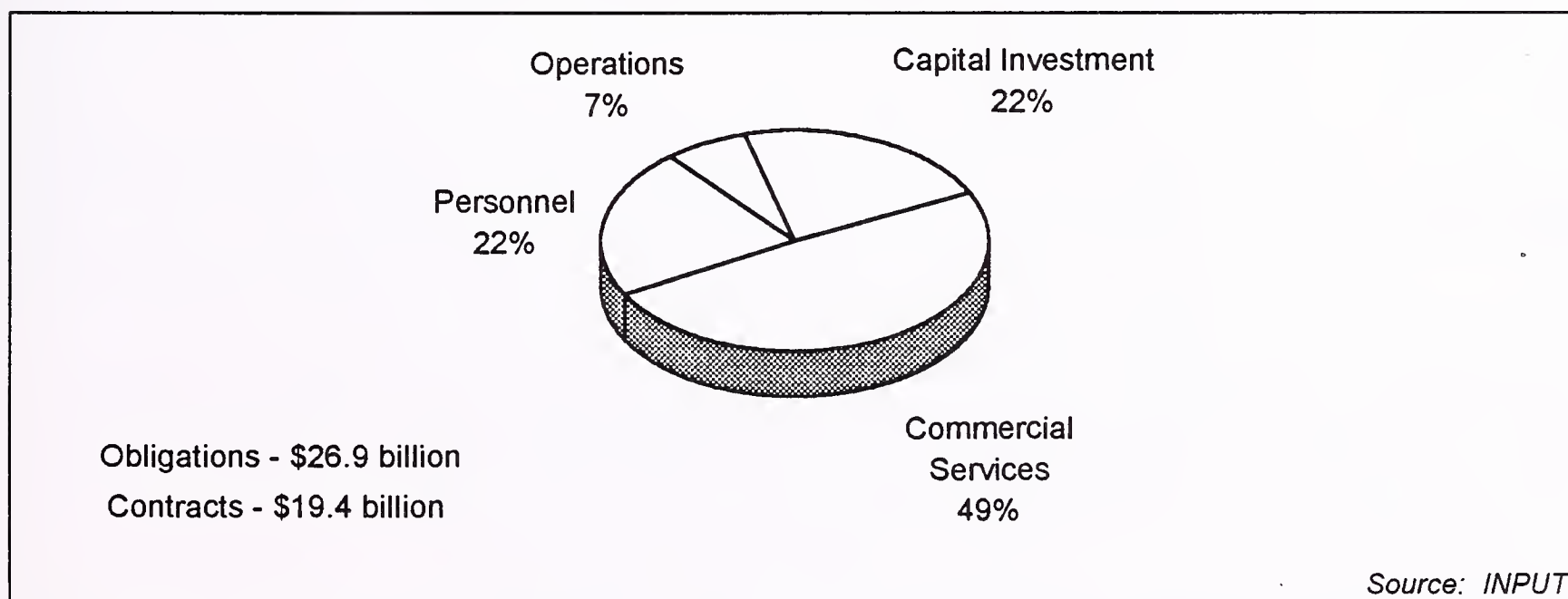
a. Budget Categories

- The addressable proportion of the FY 1995 IT budget—to be expended on contracts—remains at 72%. This is more than in the budgets for FYs 1989 through 1993 and back to the level of FY 1987. The major part of the expenditure, 49% of the overall IT budget, is planned for commercial services. Commercial service budget items include network services/telecommunication, processing services, professional services, maintenance and significant use of technology. The commercial services segment is proposed at $860 million greater than in FY 1994. Civilian agencies account for $580 million (67%) of this total commercial services growth.

- Capital investment (CI) has decreased to 22% of proposed IT expenditures. In dollars it is about $240 million more than estimated for last year. CI includes:

  - Computer and communications hardware

  - Computer and communications software

  - Physical plant for the hardware ("site")

- Operating costs remain at 7%, only $28 million higher than the estimated level for FY 1994. About 33% of this amount goes toward leased equipment and software. Most is spent on facility leases, repairs and expendables.

- Personnel outlays are proposed at 22%, the same level as reported last year. This represents an actual reduction in staff levels since some of the dollars go to cost of living increases, promotions and buy-out packages to promote early retirement. Defense staffing levels continue to lead the overall decline in internal personnel support. DoD, in particular, will likely lose program dollars to cover personnel outlays. The total amount for personnel outlays is actually $155 million higher than estimated for FY 1994. None of these outlays are spent on commercial contracts.

b. IT Budget Trends

The IT budget representation in Exhibit III-4 relates to the proposed outlays or expenditures for FY 1995, not the budget request submitted to Congress. The latter identifies additional funding needed to cover various funds transfers for services between agencies and from other projects.

The proportion of the budget spent in each of these segments has varied considerably in the past decade. In the period FYs 1987 through 1995, there have been progressive changes, as illustrated in Exhibit III-5. Commercial services spending is the only segment growing as a proportion of the total IT budget. Proportions for the other categories are on a downward progression.

Exhibit III-5

Federal IT Budget Progression
Fiscal Years 1987-1995

Source: OMB
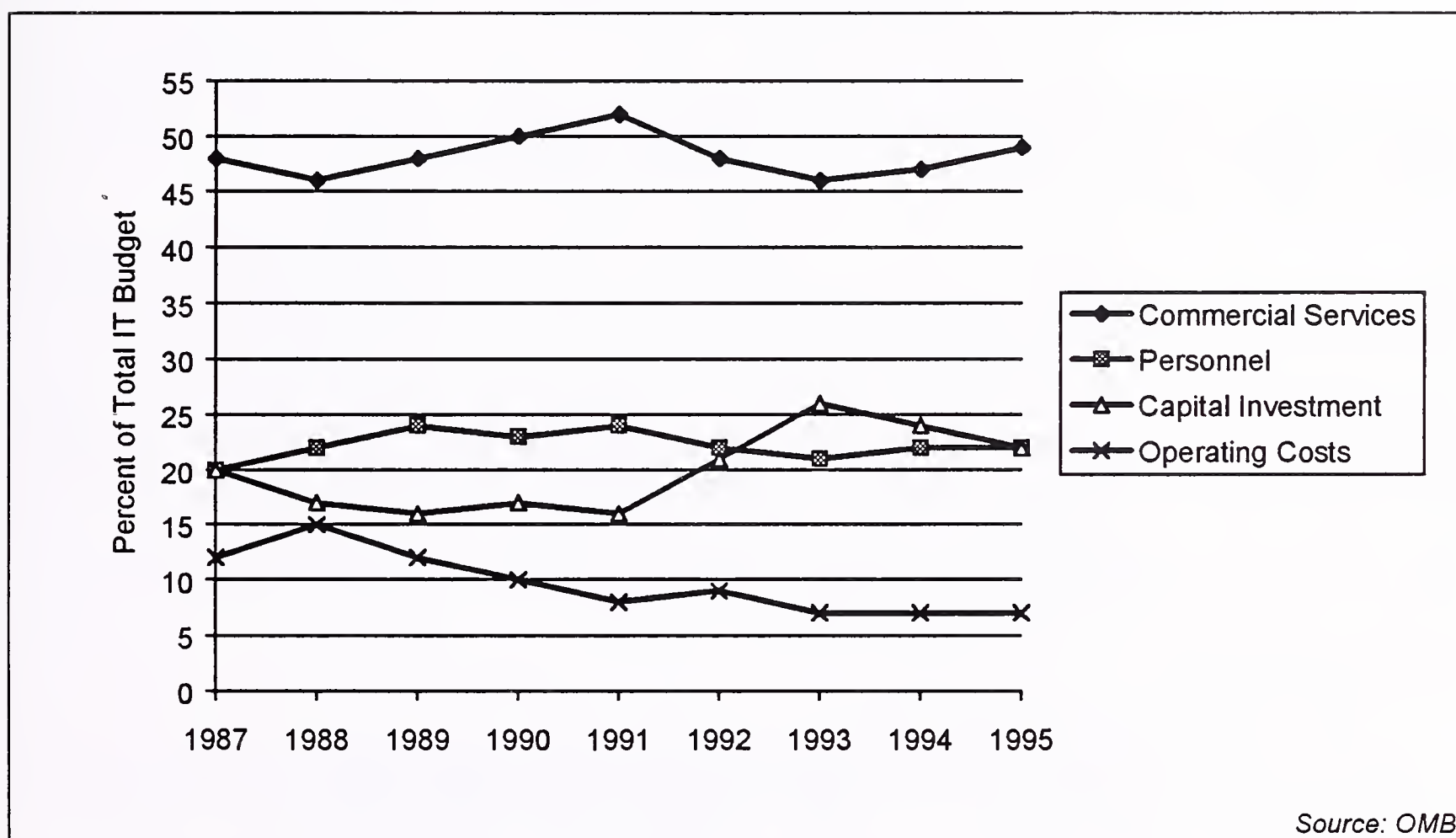
- Beginning in FY 1988, commercial services steadily increased about 2% per year to 52% in 1991, indicating a growing reliance on private-sector sources. Outlays fell in FY 1992 to only 48%, and held about 47% of the requested funding through FY 1994, reflecting the substantial increase in planned capital investment. The growth in commercial services spending for FY 1995 follows our suggestion last year that the level would return to 50%.

At the other end of the budget spectrum, operating expenses have declined over the same period. The inventory of computer leases was terminated in response to congressional mandates in 1987-1988. The decreasing proportion seen in FY 1995 for operating costs remains at 7%.

- The decline in capital investment prior to FY 1992 paralleled the reduction in cost-per-MIPS, accelerated PC acquisitions, and the cancellation or slippage of a number of projects over this time frame. The significant jumps in FY 1992 and FY 1993 support release of more than $1 billion by the CIM project office, increased spending by Treasury, and emergency upgrades needed by a number of older information systems. Since then, budget levels have begun to decline as a percent of overall IT budget, mostly due to increased competition in the PC market and overall drop in hardware prices.

- Federal personnel costs were at their lowest in 1987, when a number of older data processing suites were removed from service. Through FY 1991, agencies partially reversed the outward flow of qualified people. In FY 1992 and FY 1993, however, the proportion of the IT budget again declined, although the current dollars were actually higher. The active reduction in the federal workforce in FY 1994-1995, led by the National Performance Review which seeks a total reduction of 252,000 in federal civilian workforce, and targeted staff reductions in the Department of Defense, will contribute to the further decline in in-house personnel support.

c. Budget Variances

Exhibit III-6 lists actual outlays for each of four budget segments from FY 1986 through FY 1993. (Data for FY 1994 will not be available until April 1995.) The outlays present a slightly different distribution than requested in the budget for each year. The changes are caused by a number of actions.

- Some proposed systems or hardware procurements are canceled or reduced by Congress. Agriculture, Treasury and Defense spending will likely be lower than projected due to congressional threats to major program budgets.

Other expenditures increased in response to activities added by Congress in the Budget Authorization and/or the Appropriation Acts. Social Security Administration and Internal Revenue Service spending levels will increase due to supplemental appropriations.

- Leases are converted to ownership or are terminated.

Exhibit III-6

Actual Outlays of Federal Information Technology Budget
FYs 1986-1993

	1986	1987	1988	1989	1990	1991	1992	1993
Capital Investments	3.1	3.5	3.3	3.4	4.2	5.3	5.9	5.7
Personnel	3.7	4.0	4.3	4.7	4.8	5.3	5.4	5.7
Operating Costs	1.8	1.9	1.7	1.6	1.8	1.6	1.7	1.6
Commercial Services	6.9	7.8	8.4	9.2	10.0	10.5	11.9	11.9
Total	15.5	17.2	17.7	18.9	20.8	22.7	24.8	24.9

Source: OMB, $ billion

A comparison of the IT budget requests with the actual outlays for the same time frame indicates the relative closeness of the two in FYs 1985, 1987, 1989 and again for FYs 1992 and 1993, as shown in Exhibit III-7.

- In 1986, several systems were authorized by Congress to meet problems in Defense and NASA that had not been forseen during the budget preparation cycle. Also, commercial services were increased to provide more communications, programming and analysis services.

- In FY 1988, Department of Defense froze RDT&E expenditures in midyear because earlier outlays were exceeding authorizations. By the third quarter, the secretary of defense authorized resumption of research programs, but denied expenditures for information technology.

Exhibit III-7

IT Budget Requests Versus Outlays
FYs 1986-1993

	1986	1987	1988	1989	1990	1991	1992	1993
Request	14.3	17.1	18.9	18.4	19.5	21.4	24.5	25.4
Outlay	15.5	17.2	17.7	18.9	20.8	22.7	24.8	24.9
Variance	+1.2	+0.1	-1.2	+0.5	+1.3	+1.3	+0.3	-0.5

Source: OMB, $ billion

FY 1990 and FY 1991 were affected by midyear increases in outlays authorized by Congress to meet defense and civilian agencies' needs. The likelihood of outlays exceeding budget in FY 1994 is low because of pressures to reduce federal spending. Expenditures will likely be limited to the amounts authorized at the beginning of the fiscal year.

3. OMB Five-Year Plans

IT represents 1.7% of the overall federal budget for the operating year FY 1994. This proportion has held steady since FY 1992. As a proportion of the government operating budget, IT represents 5.8%. This is an increase of 0.3% over last year. The operating budget excludes mandatory spending, such as Medicaid/Medicare.

Since FY 1991, agencies anticipating IT expenditures of less than $2 million are not obligated to submit Exhibit 43 to the Office of Management and Budget. For FY 1994, approximately $28 million was not reported that had been reported when the threshold was $1 million (prior to FY 1991).

One item in the IT budget identifies interagency funds transferred to an agency for services provided by another agency. Under-reporting of these transfers amounted to $1 billion in FY 1991, but has decreased to an estimated $664 million for FY 1994. OMB reports that the Federal Aviation Administration interagency transfer reporting accounted for 88% of the total.

The FY 1991 issue of the Five-Year Plan illustrated a growing reliance on the values in the plan. Congress demanded improved compliance of agency budgets with the terms of the Revised Paperwork Reduction Act. This annually updated plan progressively identified more of the proposed IT budget, as shown in Exhibit III-8. The percentage of the budget represented by major programs increased over the nine-year period. Plan

programs amounted to 27% of the FY 1983 IT budget and in FY 1991 reached 43%.

The value of an agency's major program funding in a given fiscal year has no fixed relationship with the requested IT budget. This dissimilarity is also noted in the federal processing services market.

- Although defense IT budgets account for half of the total for processing services each year, major ADP procurements for general-purpose resources were slightly less than one-fourth of the total funding for each year.

- The total value of major systems and services being acquired over the nine-year period is not revealed by the annual budget and OMB plan forecasts.

- The total does not include funding for the early years of several very large systems integration programs.

- The IT budget did not include expenditures for the FAA Advanced (ATC) Automation Program prior to 1991, because it was funded by the off-budget Airways Improvement Fund. Since then, Congress directed that these expenditures be given greater visibility by including them in the IT budget.

- SDI supercomputers were special purpose to that program and were included in project funds, rather than in the IT budget.

- Beginning in 1992, Congress no longer requires independent agencies to file Section 43A&B, if they do not expect to spend more than $2 million on information technology acquisitions.

- IT budgets and OMB plans also exclude planned expenditures of the public corporations, such as the Postal Service, TVA, BPA, etc., because they are considered off-budget expenditures.

- Since the 1991 version of the Five-Year Plan, OMB no longer includes listings of the major IT acquisitions planned by each agency. Instead, it provides profiles of significant long-range plans and outlines of some of the major projects needed to accomplish the missions.

- For FY 1995 IT budget reporting, OMB changed the definition of the exhibits. For this year, agencies reported major spending for financial and accounting programs. For FY 1996, a new structure and reporting requirements are expected.

Exhibit III-8 also illustrates why INPUT's Federal Information Technology Procurement Program PARs and INPUT's Federal Systems

and Services Market Program reports are important to vendor clients. Although some agencies identify a larger proportion of their IT spending in five-year projections (43B) (e.g. Education, Justice, NASA and Tranportation), many do not (Commerce, Defense, Energy and HHS). A large number of programs fall under the reporting threshold. The Five-Year Plan does not cover many of the services recompetitions and critical low-level front-end studies for larger programs.

4. Defense versus Civilian IT Budgets

The proposed Defense (including military services) IT budget for FY 1995 is 38% of the whole budget, as shown in Exhibit III-9. It will be even less if the House Armed Services Committee is successful in implementing additional budget cuts. With very little discretionary IT spending levels remaining, further budget cuts will reduce operational spending levels. The majority of the proposed outlays will acquire equipment and integrated systems, like the Army's Sustained Base Information System, the RCAS and the changes authorized for the Joint Logistics Systems Center.

Exhibit III-8

Federal IT Budgets Comparison of Major Acquisition Plans to Total IT Budgets
FYs 1983, 1987, 1991, 1994, 1995

AGENCY	FY 1983		FY 1987		FY 1991		FY 1994		FY 1995	
	IT Budget	OMB Plan	IT Budget	OMB Plan	IT Budget	OMB Plan	IT Budget	OMB Plan	IT Budget	OMB Plan
Agriculture	445	248	558	579	760	662	841	804	934	624
Commerce	281	136	457	271	456	311	619	346	737	284
Defense	7723	1852	8906	1806	9374	1890	9692	2243	10070	1674
Education	68	76	65	54	84	53	237	112	299	243
Energy	876	128	1225	157	1519	291	1776	211	1996	183
EPA	84	51	183	116	271	132	330	149	314	96
GSA	132	1083	1693	1677	1325	1323	1507	1502	1545	75
HUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1445	50
HHS	1518	189	792	246	821	349	1524	457	1524	163
Interior	267	76	324	121	393	180	490	194	503	155
Justice	389	232	480	354	605	689	825	886	842	658
Labor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	159	63
NASA	797	522	1325	1057	1751	1350	1912	1297	1718	1567
State	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	377	184
Transportation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2098	2090
Treasury	518	729	1247	899	1332	1044	2098	2062	2129	1459
VA	320	10	403	132	520	81	547	183	641	182

Sources: Five-Year Plan (OMB/GSA/NBS) 1983, 1987, 1991, 1994; OMB A-11, 1983, 1987,
$ million, N/A - Not Available   *1991, 1994, 1995.*

The net increase in the FY 1995 request for the total federal government IT budget over FY 1994 is 5%. This growth is entirely in the civilian agencies. Defense spending declined for capital investment and operating costs over levels estimated for FY 1994. Defense spending for commercial services in FY 1995 grew by $280 million (6%). Civilian spending increased for commercial services in the same period by $651 million (8%).

Exhibit III-9

Defense vs. Civilian IT Budgets (FY 1995)

Defense Department 38%

Civilian Agencies 62%

Obligations - $26.9 billion
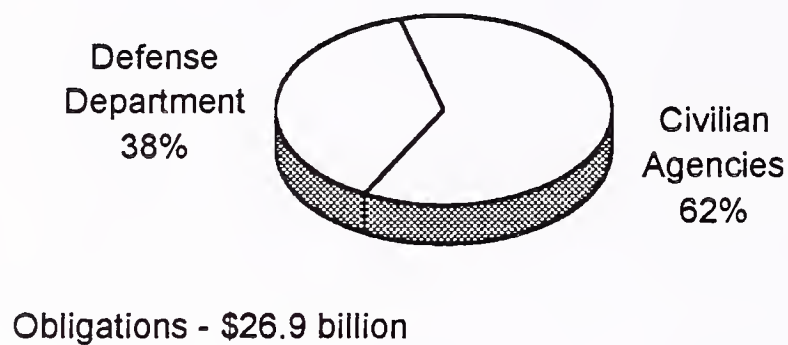
Source: OMB

The FY 1995 civilian agency IT market continues to grow, increasing by $1.0 billion (7%) over the amount requested for FY 1994. The most significant increases appear in capital investment (8%) and commercial services (8%). Spending for hardware in civilian agencies continues in FY 1995 at the high levels anticipated in FY 1993 and FY 1994.

As far back as the post-Vietnam era, the Defense portion of the IT budget was noticeably less than that of the civilian agencies. By 1983, DoD's share recovered and gradually improved, so that by 1985 it was at 51% of the IT budget, as illustrated in Exhibit III-10.

Exhibit III-10

Defense vs. Civilian Agency Progression:
Fiscal Years 1985-1995
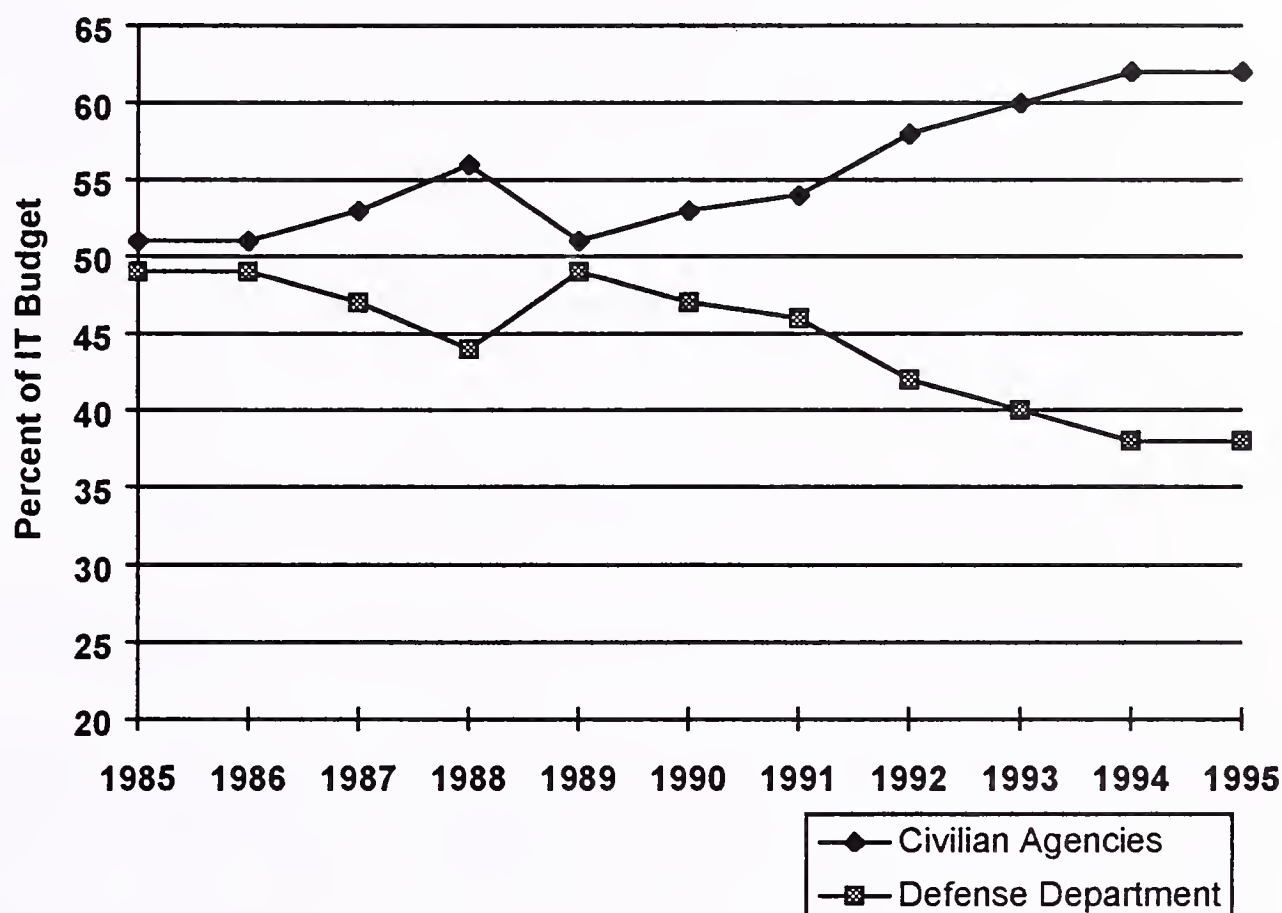
Source: OMB

For FYs 1987 and 1988, Congress reduced the Defense budget requests because the changes were poorly justified, and GAO submitted several reports indicating failure to take corrective actions on several programs with MAISRC-identified defects.

For FY 1989, delays in funding approval had several important programs in serious trouble, and Congress was convinced to allow the proportion to increase to 49%.

The following two years saw additional problems with WWMCCS modernization and disagreements on how CALS would be run. Then came CIM, and Congress moved most of the new systems money under CIM control through the 1992 Armed Services Appropriations Act. Through FY 1999, INPUT does not see the overall growth of Defense spending significantly improving; others see a real decline. INPUT forecasts the defense IT CAGR for this period to be slightly more than 3%. The civilian agencies are expected to experience a CAGR of 7% over the same period.

5. Embedded Computers

Embedded computer systems are not included in the Five-Year Plan nor in the annual IT budget. Therefore, an analysis of that market cannot be provided in this report:

- The earlier projected average annual growth through FY 1990 of the number of embedded computers in the DoD was 11% per year, prior to the Defense budget cuts of FY 1986 to FY 1988 and since FY 1990.

- The growth in the number of embedded computers supports increased professional services in operations and maintenance contracts. In addition, significant hardware maintenance functions are being employed.

- Outlays are dramatically declining, particularly for custom software development and services in the 1994-1999 time frame.

- If newer systems are not acquired, increased demands for updating software and key equipment modifications can be expected.

- GAO reported to Congress that FY 1992 expenditures for embedded and classified systems software was running $24-$32 billion, or nearly 8% of the entire military budget. Further, GAO expects total costs to increase to $50 billion-per-year within the next five years, unless tighter controls are installed. DoD has procedures in place to monitor these costs and has promised Congress that costs would be controlled.

6. Classified Systems

The nature of INPUT's service in analyzing information in the public domain does not permit significant identification and analysis of IT outlays for classified national defense and intelligence programs. Although some intelligence collecting agencies, such as CIA, NSA, DIA and DNA, acquire some hardware and systems software in the unclassified market, this is an exception rather than the rule.

B

Application and Technology Trends at Federal Agencies

1. Applications by Equipment Size

The federal sector's preferences of platform sizes for its applications are shown in Exhibit III-11. The two columns for each platform represent two different years: 1991 and 1994. The preferences for these platform sizes are rated high, moderate or low for each of the two years.

Some applications run on more than one platform size; others are limited to specific platforms. Office systems appear to be running on all platform sizes except supercomputers. Communictions is supported by all platform sizes. This exhibit was compiled from an analysis of 388 planned programs tracked by INPUT in 1994 and from responses to INPUT's 1991 survey on computer system applications by equipment size.

The role of microcomputers appears to be moving toward communication support and away from some applications. Workstations are also moving toward communications support and are increasingly used to support office systems. The role of the midrange appears to be decreasing across most application areas. The role of the mainframe continues to be strong in support of functional systems, but less so for message-based operations. The supercomputer remains strong for scientific environments and information analysis, and is still regarded as a necessary element in supporting communications.

All platform sizes appear to play a preferred role in the increasingly decentralized and networked environments in governmental user organizations. The federal user community is demanding powerful shared resources that can support a myriad of department and data center functions.

Federal agencies continue to identify plans for major system upgrades for administrative systems. There does not appear to be a strong preference for platform sizes, and the profile has not changed significantly since 1991. Part of this thrust reflects an increasing awareness by agency executives of the distributed uses of their information. A significant portion of system upgrades by the Defense agencies focuses on upgrading existing systems with the CALS initiative, rather than acquiring new systems.

Exhibit III-11

Federal Applications by Platform Size
Ranking of Applications by Platform

Application Type	Microcomputer		Workstation		Midrange		Mainframe		Supercomputer	
	1991	1994	1991	1994	1991	1994	1991	1994	1991	1994
Information Analysis	M	M	H	H	M	M	H	H	L	H
Human Resources	M	L	L	*	M	L	M	L	*	*
Electronic Mail	M	L	M	L	H	*	M	L	L	*
Electronic Publishing	H	M	M	H	L	L	M	M	*	*
Logistics & Distribution	M	M	L	L	L	L	H	L	*	*
Scientific/ Engineering	M	M	H	M	H	M	H	M	H	H
Communications	M	H	M	H	H	M	H	H	M	M
Office Systems	H	H	H	H	L	H	L	H	L	*
Administrative	M	M	L	L	H	M	H	M	*	L
Finance/ Accounting	M	L	L	L	H	M	H	H	*	*
Project Management	H	M	M	M	L	L	L	M	*	*
Total Programs	*	168	*	79	*	31	*	76	*	34

*Note: H - high preference; M - moderate preference; L - low preference; * - no reference*

Source: INPUT: 1991, 1994

MMMF

Some agencies plan new starts in the traditional areas of information analysis and administration. In general, these programs represent efforts to bring computer-based productivity improvements to the functional operations of the agency.

In 1991, 52% of respondent agencies stated they were in the process of downsizing applications to smaller computer systems. The most popular application to be downsized was accounting/finance. However, in 1994, the mainframe continues to be the platform of choice for these enterprise-wide applications. Exhibit III-12 lists applications identified by respondents in 1991 as candidates to be downsized. None of them appear to have moved appreciably from large to smaller platforms.

Exhibit III-12

Applications Being Downsized

- Accounting/finance
- Human resources
- Scientific/engineering
- Project tracking
- Information analysis
- Imaging and graphics

Source: INPUT

Some applications obviously cannot be downsized from a mainframe. Applications such as order processing, worldwide networking, high-volume number crunching, large relational database programs and heavy-duty account processing require a high level of computing power and speed that smaller computer systems cannot provide.

2. New Applications

The sheer volume of transactions and complexity of operations within the federal government sector require a constantly changing focus as managers with an existing set of applications seek to apply new developments to a wide range of information service problems. New applications are shown in Exhibit III-13.

Exhibit III-13

New Federal Applications

- EC/EDI—networks and services
- Continuous Acquisition and Life-cycle Support (CALS)
- Automated tax processing
- Standardized financial, payroll, and personnel systems
- AI applied to software development and simulation modeling

Source: INPUT

Electronic commerce (EC) is an evolving market and is key to the government's ability to provide improved services at lower cost. It accelerates the accurate interchange of procurement (EDI), logistics (CALS), financial (EFT), benefits (EBT), drawings (EDT), filing (EF) and other data, while improving the accuracy of these transactions. Because EC/EDI uses conventional data processing and telecommunications capabilities, the emphasis in the federal sector will be the development of vendor-furnished networks and software and services to facilitate EC/EDI implementation.

Currently, federal EC/EDI lags behind the explosive growth in the commercial sector. With the exception of a few major programs, most EC/EDI initiatives tend to be small pilot systems in which both government and vendors can assess costs. The awards for EDGAR at SEC and GSA's invoicing system, as well as Air Force systems procured out of Wright Patterson AFB, may change that.

In a memorandum dated October 28, 1993, President Clinton directed a federal task force to develop a plan of action for agencies to improve the efficiency of procurement through electronic commerce. A draft report, "Streamlining Procurement Through Electronic Commerce," was released for review by agencies and the public on April 29, 1994. The report identified an overly aggressive implementation agenda, but the intent to evolve to electronic commerce was unmistakable.

The CALS (Continuous Acquisition & Life-cycle Support) initiative of the Defense Department and NASA is an application to accomplish several goals:

- Integrate data life cycle elements in a source-to-use network

- Ensure compatibility of data interchange between logistic systems

- Automate the acquisition elements of:

  - Stock order processing

  - Shipping document generation and handling

  - Inventory analysis

  - Technical order (repair) systems

  - Technical manual and documentation generation on a demand basis

Each major DoD agency is proceeding with CALS-related initiatives. The role of CALS is moving beyond single workstation engineering environments into work groups. On a larger scale it is supporting electronic commerce, creating a true paperless environment in near real-time. However, some vendors express continuing concern over data security and the lack of comprehensive standards. The DoD CALS policy office, in conjunction with the National Institute of Standards and Technology, is developing the necessary standards. Considerably more must be done before data security issues are resolved.

- Recent budget-related issues and concerns for management direction in the Defense CALS office threaten the growth of this program.

  - Automated tax processing applications (EF) are developing on several fronts:

  - Internal automation at the IRS Regional Centers, providing enhanced capabilities for:

  - Rapid conversion of tax forms to electronic form

  - On-line retention of several years' returns

  - Automated analyses to select returns that need detailed auditing (rather than sampling methods)

- Automated preparation of refund payments

  - External automation of the tax return process, allowing:

  - Electronic filing (EF) of individual returns

  - Electronic filing (EF) of small business returns, which involve more forms

  - Electronic fund transfers (EFT) for tax payment and refunds

After a succession of GAO (General Accounting Office) audits identified increasing incompatibility and decreasing accuracy of financial, payroll and personnel systems, OMB has directed conversion or replacement of these systems by all agencies.

- Financial systems were supposed to meet a single set of standards and produce compatible products by FY 1992. (The Joint Financial Management Improvement Program is playing a major role.) Slippage in 1990 and 1991 caused by funding shortages made the target date unreachable.

- Payroll systems must meet new accuracy and timeliness standards and be compatible within military and civilian agencies by the mid-1990s.

- Office of Management and Budget now requires agencies to report all anticipated IT spending in support of financial management as a separate report (43A) in the A11 document.

3. Software Sources

a. *Application Development and Maintenance Sources*

Earlier research performed by INPUT showed that the federal dependence on contractor sources for applications development was heavy. (See Exhibit III-14.) An analysis of 148 FY 1995 contract opportunities for applications development showed the same level of contractor dependency as in 1992. While there is little doubt that agencies are more interested in commercial solutions, it may be up to vendors to demonstrate in their proposals that commercial off-the-shelf (COTS) products offer the required benefits of higher performance at lower cost.

Exhibit III-14

Federal Government Sector Sources of Application Development

	FY 1992	FY 1995
External Custom Development	53%	60%
Internal Application Development	28	25
External (Off-the-Shelf) Packaged Software	19	15

Source: INPUT

The federal government continues to depend heavily on customized applications. Although COTS is growing in popularity, primarily to reduce application development and maintenance costs, a significant outlay continues for maintenance of existing and new applications. Because the government spends more than 50% of its application software costs for maintenance alone, cost savings can be identified in this market segment.

Demands on the internal (in-house) IS staff to maintain older but critical custom software prevents them from assuming a greater role in developing new systems. GAO and NIST surveys have reported that more than 70% of the software life cycle costs are expended on maintenance and undermanaged enhancements.

According to a recent INPUT analysis of federal programs that identify support for application software, the federal government appears to prefer obtaining maintenance for application software from the developer rather than from a different vendor. As exhibit III-15 shows, most application development contracts (71%) require out-year maintenance from the same vendor. In only a small percentage of programs analyzed did the agency identify requirements for maintenance from vendors other than the developer, although the developer may compete for these services in an open procurement.

Exhibit III-15

Federal Agency Sources of Application Software Maintenance

Maintenance Only
10%

Development Only
19%

Development and
Maintenance
71%
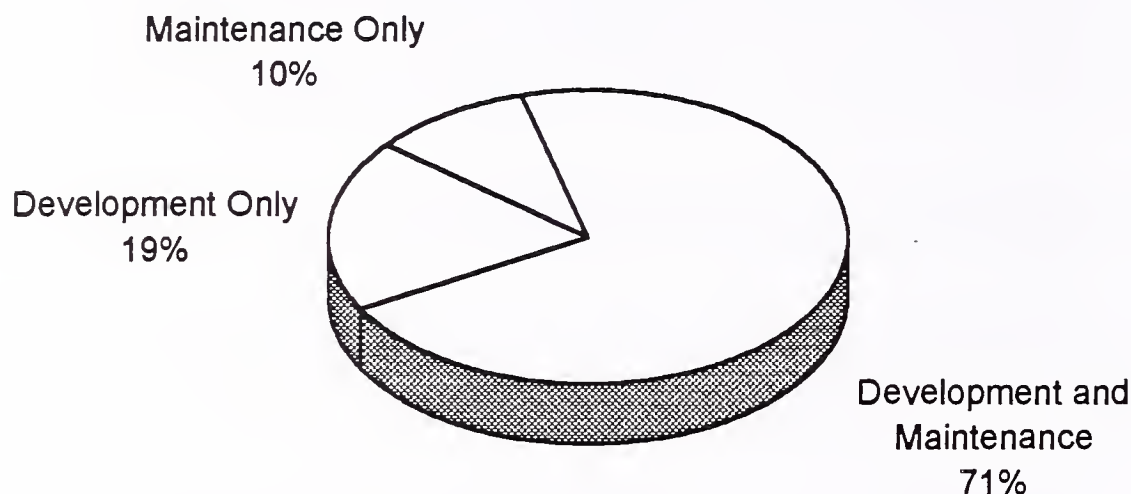
Number of programs reviewed = 42

Externally developed, off-the-shelf software package use is driven by the rapid growth of user personal computer use. Packaged software is available for the government's large inventory of minicomputers. The share of application development for this platform segment is expected to continue to grow only as these platforms are integrated into open, client/server architecture.

Continuing a trend begun several years ago, the predominant source of major new application development will be external to the government. The majority of development will come from professional services and software development firms.

A smaller but very significant part of development will come from universities and not-for-profit organizations, especially in AI, supercomputers and automation applications. Use of Ada, as a defense standard application development language, has also grown and is found in more applications of civilian agency programs.

b. *Impact of Technology*

In an INPUT survey conducted in 1993, agency and industry representatives were asked to identify technological factors that would alter the federal government's spending for information services and applications development at agencies. The ranking of the five factors

named most frequently (Exhibit III-16) indicates network expansion to be the most important single technology issue. With increasing interest in client/server architecture, operating systems will also affect government programs.

Exhibit III-16

Technological Issues Affecting Federal Government Programs

1.   Expanded networks/LANS
2.   Advancements in operating systems
3.   Increased microcomputer capabilities
4.   Improved imaging/graphics
5.   Developments in artificial intelligence

Source: INPUT, 1994

The federal government continues to expand its computer networks. Sharing of data and information resources is important to many agencies faced with reduced operating budgets and demands for improved service. Plans to recompete the FTS2000 contract are now being developed, and merging of long-distance network requirements in civilian and defense programs is strategic to the new contract. The growth of client/server as an operating architecture adds emphasis to improved networks and network operations.

Increased computing power of microcomputers is improving their role as network servers and processing platforms. New development tools and object databases improve the processing capability for text and image data.

New technologies for graphics and improved imaging offer enhanced capabilities to agencies to support their information collection and analysis requirements. Advancements in these technologies will improve productivity at government agencies.

Artificial intelligence (or more specifically, expert systems) has already been employed in limited applications. New approaches that use AI include software development, process monitoring and simulation. AI is also gaining in use in tactical situations, automated planning and support applications throughout DoD. Presently, decision-support systems represent the most common federal applications for AI. Some examples include photographic analysis for NASA, tax auditing for IRS and eligibility verification for Social Security.

Traditionally, federal agencies have used supercomputers for highly scientific and technical applications. NASA and the Department of Energy own the bulk of these systems, but major DoD agencies also have supercomputers installed in classified and unclassified establishments. Passage of the High-Performance Computing and Communications Act is a catalyst for joint agency-academic-industry participation. Projects are aimed at employing these capabilities in a number of identified critical national issues. High performance processing is a fundamental requirement of the National Information Infrastructure. High-speed drivers and data processors will be needed to handle the volume and processing speed requirements of the NII.

C

Major Issues and Driving Forces

1. Major Issues

Federal agencies face several major issues as they move forward to modernize and expand their information systems. These issues are shown in Exhibit III-17.

Exhibit III-17

Federal Government Sector Agency Issues

- Cost containment
- Acquisition reforms
- Budget deficit-control measures
- Regulations imposed on agencies
- Internal agreement on requirements
- Availability of skilled staff

Source: INPUT

Cost containment is a key issue to government agencies responding to the combined pressures of Congress and the continuing slowdown in Defense R&D expenditures. Many small vendors with federal contracts expect reductions in profits. To keep costs within the government's control, competitors are now required or encouraged to submit fixed-price bids on most systems integration and IS upgrade projects.

The Congress is poised to pass several new procurement reform initiatives. Key elements of this reform grow out of earlier initiatives and

continue the concern of government and industry that the procurement process is in need of overhaul. The important themes of these new reforms will also be carried over to the Office of Management and Budget as it revises the Federal Acquisition Regulations. The reforms are intended to streamline the purchasing process while improving the amount of competition. The improvement initiatives include:

• Open communication between government buyers and potential bidders

• Improved measures to evaluate proposals

• Increased opportunity for small businesses

• Simplified purchasing procedures

With recent changes in management at GSA, there will likely be further changes in IRM policies and procedures. New programs have already been initiated to improve relationships between industry and government. A government task force presented its recommendation to the General Services Administration (June 30, 1994) on steps to improve communication with vendors. The Office of Management and Budget has developed a pilot program to examine the feasibility of measuring past performance of contractors and permitting it as a partial basis for award of a pending contract.

Budget deficit control, whether provided under the terms of the Budget Enforcement Act or direct congressional action, is expected to affect the rate and/or extent of IS modernization at the agencies. Continuing economic and political sensitivity to the rising budget deficit could negatively impact a number of acquisitions in the less-than-critical defense and civilian technology sectors.

Furthermore, the federal government does not currently have the requisite level of in-house staff to support the quality or quantity of ADP-supported services mandated by Congress and expected by the American people. The early retirement programs are continuing in some agencies, and many of the personnel taking advantage of the opportunity possess the necessary skills and knowledge, now lost, to develop and implement critical programs and automated systems.

2. Driving Forces

The driving forces behind the federal market for information systems are summarized in Exhibit III-18. The federal government faces a number of important issues as it adjusts to demands of the National Performance Review—namely to reduce costs and improve operations. Some of these issues involve improved processes; many involve a set of driving forces that continue from one year to another with little resolution. They involve an increasing workload, reduced operating resources, growing criticism from the public and the lack of a clear sustained focus on what is important and what should not be done. The forces not only drive the manner in which work gets done, but provide a basis for criticism.

Exhibit III-18

Federal Government Sector Driving Forces

- Rising service demands
- Equipment obsolescence
- High maintenance costs
- User-computing needs
- Connectivity requirements
- Improved security/privacy demands
- New presidential initiatives

Source: INPUT

Though not as pronounced as in the early 1980s, the ADP equipment (ADPE) inventory still includes a significant number of third-generation machines that lack the flexibility, speed, reliability and capacity of currently available technologies.

The combination of older ADP equipment and a very large inventory of custom software has driven maintenance costs up and extended repair times. Excessive software life-cycle costs for maintenance and enhancement tie down an inordinate percentage of in-house IS staff and waste a large part of available IT dollars that otherwise could be spent on improvements.

The need to share data under the constraints of the amended Paperwork Reduction Act and to interact to meet Administration requirements (including the Reform '88, successor initiatives such as CALS and the Chief Financial Officer Act) will require substantially improved

connectivity. New federal standards exist for uniform protocols, open system architecture and standard systems interconnections. However, some resistance continues, especially to GOSIP, as some agencies seek to retain their TCP/IP systems.

Administrative and congressional demands for improved security measures raise national security and individual privacy protection issues. Intellectual property rights is also an agenda item as software copyright continues a troubled path. The Administration's unsuccessful attempt to implement new standard encryption technology suggests that problems will not be easily solved. Congress is also considering new computer theft and proprietary data protection measures that will affect commercial and individual privacy, as well as national security. However, the consensus of agency respondents is that something drastic will need to happen before IS security is properly funded.

In keeping with the practice of the last few presidential fiscal-year submissions, the FY 1995 budget of the United States government indicates areas of high risk, selected for their size, complexity and sensitivity. These ongoing and new systems are considered most likely to be funded, even if some others need to be delayed, or, if necessary, terminated.

D

Conclusions

Industry and agencies recognize that a number of factors are slowing the explosive growth in information technology that characterized the 1980s. At the same time, there are factors that can influence the market for continued activity in the middle of the decade of the 1990s, as listed in Exhibit III-19.

Exhibit III-19

Conclusions

- Mission-support emphasis
- Civilian market prospects
- Increased competition
- New technology initiatives
- Shift in agency priorities

Source: INPUT

1. Mission-Support Emphasis

The continuing urgency in re-establishing fiscal stability has caused the federal government to review how it is accomplishing its primary mission. Once this can be determined, unneeded or less important programs can be abolished. The savings in program costs would help reduce the budget deficit.

IT will still be given a fairly good share of the federal budget to help agencies meet the growing demands for more flexible and responsive government services.

2. Civilian Agency Market Prospects

The downward shift in defense IT outlays, while the overall IT market is still experiencing growth, emphasizes the significant jump in civilian agency initiatives. Some of these, like the IRS Tax System Modernization, the SSA's System Modernization Program, the multiphase Veteran's Benefits Modernization Program and the FAA's Advanced Automation System (for Air Traffic Control), are well underway, but by no means at an end; more contracts will be awarded during this decade. Some major modernization programs, such as the Agriculture's INFO SHARE, will have difficulty. Other agencies have barely embarked on their investments that could easily require billions of dollars in spending over the next ten years.

At the same time, several initiatives described in the CIM documentation still represent opportunities in the near term as DISA embarks on a new round of downsizing, centralizing and standardizing. In the long run, the public may be better served, but industry's role is not clear nor confirmed.

3. Increased Competition

The competition in the federal market will continue to evolve as the growth rates and number of significant opportunities decline.

Aerospace firms that first looked to IT in defense are now examining the civilian agencies for replacement markets.

The large hardware and professional services firms with a strong market position are digging in and slimming down to capture new and recompetitive business.

Smaller firms and niche market firms are either forming alliances or moving into the equally depressed commercial market. Competition in this market has become more sophisticated and fierce.

4. New Technology Initiatives

The federal government has not entirely walked away from support of new IT offerings. Instead of underwriting development, agencies are now expecting industry to offer demonstrated improvements, COTS, that will provide enhancements to quality, flexibility and productivity of processing capabilities that support agency missions.

Improvements in artificial intelligence, object database systems, imaging systems, reusable and modular software, high-performance computing and communications and software productivity tools (like CASE) are being sought that can be accommodated as technology insertions to existing facilities. Agencies, particularly DoD, want software that is hardware independent and permits the rapid interchange of data.

5. Shift in Agency Priorities

Reinventing government is emerging as many different initiatives. The National Performance Review has identified several major areas where federal agencies can improve their performance by reviewing their missions. Only those programs necessary in attaining the missions will be retained. The mission's emphasis will result in new priorities and redirected spending.

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IV
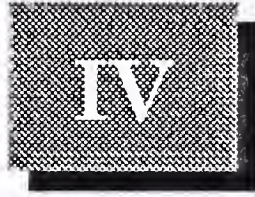
Market Forecast

INPUT dissects the federal IT budget elements and recombines them into convenient industry terms. The first reassembling provides an overall perspective of that portion of the budget spent on contracts for goods and services. In the remainder of this section, INPUT provides forecasts and discusses trends of the individual product/service markets that are defined in Appendix B.

A

Overall Federal IT Market

The overall market planned for federal acquisition of IT in FY 1995 is $19.4 billion, and will reach $24.9 billion in FY 1999. This represents a compound annual growth rate (CAGR) of 5%, as shown in Exhibit IV-1.

Several economic and political factors discussed earlier may reduce this IT growth rate moderately to significantly. At present, the impetus behind the National Performance Review is strong, and no significant downward trends in the IT market are likely. The Administration continues to believe that IT holds the key to improved service. Over the next few years, benefits should be visible in the effort to reduce operating cost. Without demonstration of cost savings, the Congress may withhold budgetary support to many large IT-based programs. Such scaling back is already evident in defense spending.

The largest component of the addressable IT market is commercial services. The FY 1993 spending level estimated at $6.5 billion was actually $6.8 billion. The requests for FY 1995 are $550 million more than in FY 1994, with gradual increases in expenditures through FY 1999 expected. This market segment is expected to grow at a 6% CAGR to $10.0 billion in FY 1999. Commercial services include professional services, processing services, systems operations and maintenance. Current agency long-range plans indicate a trend of continuing need for industry operational support, despite program cancellations and prospects of consolidating computing resources.

Anticipated spending for computer systems is only slightly higher for FY 1994 than agencies reported for FY 1993. For some time, computer systems has been a gradually declining market, down from a CAGR of 5% projected in FY 1989. Prospects for spending growth are slightly improved since last year. Levels should rise in FY 1995 and continue through FY 1999 at the same rate (3%) forecast last year. Computer systems was the largest IT component initially estimated for FY 1993. Computer systems include systems integration, turnkey systems and major equipment additions and replacements.

The telecommunications market will continue steady growth at a CAGR of 10% through FY 1999. Actual spending in FY 1993 was higher than estimated last year, as agencies continue aggressively to complete the telecom infrastructure. The communications segment includes circuit/time charges under FTS2000, network services, and customer-premise equipment. INPUT expects these services to increase from $4.5 billion in FY 1994 to $7.1 billion in FY 1999. The forecast includes procurement of a number of dedicated data networks, more LANs and increasing digitization, but at decreasing tariffs.

The telecommunications market potential may be a great deal larger than anticipated from current federal agency use. In previous years, Congress has expressed its concern that the value of FTS2000 alone is at least one order of magnitude greater than was being reported by the agencies. It is not clear whether the agencies use operating funds instead of IT dollars to pay for telephone services, or whether someone in Congress is exaggerating for political effect. This issue may be one of inaccurate reporting. A real demand exists beyond currently reported needs; it goes to unanticipated network requirements that will result from architectural approaches to support enterprise-wide missions and information super-highway services. The telecom segment in Exhibit IV-1 reflects only reported requirements.

Exhibit IV-1

IT Markets, FY 1994-1999
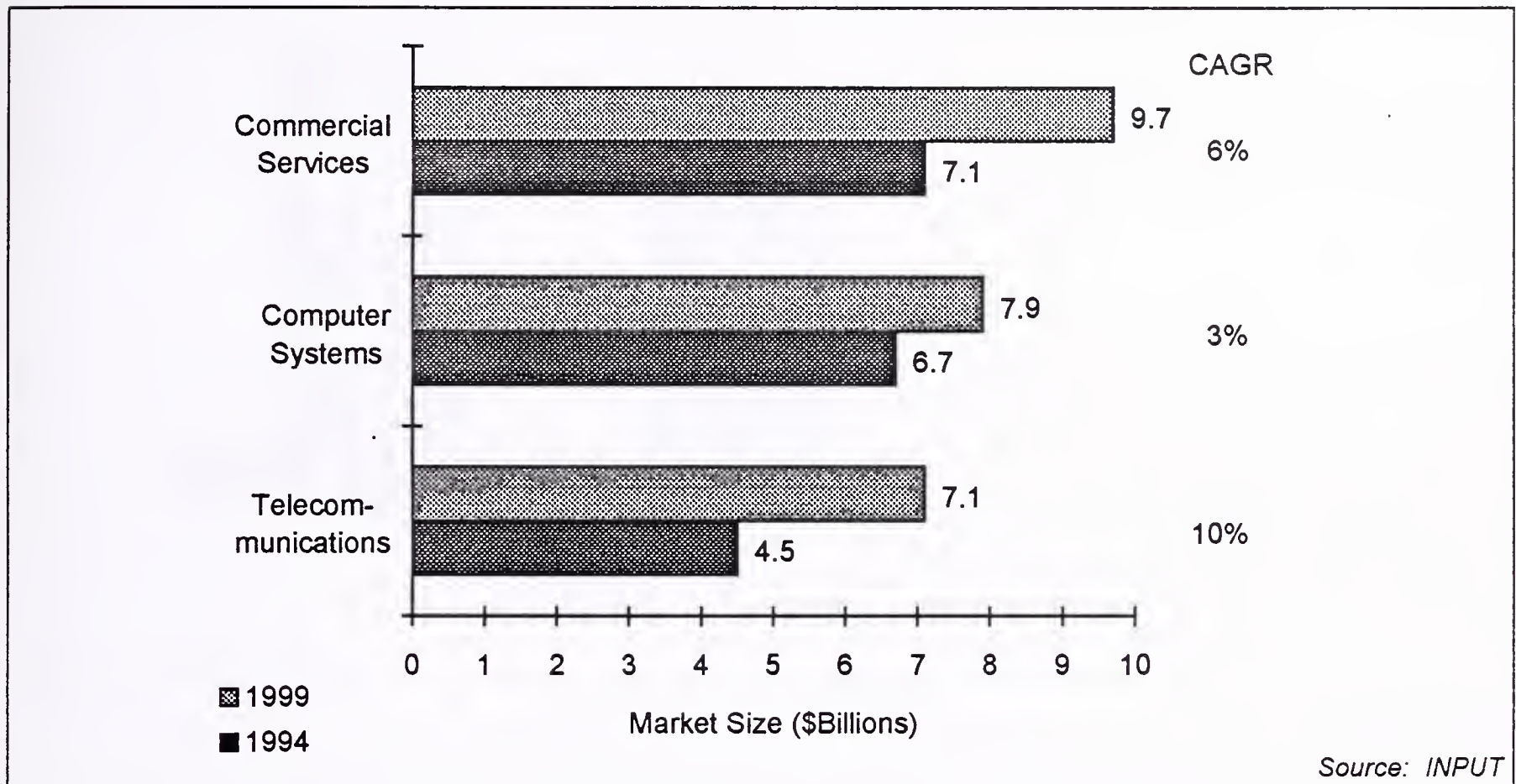
The expenditures shown in Exhibit IV-1 are based on those requested by the agencies in their A-11 Section 43 reports.

B

Professional Services

Professional services include consulting, design, education and training as well as software development. This segment does not include the professional services associated with systems integration, systems operations and telecommunications.

The federal professional services market is growing at a higher CAGR than forecast a year ago. Actual reported spending levels in FY 1993 were higher than estimated by the government, and even higher levels are forecast through FY 1999. The dependency on contractor sources for services has already begun to materialize. This market is projected to increase to $4.0 billion by FY 1999, at a CAGR of 9%. This growth is higher than the 6% CAGR of FY 1992, and exceeds the CAGRs of 7% in FYs 1991 and 1990, and 8% of FY 1989, although it is significantly below the 13% reported in FY 1988.

Professional Services Market

Source: INPUT
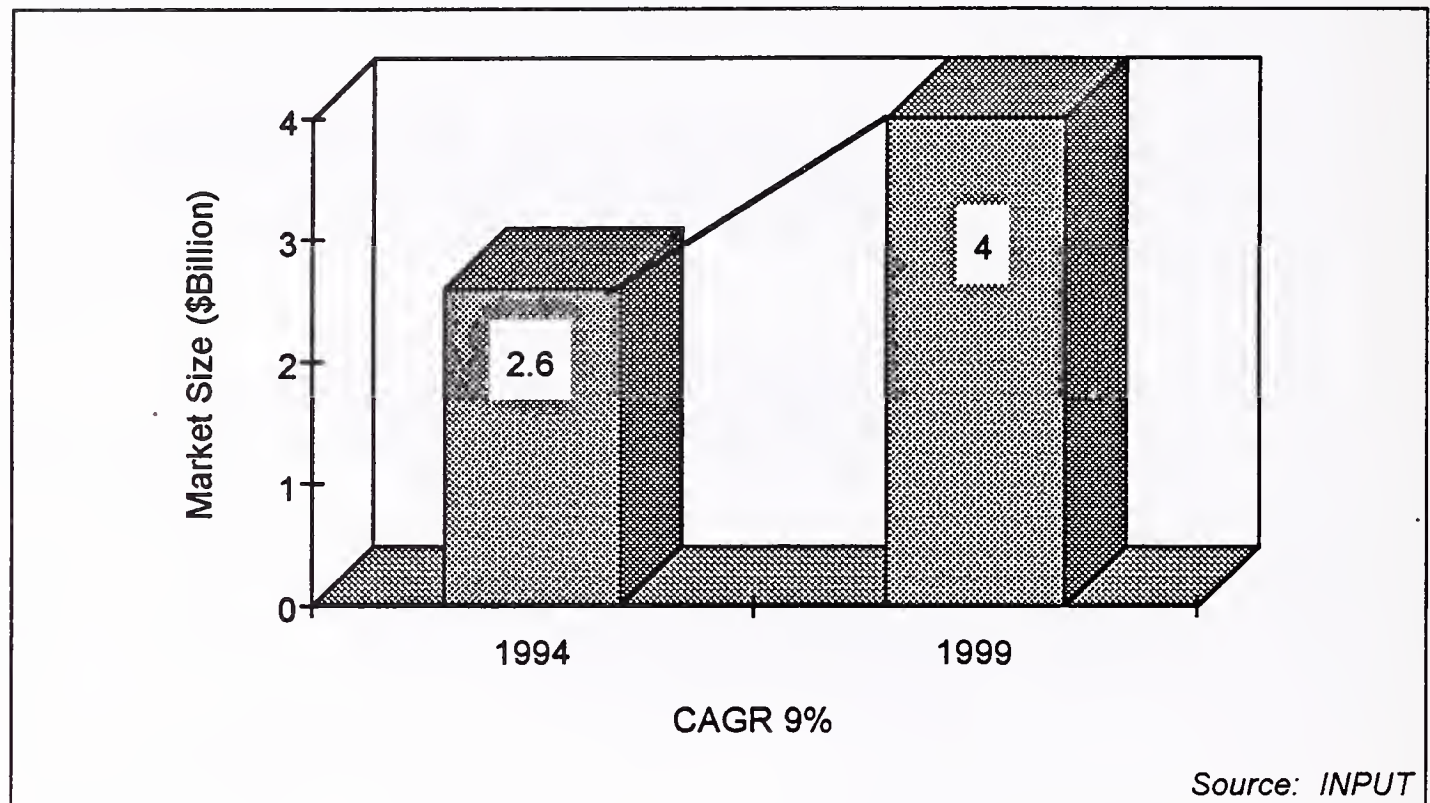
The projected need for contractor assistance makes the federal government the largest user group for professional services in the U.S. If all of the segments excluded from the basic professional services mode in systems integration and systems operations (outsourcing) were added, the entire professional services market represents a growth from $5.5 billion in FY 1994 to $7.8 billion in FY 1999 at a CAGR of 7%.

The relationship between the distributed modes of the professional services market is illustrated in Exhibit IV-3. The basic services submarket, composed of software development, design and consulting, and education/training, represents the largest segment of the professional services market. Its growth is all the more impressive given that it starts with the largest numbers. Last year's CAGR forecast of 5% has now been calculated at 9%. The systems integration component continues to grow at expected levels, and systems operations show only moderate growth, and that growth is limited to operations of government-owned facilities.

Exhibit IV-3

Professional Services Market—All Segments
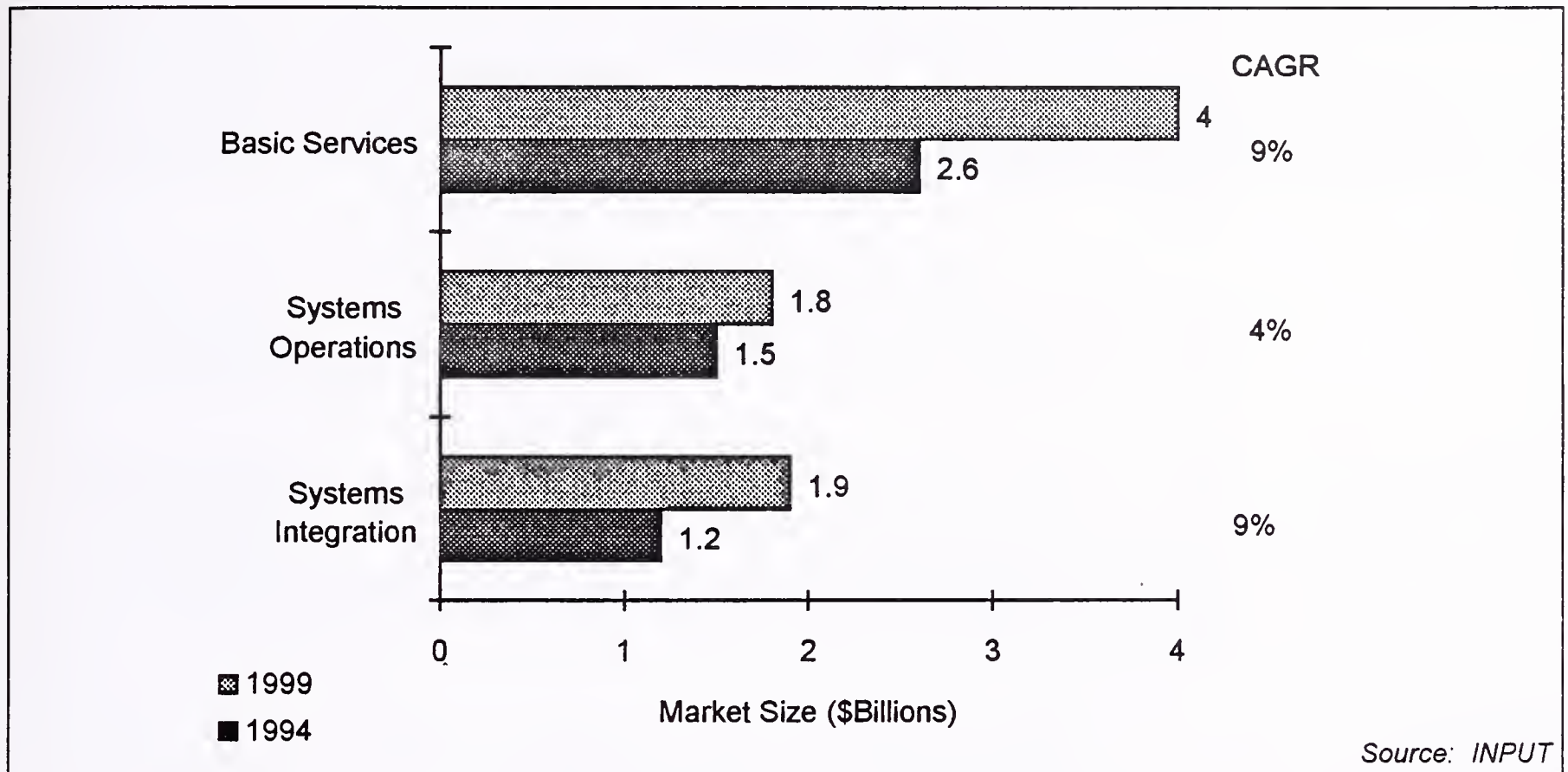
1. **Programming and Analysis/Software Development**

Programming and analysis services, also called software development, is forecast to grow from $1.7 billion in FY 1994 to $2.6 billion in FY 1999 at a CAGR of 9%, as shown in Exhibit IV-4. This represents an overall increase from last year's forecast, and represents an aggressive dependency on outside resources for software development. This increased dependency will continue through the outyears.

The software development submarket includes:

Hardware and/or software system design

- Custom software development

- Modification of commercial software products

- Software testing of custom and commercial packages

- Software conversion

- Maintenance of custom applications software

- Independent verification and validation of software packages prepared by other vendors

The declining availability of programming skills in the federal government is the most significant factor behind the projected growth. Government staffing limits and the backlog of software maintenance tasks at most government data centers contribute to the demand for vendor assistance in this service mode.

A number of programs planned for near-term procurement should sustain the projected growth. Examples include Information Systems Support for the Army, WWMCCS Maintenance for the Air Force, and Licensing Support Services for Energy.

Interoperability pressure (more specifically, the ability to exchange data) is the driving force behind the use of contractors in software development. Vendors can more readily provide the expertise needed to knit together different platforms and their applications software to accelerate data interchange.

Exhibit IV-4

Professional Services Submarkets

	Market Size ($Billions)	CAGR
Software Development	2.6 (1999) / 1.7 (1994)	9%
Design & Consulting	0.8 (1999) / 0.5 (1994)	9%
Education & Training	0.6 (1999) / 0.4 (1994)	7%

☒ 1999
■ 1994

Source: INPUT
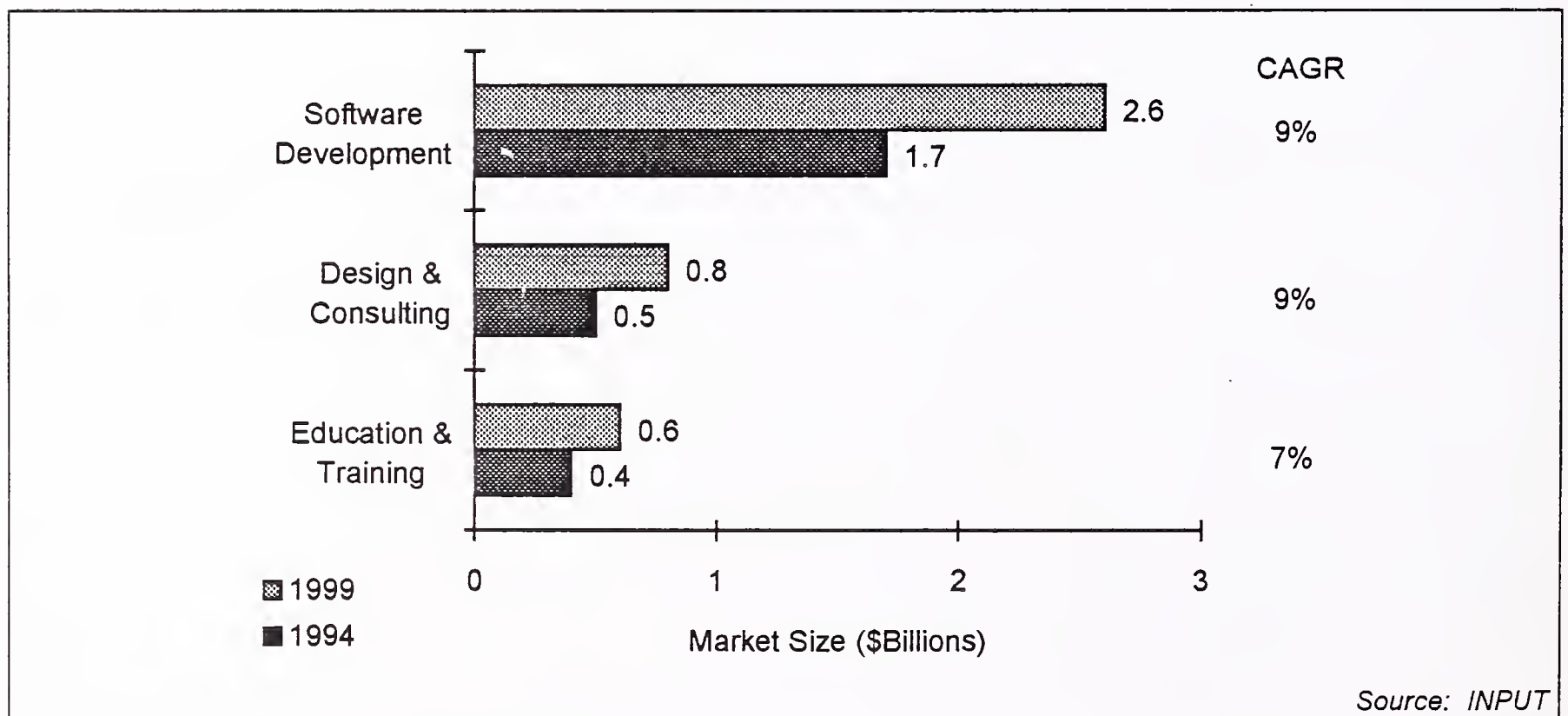
2. Consulting and Design Services

IT consulting services in the federal market will grow at a CAGR of 9%, from about $510 million in FY 1994 to $790 million in FY 1999. The growth forecast two years ago was depressed by the slowdown in CIM/DISA initiatives, but renewal of systems engineering and development activity, plus the continuing shortfall of systems experts in the federal workforce, contributes to growth in this segment.

The types of services contracted include:

- Feasibility studies

- ADP requirements analyses

- Systems audits

- System engineering and technical direction (SETD)

- System engineering and technical assistance (SETA)

- Software engineering and technical assistance

The primary demand factor is agency need for assistance in producing the technical justification for planned improvements in information technology resources during this period. Agencies are understaffed in the technical planning and evaluation areas.

Congressional pressure on agencies to minimize or eliminate entirely the use of outsiders (and previous government employees) in functions perceived as governmental management could have a dampening effect on potential growth in this market.

3. Education and Training

Education and training services relate to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming and software maintenance.

The government normally contracts for the following separately from systems integration programs:

- Training programs

- Books and manuals

• Seminars

• Automated training systems

In previous years, this product/service market eroded under budget pressures and inclusion of the services in systems integration programs.

The demand existed for training and education, but stretched IT budgets compromised the training component. Agency officials had to seek funding for training elsewhere, usually from within operating budgets. This submarket is recovering in response to acknowledged demands from the user community for educational services. The users demand grew from implementation of new software, tools and sophisticated hardware.

Computer training on use of desktop technology and LAN administration was provided in-house by a number of larger agencies under their regular training budgets. Courses for user computing, local-area networks, distributed processing and new software tools are better generated by industry.

The forecast in previous years has been for "no growth", maintaining current levels of annual spending. However, with growing client/server capabilities and network operations, the training demand is pushing this submarket upward. From an artificially depressed level of $400 million in FY 1994, the market is expected to grow to $600 million at a CAGR of 7% through FY 1999.

C

Processing Services

Processing services includes transaction processing with some batch-mode workloads. It previously included systems operations on contractor-owned equipment (COCO), now part of a separate delivery (mode systems) operations discussed later.

For the last half of the decade of the 1980s, this product/service market continued to decline as installation of new distributed processing systems and PCs depressed the need for outside processing support. Exhibit IV-5 shows the "no growth" state of this market.

Exhibit IV-5

Processing Services Market

Market Size ($Billions)

- ▧ 1999
- ■ 1994

Source: INPUT
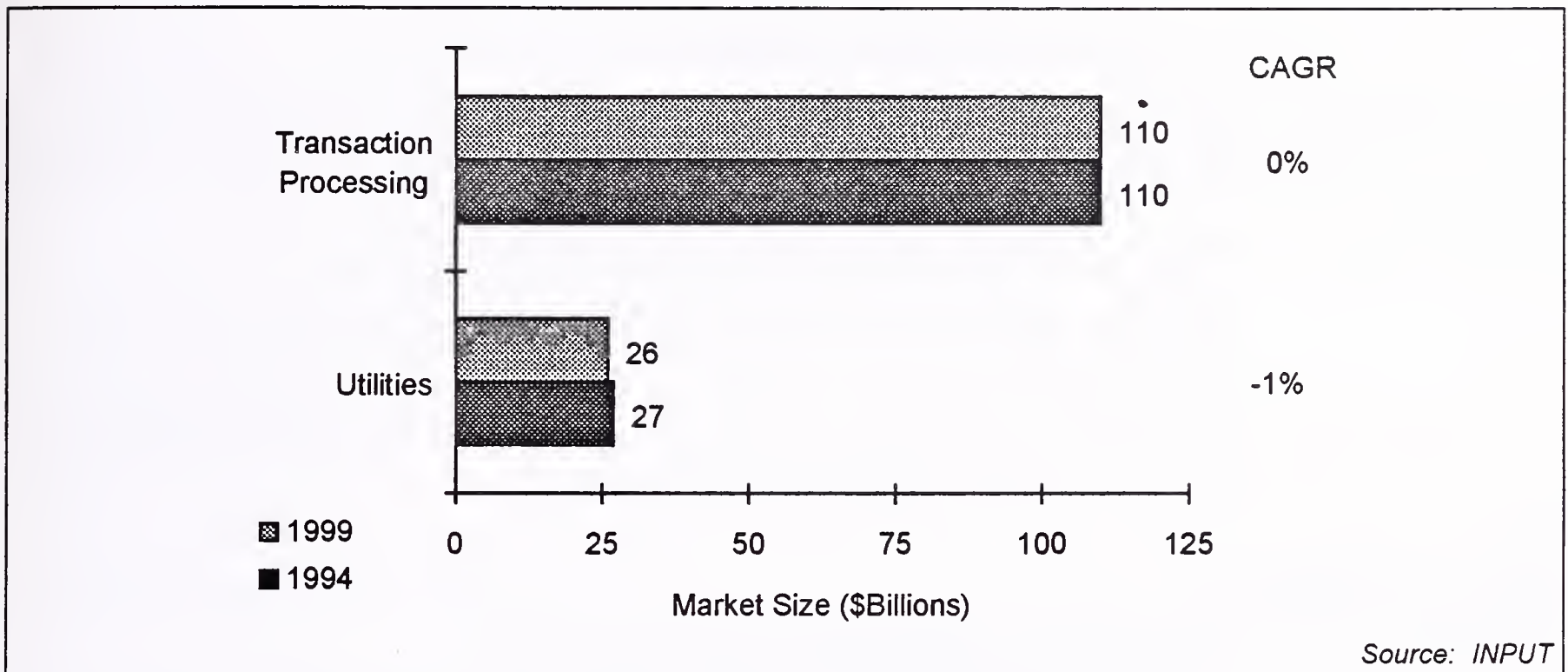
1. Transaction Processing

Transaction processing, previously called remote computing services (RCS) and identified as ADPE time in the federal IT budget, has continued to decline since FY 1984, when growth was projected at 13%. Transaction processing is lower now than in the 1980s, but remains active for agencies still waiting for new facilities. Many of the larger federal data centers continue to add capacity and take on processing for other agencies to partially justify their own operating expense.

Beginning with the IT budget for FY 1989, the funding for Medicaid and Medicare insurance provided by Health Care Finance Administration (HHS), was deleted and moved into a states-aid category. In addition, the demand for services under GSA's Teleprocessing Services Program fell from $80 million in 1983 to $26 million in 1989, especially for support under MASC (Multiple Award Schedule Contracts). GSA advised all agencies in May 1990 that TSP was to be terminated at the end of FY 1990 (September 1990).

Transaction processing requirements must now be procured through RFPs, which may require processing requests to GSA for a DPA (Delegation of Procurement Authority). The communications segment must be acquired through the FTS2000 program, in a separate action by the agency.

Network services were separated from this product/service market in 1989 and are now included with the communications market forecast.

2. Utility and Batch Processing

Small amounts of utility and batch processing continue to appear in agency IT expenditures, but have declined to about $29 million per year. The bulk of this work appears in the Education Department and DoD budgets.

Continued budget-deficit reduction actions that delay implementation of upgraded systems could lead to a stronger market than currently predicted, to meet agency productivity goals and mission objectives. This could support vendor-supplied disaster recovery systems, if the agencies cannot install equipment to satisfy their needs. Utilities are also a form of ADP insurance for agencies with marginal processing capacity.

D
Software Products

As shown in Exhibit IV-6, the federal software products market is expected to increase from $1.1 billion in FY 1994 to $1.4 billion in FY 1999 at a CAGR of 4%. This is less than the 17% forecast in 1989 and 13% in 1990, partly because of competitive pricing and the impact of requirements contracts that specify the application packages to be furnished in quantity.

The software products market is being driven by the availability of commercial, shrink-wrapped applications. This, in itself, results in lower levels of spending for the same level of software support. An additional downward market driver is software licensing. This contract condition makes it possible for an agency to purchase single copies of products and copy them for multiple installations.

1. Applications Software

INPUT divides the software products product/service market into applications and systems. Applications software includes accounting, human resources, procurement and mission-unique support software.

This latter category concerns software that directly supports the mission of the agency. The following examples are typical:

- IRS uses software to assess the audit of a taxpayer's return.

- DLA uses software to track the movement of supplies at depots and warehouses.

- NASA uses software to evaluate the usability of pictures transmitted from space.

Exhibit IV-6

Software Products Market

Source: INPUT
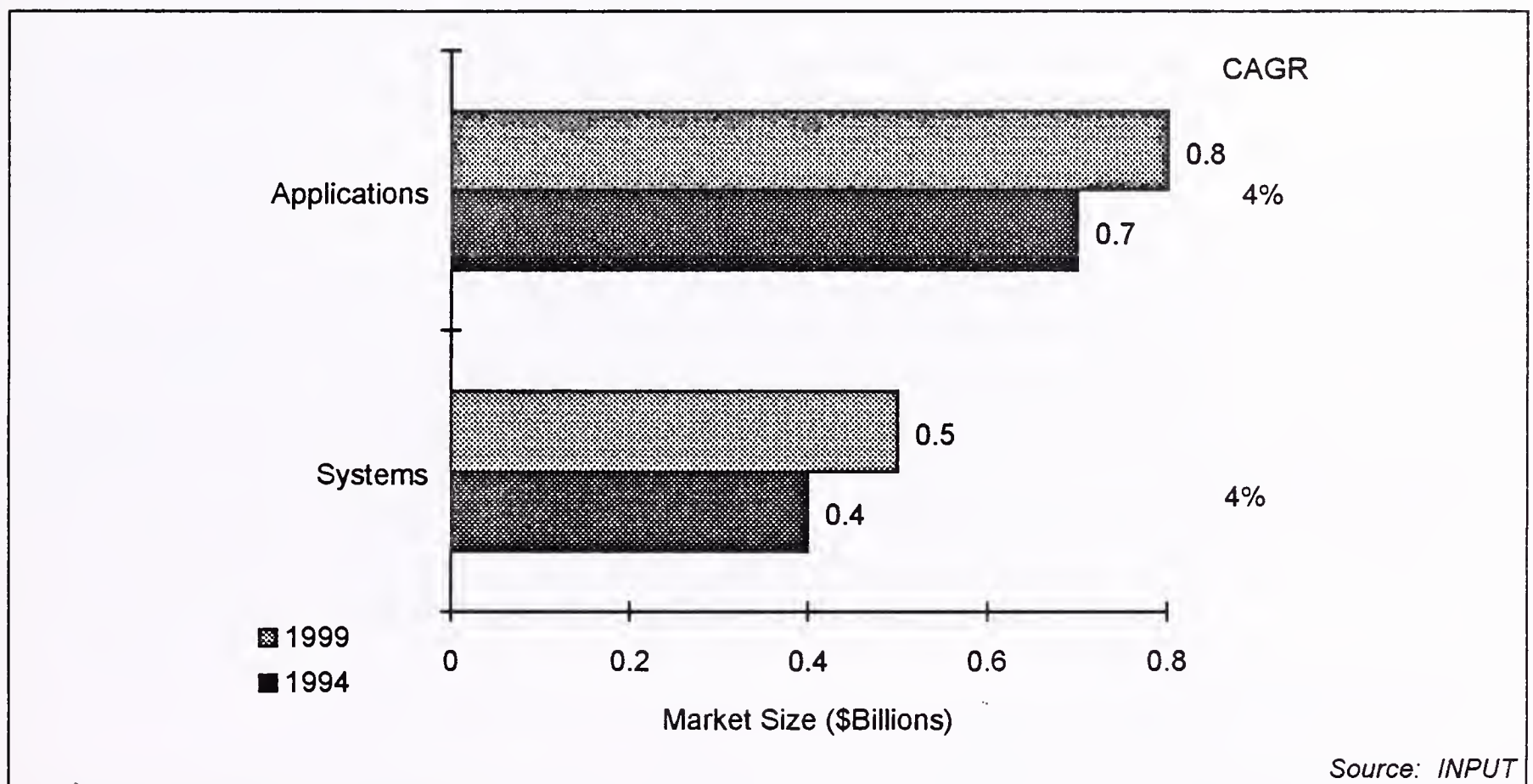
Applications software outlays are driven by the large PC inventory and updates of existing mainframe suites. Price competition is considered the key factor in the lowered 4% CAGR of the last couple of years, down from 15% in 1990. The market is expected to increase from about $700 million in FY 1994 to $840 million by FY 1999.

As a result of budget constraints and heavy pressure from OMB, many agencies are beginning to view their software requirements in other than unique terms. When they have a fairly standard application, particularly an administrative application, they acquire standard packages more often than

before. This leads vendors to increase development of packages that are suitable for government use and government-oriented marketing efforts.

Increasing emphasis is being placed by GSA, GAO, OMB and NIST on the use of standardized applications. Commercial-grade off-the-shelf packages that have been modified to meet government needs are being acquired. Other commercial software products are purchased at volume discounts as part of "application suites," or are purchased centrally with rights to copy.

Beta testing of packages by agencies leads to bid solicitations for specific types of platforms under the QPL (Qualified Products List) procurement ground rules. This is particularly pertinent in the requirements-type (indefinite quantity, indefinite schedule) contracts.

One area receiving much attention is standard financial packages. The Joint Financial Management Improvement Program (JFMIP) issued a Core Financial System Requirements document for agency use. In connection with this JFMIP requirement, GSA issued contracts to several additional vendors for core-compliant software.

2. Systems Software

Systems software is usually sold with the hardware. Purchases after installation include DBMS, compiler controls, accounting and charge-back software, communications and software development tools. Recent price reductions and increased competition in this market are driving down growth rates. Unbundling of systems software from hardware platforms will make some of these products more visible, since they will be priced separately. The recent Department of Justice ruling against Microsoft Corp. emphasizes a need to unbundle operating system software for desktop processors and LANs. As a result, the market will show artificial signs of growth through FY 1999.

3. Software Modularity and Reuse

Two areas of vendor concern are the current and CIM-planned availability of government software for use by other agencies at minimal cost and constraints on commercialization of federal software under existing copyright laws.

The current federal centers NTIS, National Energy Software Center and NASA's COSMIC (Computer Software Management and Information Center) catalog tapes, disks and documentation of federally-generated and federally-funded software for use by other agencies. Commercially available software is listed for information, but requires agreement or lease from the vendor-owner.

Defense Information Systems Agency (DISA), under the CIM initiative, proposes to specify the preparation of defense software in modules and store them in a DISA Software Reuse Center, with electronic access for potential users. Industry and some agency software experts note the attendant problems of increased cost of modularity and determination of ultimate responsibility in the event the software fails to meet specifications.

Current law prohibits the copyright of federally developed software and constrains efforts to transfer the software to industry, according to senior administrators, patent attorneys and technology transfer officials. The GAO submitted recommendations to Congress for modifying the current statutes.

The strong feeling among IT officials and GAO is that newer capabilities of software technology have been substantially oversold. The continual release of newer, better, faster, more flexible, more user- friendly software puts at risk the substantial current inventory and the improvement of data interchange between in-place systems.

E

Turnkey Systems

Turnkey systems are value-added packaged hardware and software solutions to specific applications requirements that satisfy, with few modifications, commercial, industrial and government needs. This product/service market's federal growth rate results from sharp Defense budget cuts in custom-system appropriations. Exhibit VI-7 shows it will increase from $1.4 billion in FY 1994 to $2.0 billion in FY 1999. The growth rate had been holding constant at 5% for the past several years. Its increase for the next five-year period can be attributed to an increase in the number of commercial systems being brought into the government.

The full value of this market segment is not represented in these numbers. The price of some of the systems permits many of the acquisitions to fall beneath thresholds not requiring notification in the OMB A-11, and agencies are looking for commercially available systems that are readily adaptable to in-house applications.

Exhibit IV-7

Turnkey Systems Market

Source: INPUT
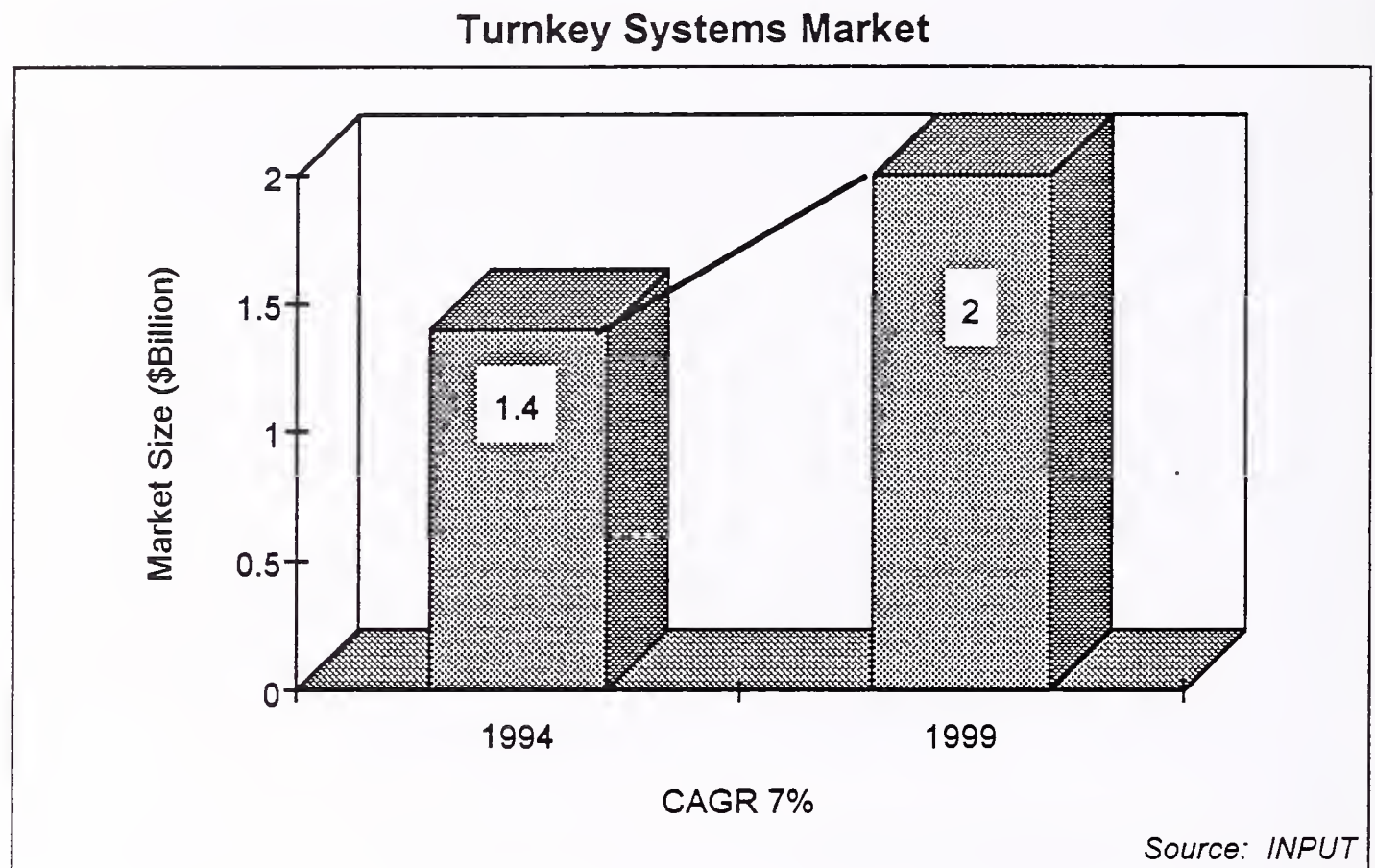
Scientific and engineering applications continue to be the largest area of agency turnkey system use. These include CAD, CAM, CIM and data collection packages. On the civilian side, Commerce, NASA and Energy have the greatest need for these systems and support most of the civilian growth. Defense also has growing requirements in this area, but budget limitations threaten DoD's ability to procure necessary levels of support.

Document handling represents the second largest application area. This includes, among other applications, DoD's initiatives on CALS (Continuous Acquisition and Life-cycle Support). However, some CALS-related initiatives were cut from the current budget and others will be impacted by the DoD CIM program. Other document-handling applications of interest to federal agencies include library, graphics, mapping and publishing systems.

Other turnkey applications include:

- Human resources

- Fleet scheduling

- Maintenance tracking

- Medical drug information

- Financial systems

Turnkey systems being procured by federal agencies include custom design and applications. The vendor provides the entire system, including applications software and special peripherals. Also, vendors install the system, train client personnel to operate it, and provide service during the warranty period.

Some agencies are initiating systems integration procurements whereby the standalone (also called "stovepipe") systems can be connected to mainframe and distributed database systems.

F
Systems Integration

1. Overall Market Potential

The market for systems integration is expected to grow at 8% CAGR, from $3.6 billion in FY 1994 to $5.4 billion in FY 1999, as shown in Exhibit IV-8. The systems integration (SI) market is not growing as fast as most observers thought in 1991, but is still one of the fastest growing IT segments in the federal government. Growth rates for each of the components is holding steady over the last several years.

Unlike the commercial markets, hardware outlays are the predominant investment. The hardware segment was holding at 55% in recent years but is now at 50%, where it is expected to hold through FY 1999.

Hardware systems represents the largest dollar outlay in the systems integration market, but the professional services component of the systems integration forecast shows a lower growth rate, as agencies modernize and acquire additional systems. The equipment portion of SI was flat in the late 1980s, reflecting sizable budget cuts at many agencies, especially on the Defense side. But beginning in FY 1991 and continuing through FY 1995, there is a sizable increase in equipment acquisitions, replacing older mainframes and incorporating large numbers of workstations and PCs.

Exhibit IV-8

Systems Integration Market
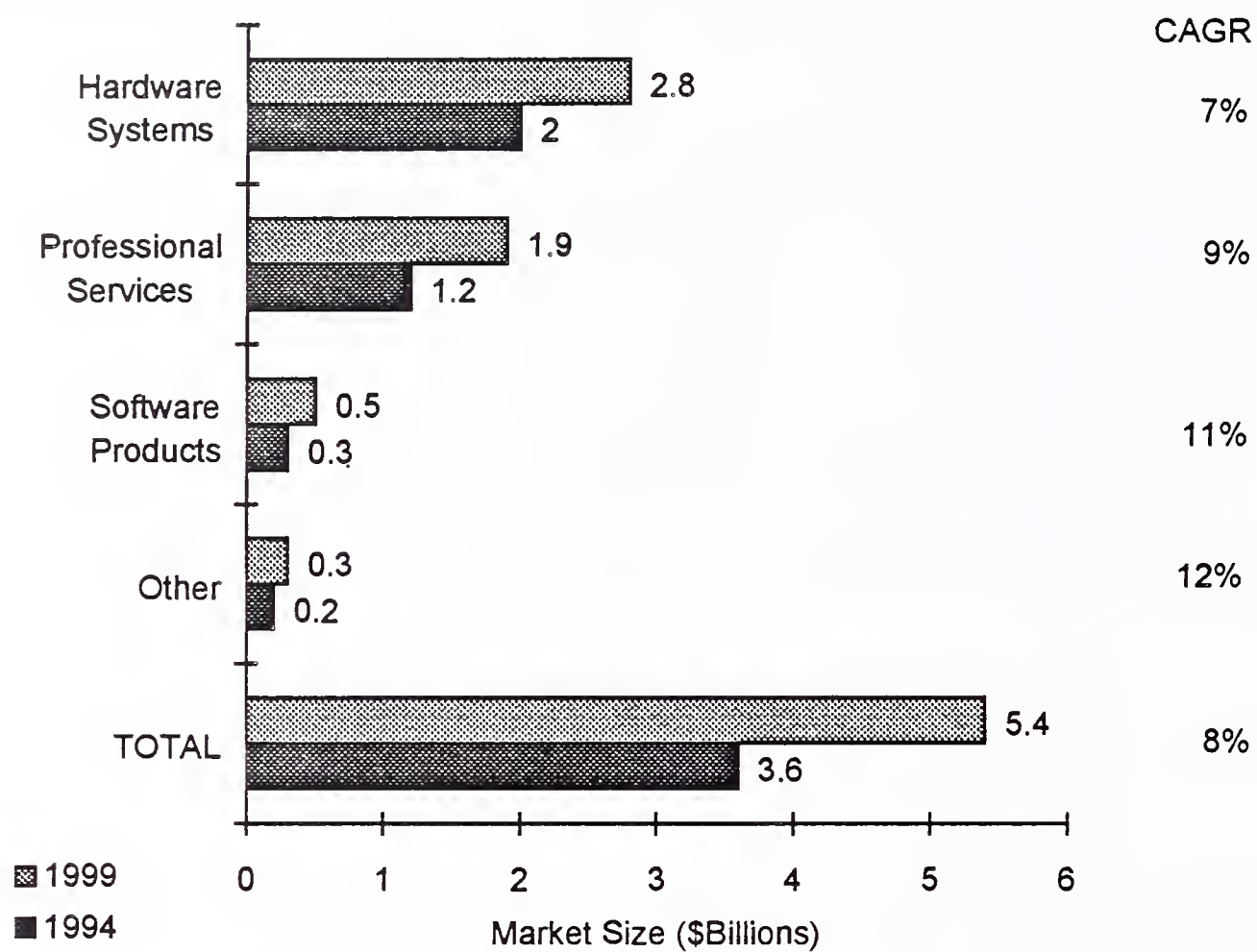
Source: INPUT

2. Professional Services

Professional services grew at 17% per year in FY 1987 to 1989, but dropped to 15% in FY 1990. Reported expenditures for FY 1993 were $1.2 billion, less than the amount forecast for FY 1991. However, increases are expected in this segment. Delays in approval of several DoD systems by CIM and problems with Treasury programs accounted for all of the shortfall in FY 1993. FY 1999 outlays are now expected to reach $1.9 billion, less than the $2.3 billion predicted in 1992, but an increase from the level forecast last year.

In FY 1990, outlays for professional services were 51% of the total spent for SI. The proportion has since declined to 31% in FY 1993, but has increased in FY 1994 to 35% and is expected to hold at that level through FY 1999.

The services included in this market are:

- Project management

- Consulting services

- Design services

- Integration services

- Custom software development

- Education

- Training

- Documentation

- Operation and maintenance (systems operations—only if specified in the contract).

3. Equipment

Earlier, the amount of each program spent on equipment declined as a percentage of the overall project cost. The reduction was attributed to the progressive decrease in the cost-per-MIPS. But since 1990, the amount has risen to the level of about 1988, as the projects include more terminals/PCs for users and extensive networking is needed.

Reported expenditures for FY 1993 were $2.0 billion, less than anticipated. They are now expected to rise to $2.8 billion in FY 1999, at a CAGR of 7%. More of the CPUs originally planned for reuse have become obsolete and need replacement. LANs and network management equipment are also adding to the rise in hardware costs.

4. Software Products

The size and growth rate of the software products component of SI is unchanged since the 1991 forecast. Outlays were $280 million in FY 1993, are estimated to be slightly lower in FY 1994, but are growing at 11% CAGR to $450 million in FY 1999. Certainly, part of the unchanged spending profile is due to the increased use of microcomputer application products, while growing, have undergone substantial price reductions.

Another factor is the continuing conversion of existing applications to minimize delays in cutting over to new systems. A significant problem in creating new systems from old ones is the matter of site licenses and restricted use of commercial, copyrighted software.

5. Other Services

The "other services" category, although relatively small in the federal market compared to the commercial market, includes transaction processing and network services during the implementation phase, site preparation, mechanical engineering, data/voice communication services and initial data processing supplies. This segment is expected to grow at a 12% CAGR.

6. Trends

A number of awarded and near-term projects are driving the market:

- RCAS and IPS in the Army at $182 million and $17 million, respectively

- AWIPS-90 for NOAA at $122 million

- MARK II system for USGS at $100 million

- Treasury's System 90 at $57 million

- Service Center Support System for IRS at $2.2 billion

- Mission-Oriented Information Systems Engineering for USCG at $75 million

Currently, civilian SI spending exceeds that of Defense by approximately $2 billion dollars. This reflects current budget constraints in the DoD. INPUT expects these constraints to continue throughout the forecast period, largely driven by CIM plans to reduce Defense systems spending, and continued pressure on the budget by the House Armed Services Committee.

All major SI initiatives are not being canceled; some may be deferred or stretched out. As a result, the Defense market will continue to lose ground to the civilian market demand over the next few years.

Most SI projects include provisions for communications. With the advent of FTS2000, cost estimating became difficult in the absence of firm rate data from the two FTS2000 contractors, AT&T, and Sprint. As a result of efforts to merge Defense communications (DISN) with FTS2000, the GSA is now involved in planning communications for Defense use as well as civilian use.

Risk management is heavily emphasized in the federal market. Despite system complexity and the government's reputation for stating incomplete requirements, the agencies want operating solutions—not just the offering of sophisticated, interesting technology. Caution must be tempered by provisions for technology insertion (for instance, imaging systems) in the future.

G

Computer Equipment

INPUT focuses on the information services industry and does not treat equipment as an independent research area, except for the components of systems integration and turnkey systems product/service markets. Federal vendor client interest in equipment, including PCs and office information systems, led to the preparation of several equipment-oriented reports and a forecast of likely trends, beginning in 1988. The results of INPUT's current federal research is seen in Exhibit IV-9.

1. Equipment Overview

In FY 1993, the federal agencies spent about $6.6 billion on computer equipment, with the primary emphasis on large-scale systems, which included mainframes and supercomputers. As presently seen, the computer equipment market is expected to grow at a CAGR of 3% to reach $7.9 billion in FY 1999. This rate is a slowdown from the 6% CAGR forecast last year, with the principal changes appearing in microcomputers and large-scale systems.

Some of the planned IDIQs (Indefinite Delivery-Indefinite Quantity) requirements contracts could exceed reported request levels, if past experience applies.

Exhibit IV-9

Computer Equipment Market

Source: INPUT
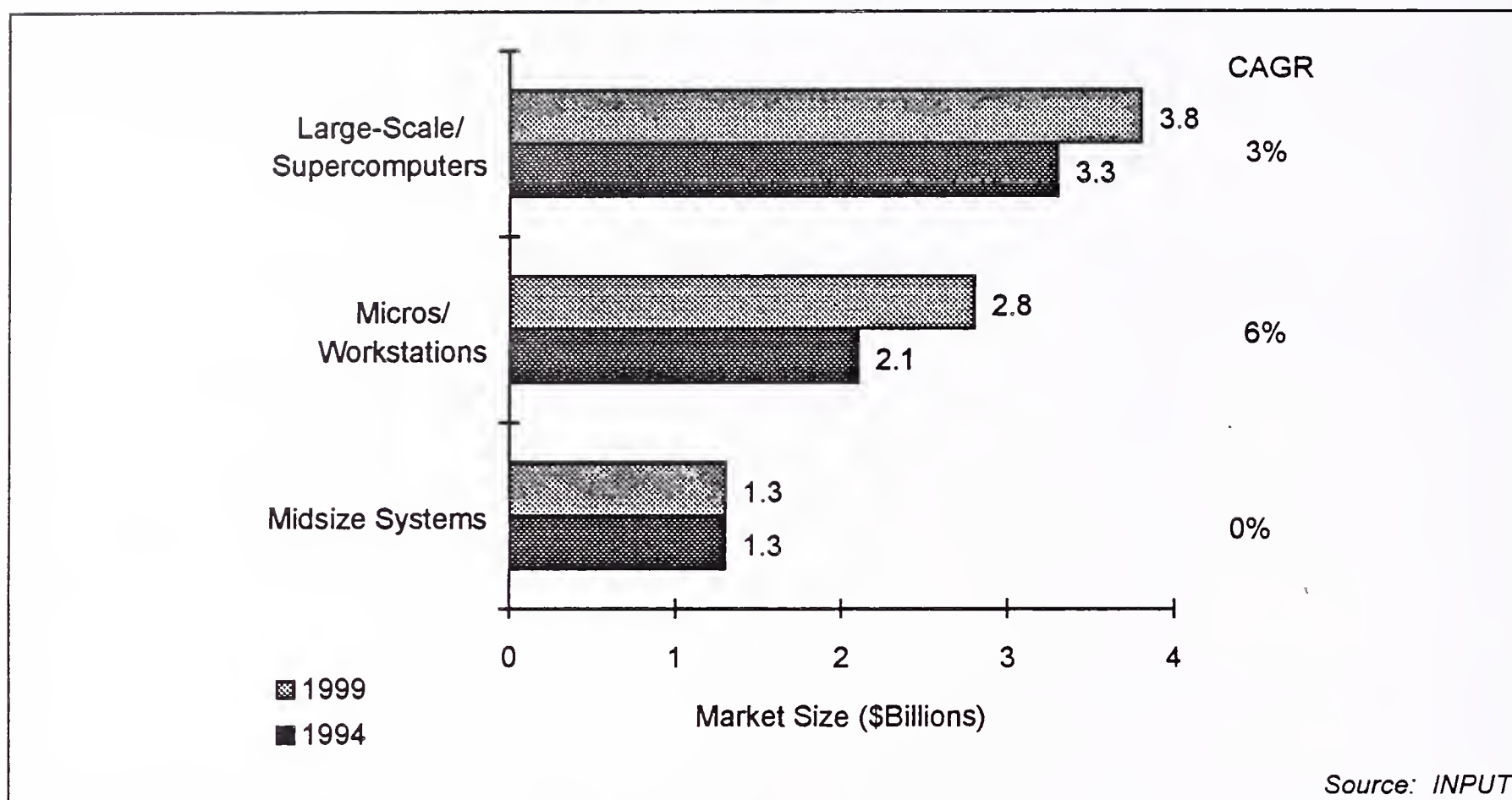
2. Downsizing

Application downsizing is moving many midsize computer-based operations onto large microprocessor-based workstations and supported PCs. Large mainframes are becoming depositories for data and applications software that can be downloaded to low-end, independently operated hardware.

3. Acquisition Trends

Microcomputer-based workstations and personal computers are being acquired via several channels. The Five-Year Plans indicate continuing intention to acquire hundreds of thousands of units through requirements contracts. Several medium-to-large programs include the acquisition and installation of hundreds of terminals linked to client/server architecture.

4. Equipment Modernization

Mainframes of the IBM 360/370 class have been largely replaced because they have become too expensive to maintain or are not maintainable. More modern architecture off-loads overhead functions from the mainframe to networked workstations, permitting the mainframes to operate at or near

designed transaction speeds. Furthermore, higher performance replacement programs of the late 1980s moved onto higher capacity mainframes or minicomputer-based distributed systems.

In the federal market, system upgrades and expansions involve replacement or addition of specific ADP elements. Five-Year Information Technology Plans continue to reflect significant investment for increasing memory systems and data communication hardware. Leases remain as acceptable strategies for obtaining newer technology mainframes and operating software when capital investment funds are not available.

For the 1990s, a number of expansion projects involve the addition or extension of networks. Some projects require networks to serve workstations. Still others will connect microcomputers and minicomputers, which in turn are tied to centralized databases. Software for these projects is either acquired separately through professional services vendors or developed in-house.

5. High-Performance Computing

Traditionally, federal agencies have used supercomputers for highly scientific and technical applications. NASA and the Department of Energy own the bulk of these systems, but major DoD agencies and a few civilian agencies also have supercomputers installed in classified and unclassified establishments.

Federal computing is becoming more complex. The National Information Infrastructure (NII) will be imposing new levels of processing requirements on the federal government. Massive data transfer must be accommodated through processing at terminals as well as driving the network traffic. INPUT expects agencies to find new applications for supercomputers based on NII activity, thus fueling continued market growth. INPUT's PAR database currently tracks 34 programs involving supercomputers.

H

Communications and Network Services

1. Overview

The federal market demand for communications and network services will increase from $4.5 billion in FY 1994 to $7.2 billion in FY 1999. Prices for leased circuits is falling as competition is opened up to companies other than FTS2000 contractors. This results in lower spending levels in out-years than anticipated last year. The professional services segment of this market continues to increase its growth rate as more requirements are identified for network support and with fewer government staff to accommodate the needs. The market for telecommunication products and services will experience a 10% CAGR through the five-year forecast period, as shown in Exhibit IV-10. This is higher than the 6% level predicted in early 1990.

Exhibit IV-10

Communications and Network Services Market

	1999	1994	CAGR
Leased Tele-communications	3.9	2.3	11%
Network Services	2	1.2	11%
Hardware	0.5	0.5	2%
Professional Services	0.6	0.4	7%

Market Size ($Billions)

■ 1999
■ 1994

Source: INPUT
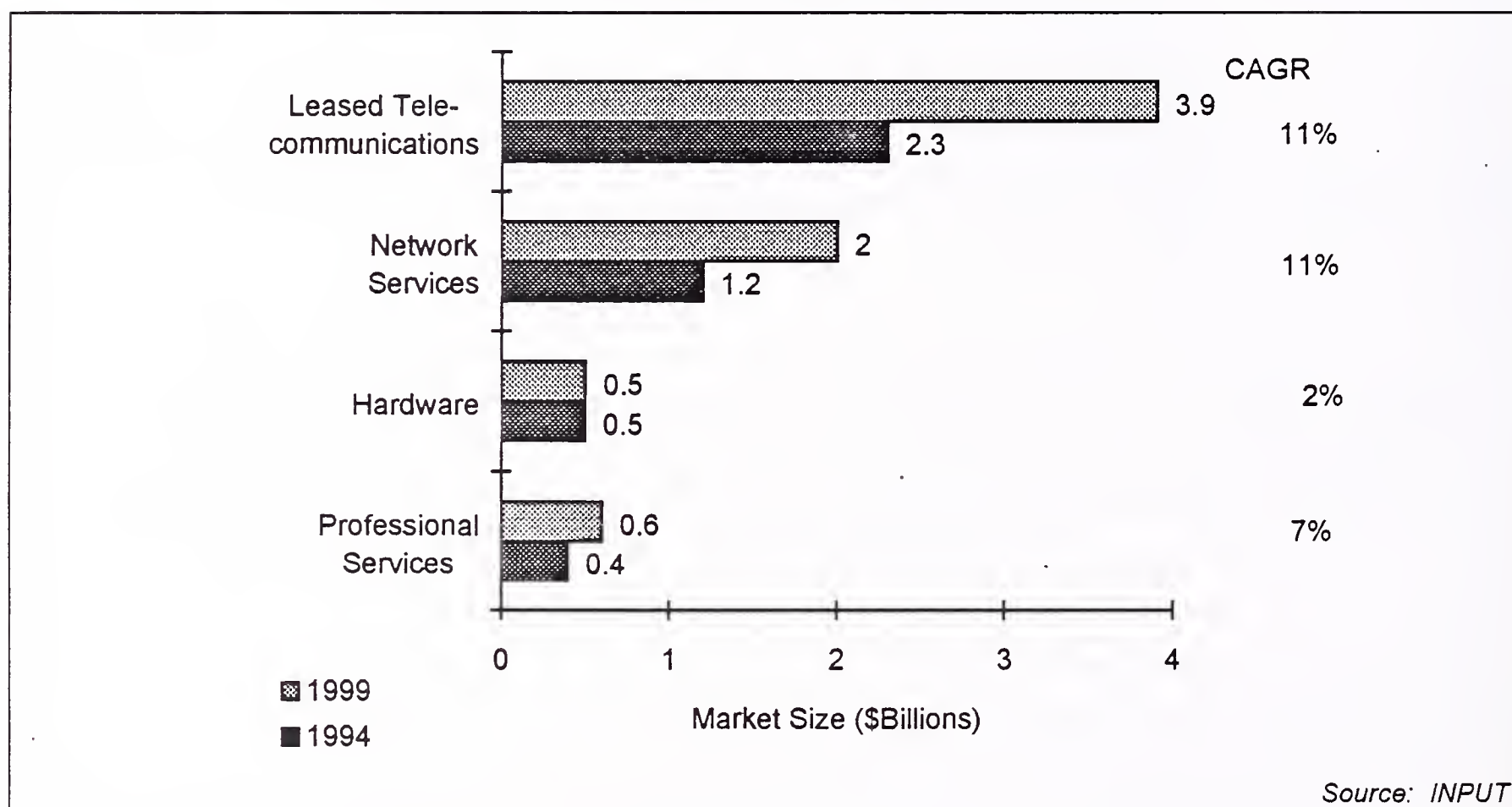
2. Components

Network services is divided into two major segments: electronic information services selling information to users and network applications enhanced transport of user information processing needs. Earlier INPUT budget estimates developed from OMB A-11/Section 43 data were substantially

undervalued because the funds were buried in the general telecommunications budget requests. Agencies have improved their reporting of telecommunications requirements in the A-11 in recent years. For FY 1996, OMB is relaxing its reporting requirement to separate out leased circuit spending from other communications categories. This will make it more difficult in the future to analyze the component level spending.

Agency network services contracts typically last seven-to-ten years, and rarely are terminated by budget constraints. Separate new and replacement acquisitions may be deferred or canceled if an enhanced FTS2000 can meet their needs. Leased telecommunications circuits, principally obtained through the two FTS2000 contractors, include services also leased from the RBOCs (Regional Bell Operating Companies) and the independent suppliers.

Leased circuit expenditures are expected to grow from $2.3 billion in FY 1994 to $3.9 billion in FY 1999, at a CAGR of 11%. These values should be at least twice the values noted in Congress, but the budget requests do not justify more. INPUT assumes that a lot of intradata leases are buried in administrative funds.

Professional services and equipment (hardware) are small in comparison to the media costs. Professional services is likely to increase from $450 million in FY 1994's to about $630 million in FY 1999.

Equipment outlays, largely CPE (Customer Premises Equipment) and ASP (Aggregated Switch Procurements), are nearly $500 million in FY 1994. Spending is expected to increase to $550 million in FY 1999, at 2% CAGR. The hardware market is more competitive than the other components because the specifications permit use of a variety of sources, many of them commercial-off-the-shelf.

3. Prospects

A number of projects listed by the agencies are funded outside the FTS2000 system. These include:

- Treasury: Communications System (U.S. Customs)

- Navy: Network Support Services

- DISA: DISN Integration

- Justice: Integrated Digital Communications System (IDCS)

- Defense: Defense Research and Engineering Network

4. Trends

Despite proposed deficit reduction measures, INPUT believes that the effects of budget constraints will be mitigated somewhat in the federal communications market segment. Budget reductions may actually increase federal dependence on communications services. Teleconferencing and electronic message distribution will be emphasized to reduce travel and other costs.

Although the federal communications market has shown signs of increasing volatility, INPUT continues to believe it will show sustained growth through the 1990s. Despite market growth in terms of spending, the number of distinct opportunities will probably decrease.

Other factors that will drive the federal telecommunications market include:

- Agencies are more demanding and sophisticated in their communications requirements, either riding FTS2000 or, when appropriate, initiating their own requirements-type contracts.

- Pressures continue in Congress to further limit the expansion of services available on FTS2000 from the present contractors, AT&T and U.S. Sprint. Definitions for the FTS2000 as an integrated service for civilian and defense agencies have not been developed. Neither has the acquisition strategy. Multiple awards are likely, but will probably not be limited to two suppliers for all services as before.

- Technological advances will change the market character. For example, as better network management tools become available, agencies will come to expect resulting economies and efficiencies.

- Competition is becoming more intense. Because this market still shows some of the vestiges of monopoly, the increase in competition will be even more dramatic, especially in the earlier phases of full digital service that will enhance data communications capabilities.

- Communications security requirements will likely increase. Most agencies consider communications to be the weakest link in information processing. Security considerations will prevent much interaction between local-area networks in DoD, at least in the near future. The market place has not yet voiced the level of demand for security that will drive upgraded technologies and services.

Electronic Commerce/Electronic Data Interchange

1. Overview

Electronic commerce/electronic data interchange (EC/EDI) continues to get good press for its potential in improving government services. Growth in the federal market lags behind that in the private sector.

EC includes several modes: procurement (EDI), logistics (CALS), finance (EFT), benefits (EBT), drawings (EDT), filing (EF) and other data. INPUT expects the federal EC/EDI market to grow from $189 million in FY 1994 to $238 million in FY 1999, as shown in Exhibit IV-11.

2. Components

Currently, growth is occurring primarily in the software products area, reflecting OMB's growing emphasis on packaged software, at the expense of tailored software development (included under professional services). Expenditures of $55 million in FY 1994 will grow at a CAGR of 4% to almost $66 million in FY 1999.

Exhibit IV-11
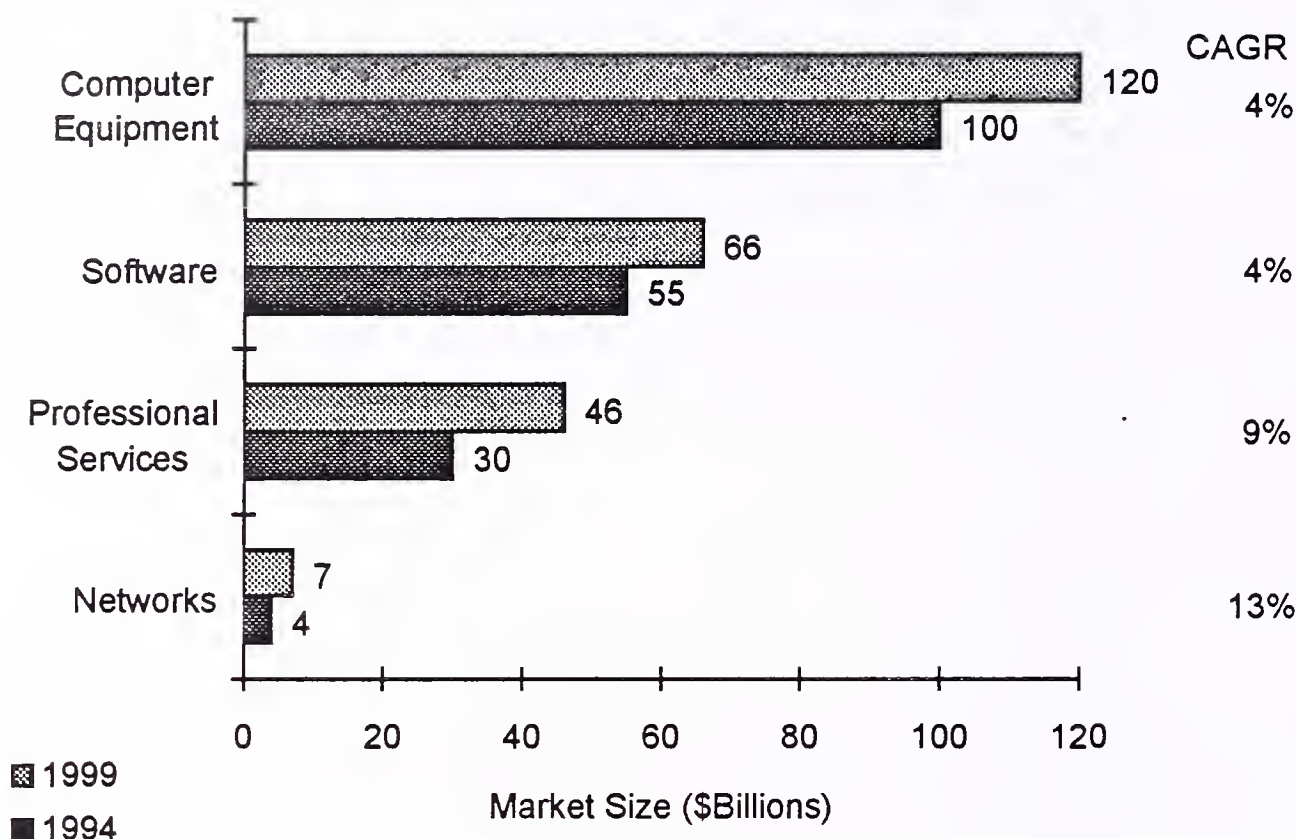
Electronic Commerce/EDI Market

A gradually improving federal computer equipment market will increase outlays from about $100 million in FY 1994 to $120 million in FY 1999 at a CAGR of 4%, a slight decrease from last year's dollar forecast, but at a higher rate of growth based on lower actual spending in FY 1993 than the government had estimated. That is, EC/EDI can be processed by conventional hardware and only slightly specialized software. It appears that the current systems are being set up for standalone operation.

Professional services growth from this year's $30 million to $46 million in FY 1999 suggests that planning and implementing EC/EDI is more organizational rather than a technical problem. As in other market segments, professional services growth shows the extent that agencies will contract out support requirements.

The surprise in this specialized market is the low level of network expenditures encountered. The increase from slightly more than $4 million in FY 1994 to more than $7 million in FY 1999 is hardly more than a ripple in the budget pond. The special services provided by these networks appear to be only an early phase to conversion to a fully equipped service. There is also a growing trend among some network providers to heavily discount their federal offerings.

Unlike most other product/service markets, EC/EDI prospects are actually enhanced by budget cuts. Federal managers can save much of their administrative expense by reducing paperwork. Greater automation of procurement, invoicing, human resources and other administrative functions through EDI will reduce expenses and increase accuracy and efficiency.

The DoD CALS effort continues to lead in EC/EDI development. However, other agencies, including Treasury's Customs Service, apply EC/EDI (EDIFACT) at the international level. Treasury's Financial Management Service has implemented electronic funds transfer technologies to facilitate financial processing for federal agencies. Through pilot programs applied in traditional fixed-price environments, agencies will increase their operating efficiencies with EC/EDI.

3. Prospects

Agencies are gaining greater awareness of EC/EDI through several highly visible EC/EDI applications being implemented through agency programs already operational. These include:

- The SEC EDGAR Project for electronic filing of corporate documents

- The Navy EDMICS Program for an engineering and image processing system

- The GSA Federal Supply Service Program for sending invoices and bills-of-lading to suppliers

- Defense Logistics Agency's EDI Value-Added Network, and supplier connections under JCS Continuous Acquisition and Life-cycle Support (JCALS)

- Transportation's Automated Document Transfer System

- U.S. Customs Service's EDIFACT program

- Air Force acquisition at Wright Patterson AFB

4. Trends

EC/EDI is now being included in system upgrades, not just in standalone EC/EDI acquisitions. It is still viewed by most agencies as a more productive alternative to other data interchange processes.

The policies and regulations impacting EC/EDI are still evolving. The DoD Process Action Team on Electronic Commerce/Electronic Data Interchange in Contracting was chartered in July 1993 for the purpose of assessing existing DoD EC/EDI systems and to develop a comprehensive plan for implementing a standard DoD-wide EC/EDI approach. On January 5, 1994, DoD implemented a standard DoD-wide EC/EDI procurement system.

The federal EC/EDI market will expand as advancements are made in standards. X.12 is already gaining a strong foothold among most federal agencies. Furthermore, NIST made X.12 a mandatory FIPS standard in 1990.

The international standard, EDIFACT, is recognized in some application areas, such as Customs, as the only standard that allows for full participation among trading partners worldwide. However, protocol differences between X.12 and EDIFACT may delay the standardization of federal EDI.

Agencies will use GOSIP to integrate their multivendor networks and systems. However, INPUT expects many Defense agencies to continue to use TCP/IP, an incompatible approach, for the next three to five years.

J

Office Information Systems

1. Overview

As shown in Exhibit IV-12, INPUT estimates that the federal government office information systems (OIS) market will increase from $1.4 billion in FY 1994 to $1.8 billion in FY 1999 at a 5% CAGR. Demand for office systems peaked four years ago and is declining slightly since FY 1990.

Exhibit IV-12

Office Information Systems Market—Overview

Source: INPUT
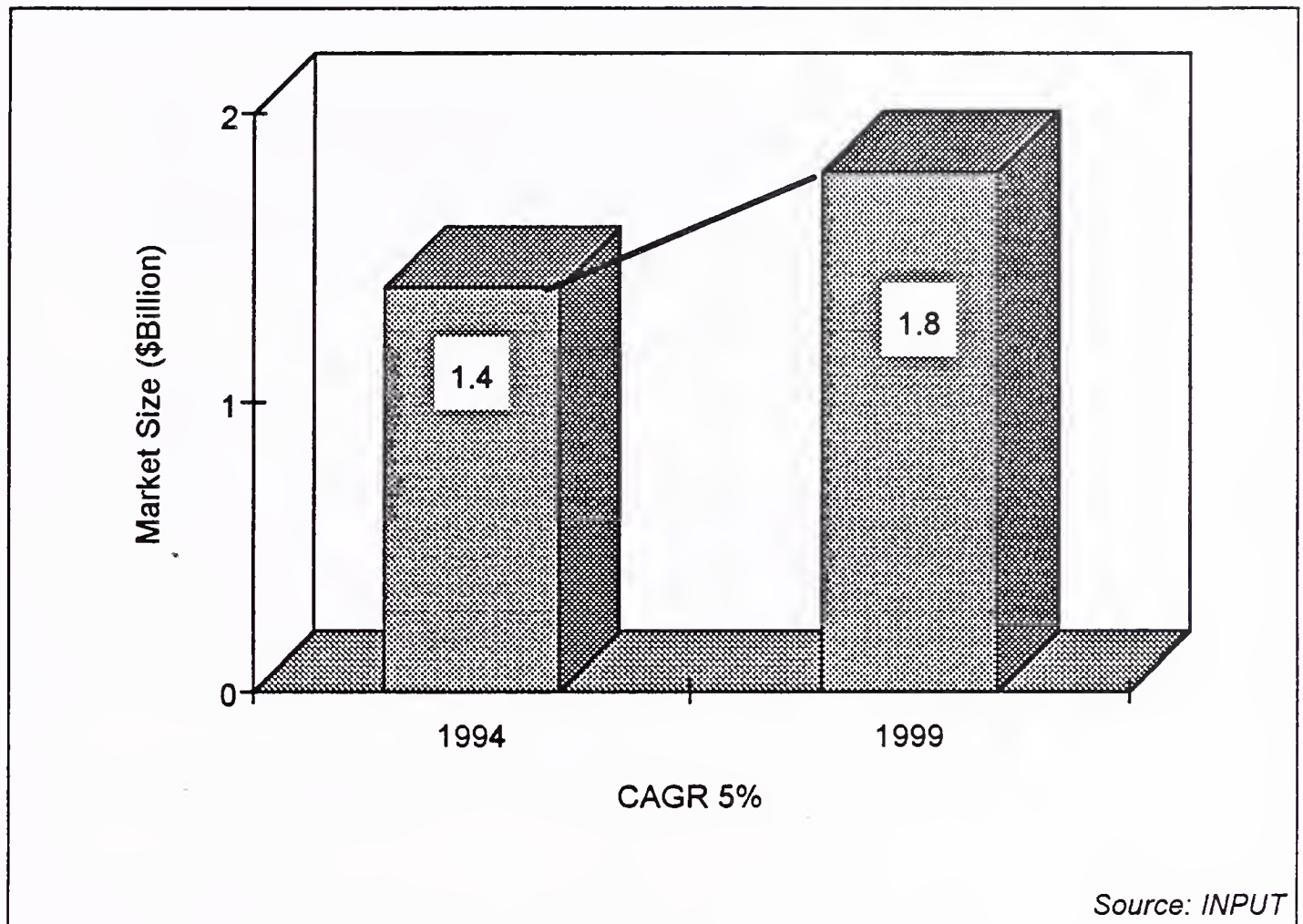
2. Components

Most federal OIS expenditures are concentrated in purchases of hardware components, but not to the extent seen in the late 1980s. Exhibit IV-13 notes that the CAGR for hardware will decrease to 3% in the next five years, with anticipated budget levels going from $0.9 billion to $1.1 billion in FY 1999. That amount still accounts for more than half of the expected outlays.

Professional services has become the fastest growing segment and will remain the fastest through the remainder of the 1990s at a 9% CAGR, as more functionality becomes available for office operations.

Exhibit IV-13

OIS Submarkets-I

CAGR

	Market Size	CAGR

Hardware Systems — 1.1 / 0.9 — 3%

Professional Services — 0.3 / 0.2 — 9%

Software Products — 0.3 / 0.2 — 6%

▨ 1999
■ 1994

Market Size ($Billions)

0   0.5   1   1.5

Source: INPUT
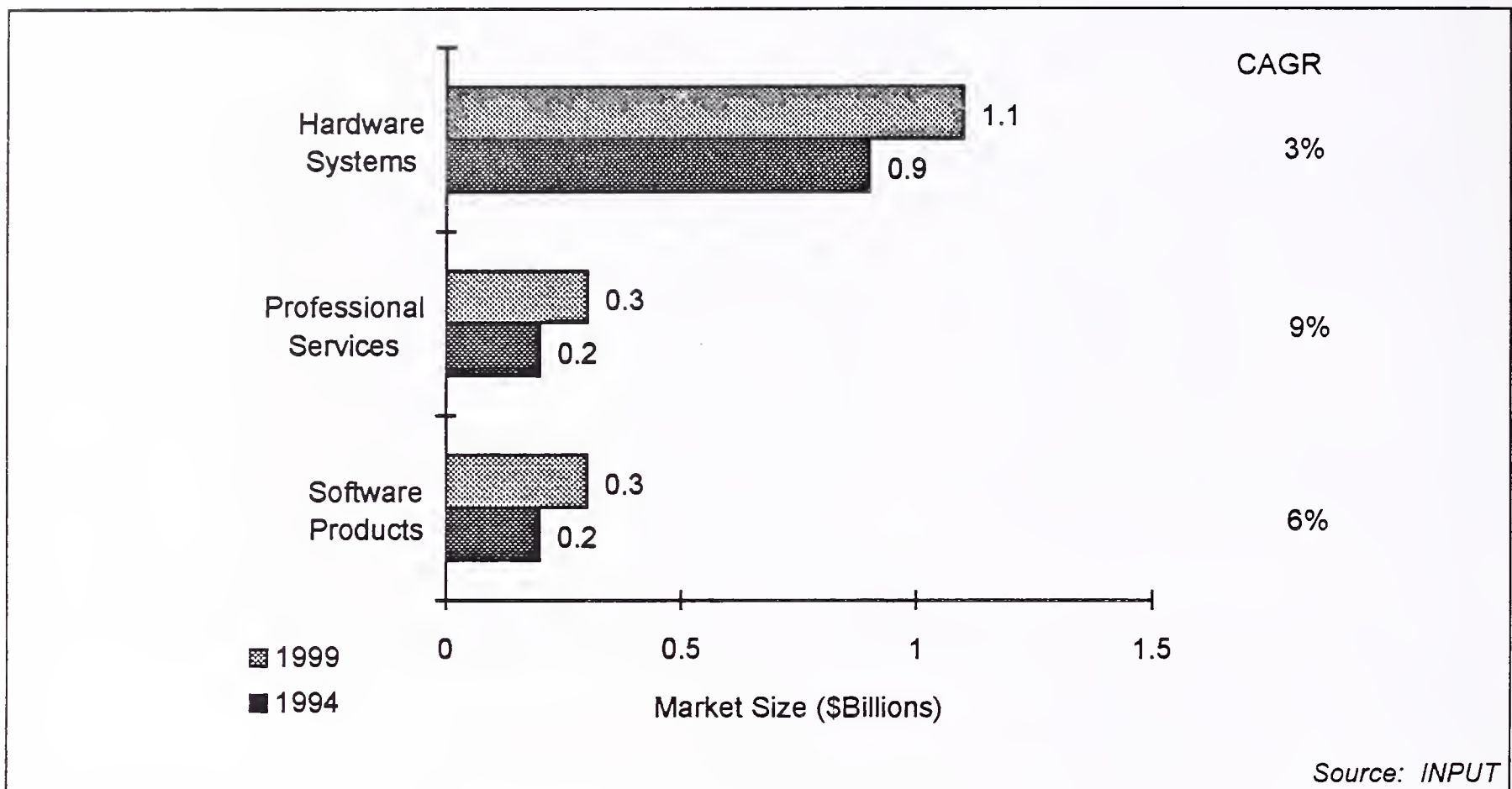
Some turnkey systems will continue to be ascribed for specific applications that are one of a kind in the office environment. These can be equipped for special assignment, like traffic control or vehicle tracking.

Spending is expected to be flat, holding at $100 million annually through FY 1999. A small amount of processing services continues to be used for overflow support of major OIS. Both of these submarkets appear in Exhibit IV-14.

Exhibit IV-14

OIS Submarkets-II

Legend:
- ▨ 1999
- ■ 1994

Turnkey Systems: 97 (1999), 83 (1994) — CAGR 3%

Processing Services: 10 (1999), 10 (1994) — CAGR 0%

Market Size ($Billions)

Source: INPUT
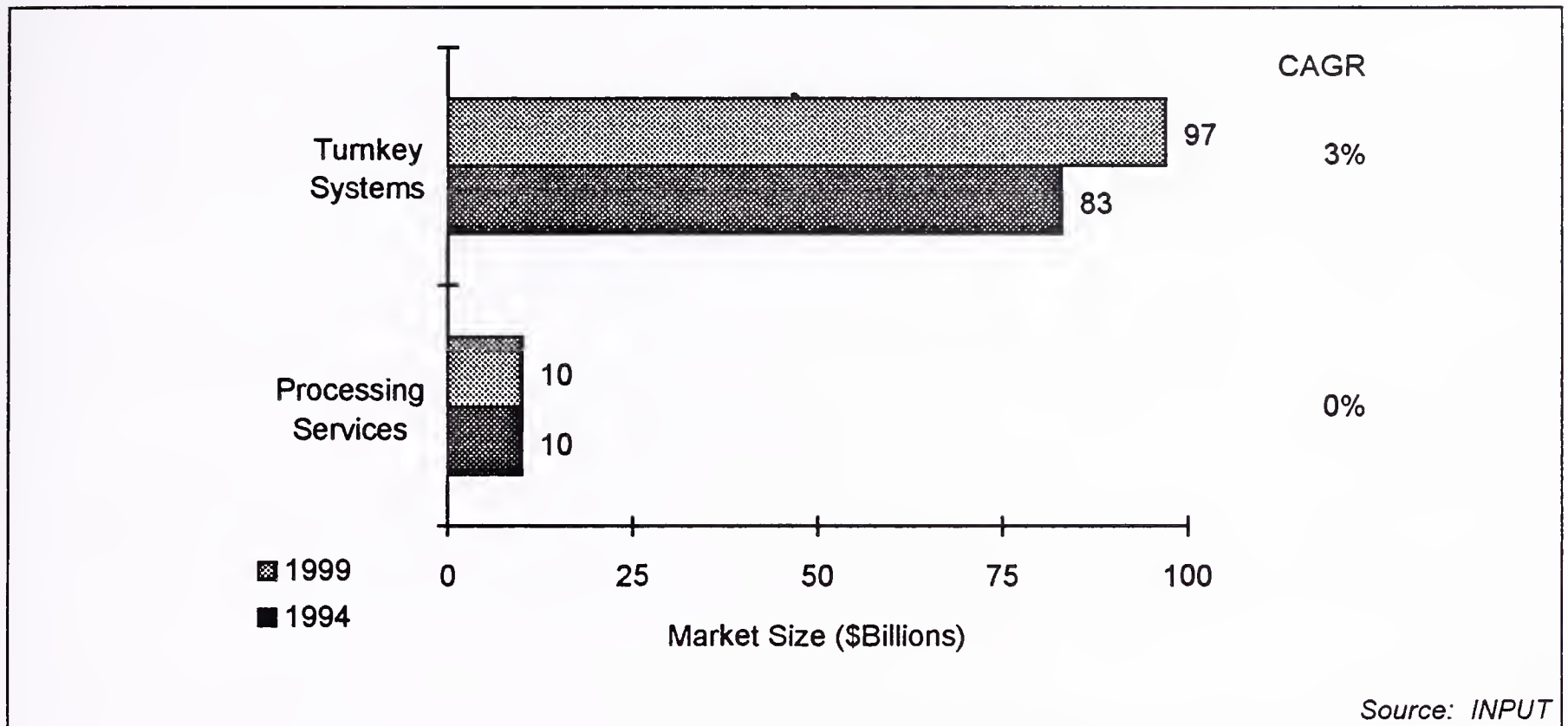
3. Prospects

A number of projects in this segment of the federal market indicate continuing interest. Note that OIS is the object of several major systems integration programs.

- Justice: New GAMMA (FBI and DEA)

- Transportation: U.S. Coast Guard (SAIL)

- NASA: GSFC SEAS Program

- Agriculture: LM/Office Automation, and Inspection Coverage System

- State: Office Systems Recompete (SOAR)

- HHS: Social Security Administration (IWS LAN)

4. Trends

The nature of office information systems and the location of the intended support are changing. Today, OIS implies work units with users tied together via LANs, and institution-level processing distributed to workstations or work units linked to these larger processors. Group-ware

products and software suites are gaining popularity in the office environment.

The rapid technical performance improvements of PCs and workstations using Intel's 80486 and Pentium chips are rapidly expanding the variety of applications available in the office environment for management support. The expanding product line for Apple and other Motorola-based processors also offers alternatives to processing scenarios of the late 80s and early 90s.

Some OIS projects are called Executive Information Systems (EIS) or Decision Support Systems (DSS) to differentiate them from the earlier office automation context. As a result, many of these OIS automation efforts are influenced by, or under the control of, agency IS organizations.

Over the next five years, INPUT expects greater demands on agencies for office systems capabilities without an equally growing availability of OIS funds. This will force agencies to reorient their purchases toward more multipurpose systems instead of OIS-specific systems.

K
Computer Equipment Maintenance

1. Overview

Except for research conducted in the commercial market for customer services and third-party maintenance (TPM), INPUT had not previously analyzed the federal maintenance market. Client interest resulted in a market analysis report produced in 1990 that provided some insight into the maintenance market. As seen in Exhibit IV-15, INPUT's most recent analysis reveals a market of $2.8 billion in FY 1994, with prospects of a 3% CAGR that will reach $3.3 billion by FY 1999.

Exhibit IV-15

Computer Equipment Maintenance Market

CAGR

Segment	1999	1994	CAGR
Midsize Systems	1.4	1.1	4%
Large-Scale Systems	0.9	0.8	3%
PCs/ Workstations	0.7	0.8	-2%
Ancillary Services	0.3	0.2	12%

☒ 1999
■ 1994

Market Size ($Billions)
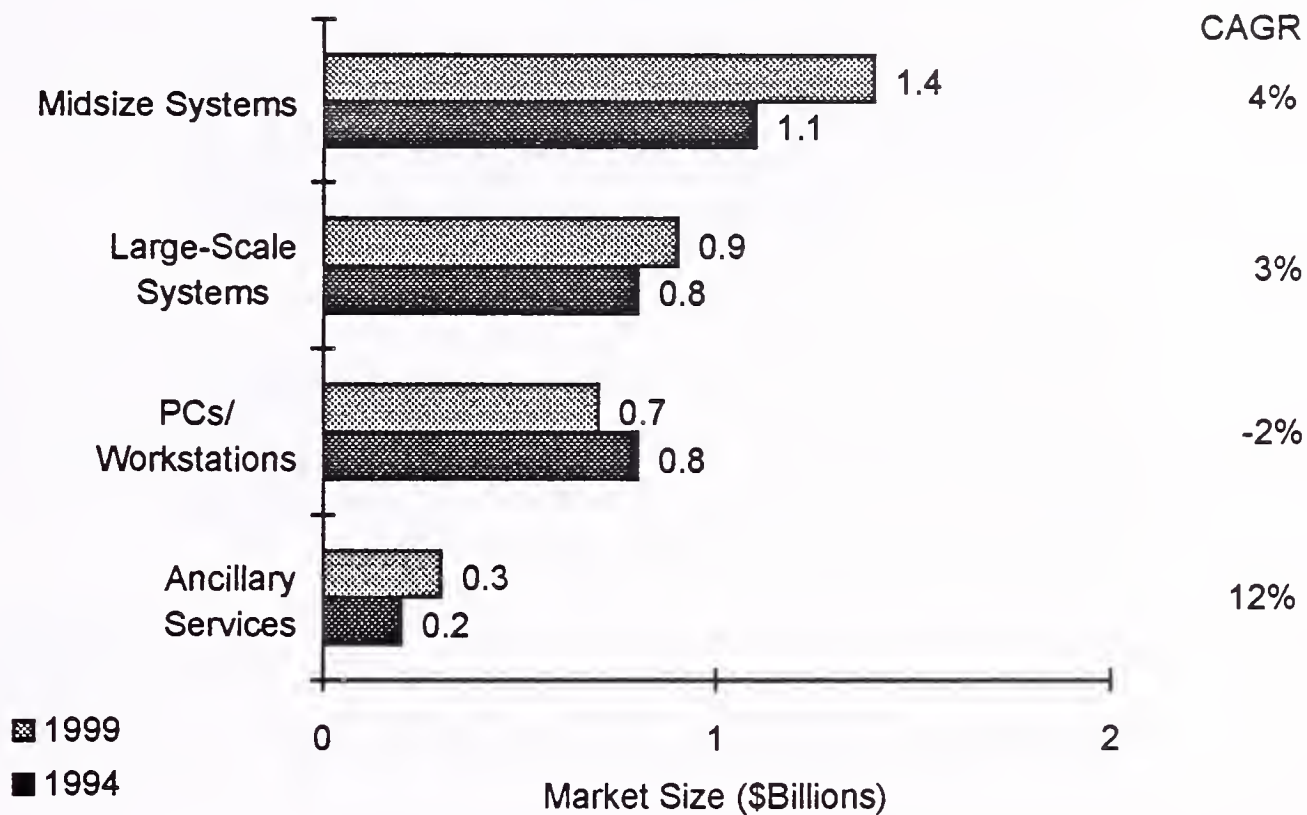
Source: *INPUT*

INPUT may not have captured the entire equipment maintenance market. Some difficulty is encountered in separating IT maintenance from other non-ADP support functions at contractor-operated government facilities.

2. Size Emphasis

It is notable in Exhibit IV-15 that the largest segment of maintenance is associated with midsize systems, with the largest amount of older ADP equipment being in the government inventory. (The Federal Equipment Data Center of GSA had reported 9,493 units with average age of 12-13 years.) The $1.1 billion in FY 1994 is expected to increase to $1.4 billion in FY 1999, at 4% CAGR.

Large-scale systems, which include supercomputers, have been upgraded so that the average age is less than eight years. Outside maintenance is required for the larger machines because of their complexity. The $800 million expended in FY 1994 will grow modestly to $900 million in FY 1999.

Despite the large number of PCs and workstations, their very newness results in low demand for maintenance support. About the time that they begin to require service, they are replaced by newer and more powerful machines. Less than $800 million was spent in FY 1994, and the addition of peripherals is expected to hold maintenance expenditures steady through FY 1999.

3. Trends

Maintenance is provided by a variety of vendors, ranging from the OEMs of midsize to high-performance machines to third-party suppliers and maintainers. After some years of inattention to mixed-brand installations, the OEMs recognize the desirability of account control. In this regard, upgrades can be accomplished piecemeal, with potential pre-eminence of incumbent equipment maintenance firms.

Maintenance of customer-premise equipment in the communications environment was separately treated in that market area. Further investigation of the maintenance market may reveal more details, including specific agency trends and market shares of the leading vendors.

L
Outsourcing

1. Overview

The forecast in this market has been separated from the professional and processing services markets. The two modes are Contractor-Owned, Contractor-Operated (COCO) and Government-Owned, Government Operated (GOGO).

As noted in Exhibit IV-16, the federal systems operations expenditures are $1.5 billion in FY 1994, the same in FY 1992 and FY 1993 but is expected to grow slightly (CAGR of 4%) to $1.8 billion in FY 1998. The growth rate has decreased since the FY 1991 forecast and is not expected again to reach the 15% level predicted in 1989 and 13% in 1990.

Exhibit IV-16

Outsourcing Market
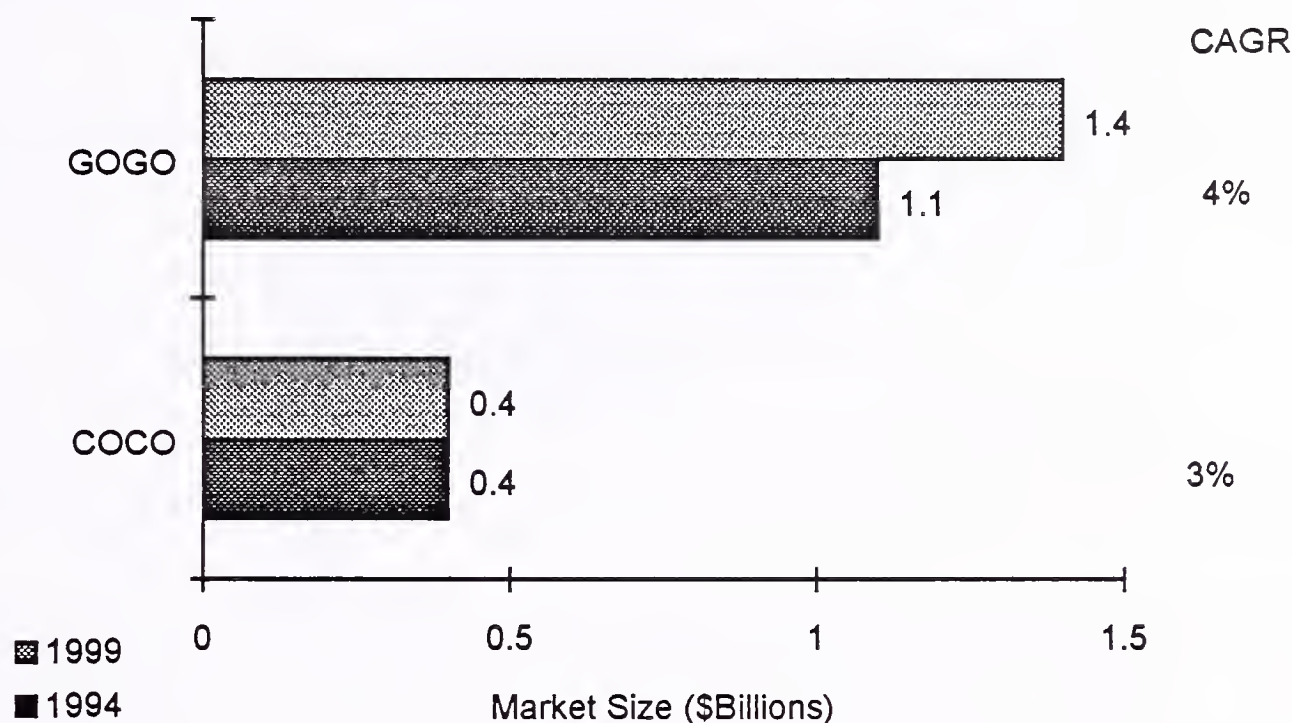
Source: INPUT

2. Systems Operations

Systems operations began to grow again on FY 1990, after experiencing CAGRs of 6%-8% since the cutbacks of FY 1983, when a number of new systems were implemented. The turnaround began with staffing restrictions and slowdown of new system acquisitions imposed by the Gramm-Rudman-Hollings Budget Control Act and a slowdown in defense spending.

The professional services segment (GOGO) is currently expected to improve at 4% CAGR, despite expectations of data processing center consolidation in Defense under DMRD-918. The dislocation of federal staffs is not expected to adversely affect the laboratories and experimental centers where the largest GOGO contracts are awarded.

COCO opportunities are fewer in number and contract value (about one-third of the GOGO market). INPUT is optimistically showing a CAGR of 3% because the agencies cannot fund adequate disaster recovery facilities. A number of agencies, including DoD's CIM, are examining outsourcing of most data centers as a way of increasing productivity at a stable and predictable cost level.

3. Trends

A number of SO programs have been added to those due to be recompeted in the next few years. The leading operational COCO program is FAA's CORN, worth $1.5 billion over a 10-year period.

Defense projects include Joint Staff Automation and WWMCCS O&M for the Air Force, the Air Force Operational Support Contract, Laser System Test Facility for the Army, and Navy programs for PMTC Support, Science and Engineering Center Support, and PEPSU Software Maintenance.

HHS programs include the Administration and Scientific ADP Services Contract, and Justice has the Automated Litigation Support recompete worth $130 million. The Environmental Protection Agency will recompete the National Computer Center Operation contract, worth $300 million.

Although industry has used the methodology for years, NASA was the first federal agency to employ mission contracting, now used at all centers except Lewis. The Air Force uses the same type of contracts for a few centers, and other agencies are moving toward allowing the contractor to use the most efficient staff mix to meet mission data processing and communications requirements.

In addition to the prospect of winning a five-year contract, the next significant advantage is the opportunity to provide software and hardware add-ons during the contract term. This process is called "flow-through" and enables the incumbent vendor to improve profitability in a product/service market (GOGO) associated with low fee rates.

Vendors not involved in or allied to another vendor for SI may experience greater competition for the post-implementation support. A number of professional service firms are attracted to SI contracts because of SO prospects for five-to-ten years.

M

Computer Security

1. Overview

INPUT expects the market for federal computer security to improve slightly from $620 million in FY 1994 to $710 million in FY 1999, at a CAGR of 3%, as seen in Exhibit IV-17.

Exhibit IV-17

Computer Security Market
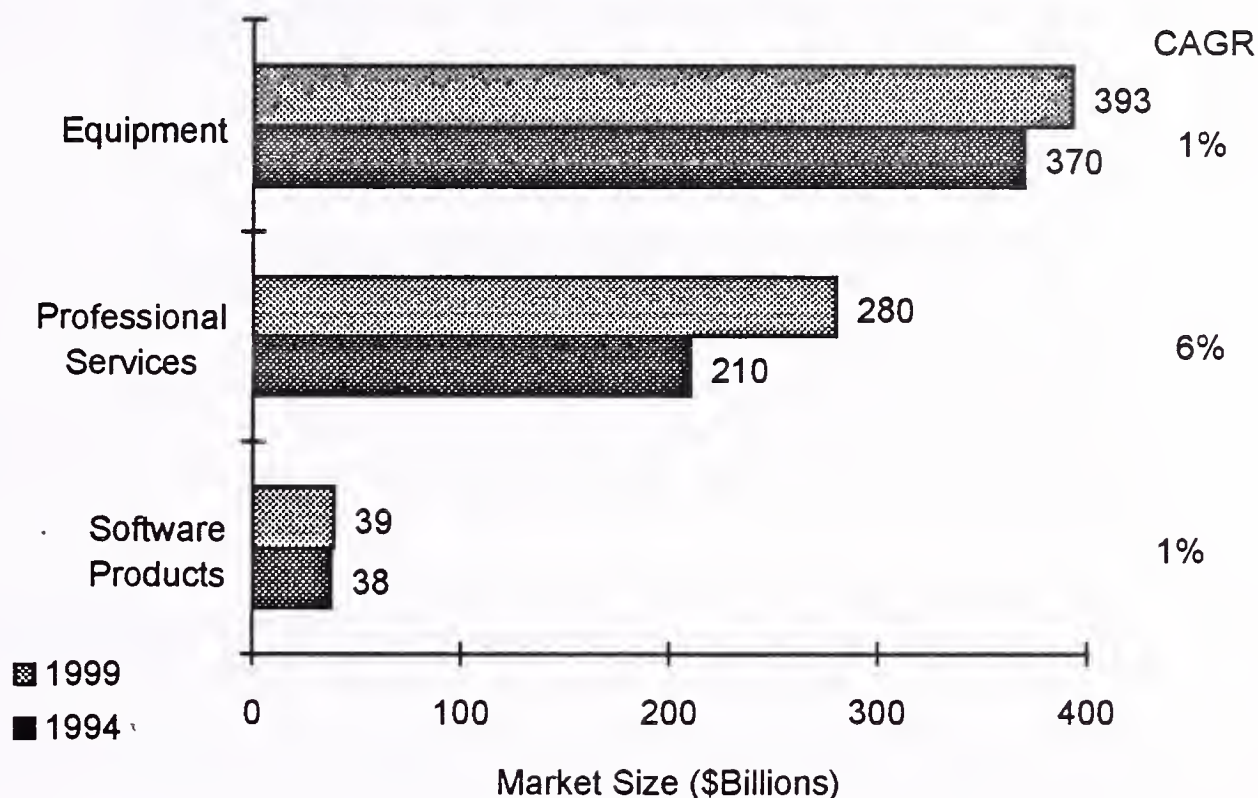
Source: INPUT

2. Security Elements

The continuing emphasis is on specialized equipment, comprising nearly 65% of the FY 1992 outlays, 60% in FY 1994, and 55% in FY 1999. Spending growth is expected to be only slight through FY 1999, unless some agency suffers grievous harm from a security breakdown. The equipment includes computers, peripherals and communications modems that are nonradiating.

Professional services will grow at a relatively high rate of 6% CAGR. OPM is providing security training to federal ADP staff, using vendors in some instances.

Attainment of software security is expected to be accomplished by the system designers and implementers of programs like the IRS Tax Modernization Program and SSA's Systems Modernization Program. Agencies like NASA established Computer Security Incident Response teams that include on-site vendor professionals.

The software products segment is the smallest segment of this market and is not expected to grow through FY 1999. The increasing availability of functional products for defining security needs and providing security measures would influence growth, provided agencies seek software solutions.

Most administrators appear to prefer physical and equipment security measures. New interest in protection and recovery from computer viruses may be the key driver to network concerns. Because this is treated as a borderline issue, any acquisitions in this segment are not likely to be given any publicity.

3. Trends

Although Congress mandated improved measures in the Computer Security Act of 1987, funding was only provided for development of a security plan and initiation of staff training. Under the Computer Security Act, support was and is provided for performing security evaluations and audits and assisting in development of physical, electronic and software security plans. Subsequent budget restrictions have further delayed any significant agency responses.

Unless Congress passes follow-up legislation with an appropriate level of funding, it is unlikely that this market will increase substantially. The agencies say that a significant and legally embarrassing incident must occur before the Administration or Congress will pay more than lip service to this legislation..

4. Network Security

Network security, consisting primarily of encryption equipment, is excluded from INPUT's forecast model because of the embedded nature of its processing. However, it still represents a major business opportunity in the federal market.

INPUT estimates this market to be approximately $600 million annually and expects it to remain fairly flat over the forecast period. Though demand is increasing, particularly among civilian agencies, the growing cost effectiveness of data encryption equipment is offsetting this growth, leading to the flat market size projection.
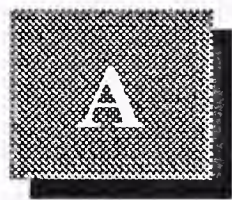
Forecast Databases and Reconciliation

A

Federal IT Budget Forecast Database

One of the features of the Federal Systems and Services Market Program (FSSMP), and earlier, the Federal Information Systems and Services Program (FISSP), is the creation of a computer-based forecast model for predicting the likely growth rates of federal IT expenditures. The model uses the data provided in Section 43 (Information Resource Plans and Budget Request) of the OMB Circular A-11 Federal Annual Budget Request Preparation Guidelines. This information provides the first two-year baseline of the five-year forecast.

Exhibit A-1 displays the overview of the four budget items and their components gleaned from the 43A documents, modified by the agency's long-range plans and interviews where the data are incomplete.

The FY 1994 column displays the estimates of the agencies of the ongoing fiscal year, previously authorized by Congress.

The FY 1995 column is a summation of the requests made by the Executive Branch administrations, plus outlays planned by organizations not governed by the Amended Paperwork Reduction Act that have not been authorized by Congress. The plans of the non-Executive Branch entities are summarized in the line called "Off-IT Budget Adjustments."

The columns titled FY 1996 to FY 1999 are INPUT's forecasts of the likely rate of growth or decline of the government's budget

elements. A principal caveat here is that these numbers are request-based and not yet specified by the government.

The forecast uses year-to-year growth rates established by INPUT each year (see the comments in the Introduction) and estimates of the Congressional Budget Office, Office of Management and Budget and economic projections of economic outlook groups in several agencies.

Exhibit A-1

Federal IT Budget Forecast, FYs 1994-1999, Database

Federal Government Budget OMB A-11 Categories		Total 1994 Estim.	Total 1995 Forecast	Total 1996	Total 1997	Total 1998	Total 1999	CAGR '94-'99 (%)
Capital Investment	Hardware	4.6	4.8	4.9	5.1	5.3	5.5	4
	Software & Other	0.8	0.8	0.9	0.9	0.9	1.0	5
	Site	0.4	0.4	0.5	0.5	0.5	0.5	2
	Subtotal	5.8	6.0	6.2	6.4	6.7	6.9	4
Personnel		5.8	5.9	5.8	5.7	5.6	5.4	-1
Equipment, Rental, Space & Other Operating Costs	Lease of Equipment	0.3	0.3	0.3	0.3	0.3	0.3	1
	Lease of Software	0.1	0.1	0.1	0.1	0.1	0.1	-5
	Space	0.4	0.4	0.4	0.4	0.4	0.4	1
	Supplies & Other	1.1	1.1	1.2	1.3	1.3	1.3	4
	Subtotal	1.8	1.8	1.9	2.0	2.1	2.1	3

Exhibit A-1

Commercial Services	ADPE Time	0.2	0.2	0.2	0.2	0.2	0.2	0
	Leased Telecom Voice	2.1	2.1	2.6	2.9	3.5	4.2	14
	Leased Telecom Data	1.4	1.5	1.5	1.6	1.7	1.8	5
	Operations & Maintenance	4.1	4.4	4.4	4.4	4.5	4.7	3
	Systems Analysis & Prog.	3.1	3.4	3.8	4.1	4.5	4.9	9
	Studies & Other	0.8	0.9	1.0	1.0	1.1	1.1	7
	Use of Info. Technology	0.5	0.5	0.6	0.7	0.8	0.9	11
	Subtotal	12.3	13.1	14.0	14.9	16.2	17.7	8
Total Info. Technology		25.6	26.9	28.0	29.1	30.5	32.2	5
Subtotal of IT to be Contracted		18.0	19.1	20.2	21.3	22.8	24.5	6
Off-IT Budget Adjustments		310	330	340	360	370	390	5
Total to be Contracted		18.3	19.4	20.5	21.7	23.2	24.9	6

Figures in $ billion

To assure a degree of compliance of the service mode/market forecasts, the database for the federal government budget elements must be developed in greater detail. Each entry is based on formulas that are adjusted each year to track with the factors noted in the preceding years. The evidence of how closely the model tracks expenditure patterns will be demonstrated later in this

Appendix under Forecast Reconciliation.

The most notable change of the past four years has been the decline into single-digit growth rates of the four key budget elements. The CAGR is used to describe the five-year change in expenditures as a percentage of the base-year value.

B

INPUT's Federal IT Expenditure Forecast Database

As explained in the Introduction of this report, the data compiled in the Federal IT budget model (Exhibit A-1) is dissembled and regrouped in service modes that are more familiar to INPUT's vendor clients and the technical program managers in the agencies. These are discussed in the main body of the report and defined in Appendix B that follows.

1. Part I—Primary Service Modes

The primary service modes that closely follow the IT budget elements are listed in the Part I - IT Market Database in Exhibit A-2. The most significant feature of this part of the forecast model is that the summation of expected expenditures for each fiscal year equals the amount calculated as the "Total Contracted-Out Spending" for each respective year in Exhibit A-1. (If the primary service modes exceed the budget/forecast it is unlikely that the funds would be available.)

With reassembling into service modes/markets, there can be some with double-digit growth prospects, as noted in Exhibit A-2. Examples include Communications/Network Services, and within a category note the 11% CAGR of replacement computer systems expected with the delay in approving new systems. Also note the decline in growth rates for new systems.

Exhibit A-2

Federal IT Market Forecast, FYs 1994-1999, Database Part I

INPUT Service Modes Contracted Portion		Total 1994 Estim.	Total 1995 Forecast	Total 1996	Total 1997	Total 1998	Total 1999	CAGR '94-'99 (%)
Computer Systems	Turnkey Systems	1.4	1.6	1.7	1.8	1.9	2.0	7
	New Systems	1.8	1.5	1.2	1.1	1.1	1.1	-8
	Replacement Systems	1.2	1.5	1.9	2.0	2.1	2.1	11
	Subtotal	4.4	4.6	4.8	4.9	5.1	5.3	4
Software Products	Application Software	0.7	0.7	0.8	0.8	0.8	0.8	4
	Systems Software	0.4	0.4	0.4	0.4	0.4	0.5	4
	Subtotal	1.1	1.1	1.2	1.2	1.3	1.3	4
Communica-tions/ Network Services	Leased Circuits	2.3	2.5	2.7	3.0	3.4	3.9	11
	Equipment	0.5	0.5	0.5	0.5	0.5	0.5	2
	Professional Services	0.4	0.5	0.5	0.6	0.6	0.6	7
	Network Services	1.2	1.3	1.4	1.5	1.8	2.0	11
	Subtotal	4.5	4.7	5.1	5.6	6.3	7.1	10

Exhibit A-2

Processing Services	Transaction Processing	0.1	0.1	0.1	0.1	0.1	0.1	0
	Utility/ Batch Processing	*	*	*	*	*	*	-1
	Subtotal	0.1	0.2	0.1	0.1	0.1	0.1	0
Professional Services	Software Development	1.7	1.8	2.0	2.2	2.4	2.6	9
	Design & Consulting	0.5	0.6	0.6	0.7	0.7	0.8	9
	Education & Training	0.4	0.4	0.5	0.5	0.5	0.6	7
	Subtotal	2.6	2.8	3.1	3.4	3.7	4.0	9
SI - Professional Services		1.2	1.3	1.5	1.6	1.7	1.9	9
Outsourcing	Systems Operations (COCO)	0.4	0.4	0.4	0.4	0.4	0.4	3
	Systems Operations (GOGO)	1.1	1.2	1.3	1.3	1.3	1.4	4
	Subtotal	1.5	1.6	1.6	1.7	1.7	1.8	4
Computer Maintenance		1.2	1.2	1.3	1.3	1.3	1.3	3
Total Contracted-Out		18.3	19.4	20.5	21.7	23.2	24.9	6

* - Less than $100 million, Figures in $ billion

2. Part II Alternative Markets

The primary product/service markets of the preceding database do not fit the markets that most of INPUT's vendor clients track. Six additional markets are identified in greater detail in the database shown in Exhibit A-3.

Because these markets are assembled from pieces of the so-called "primary markets," these results are not additive to those in the Part I database (a frequent difficulty of casual users of these forecasts).

Several of these markets appear headed for double-digit growth, unless the economy and the tax base both decline. Some, like systems integration, have declined substantially from the 16%-18% foreseen in the late 1980s and 1990. Others, like electronic commerce/EDI and computer security, receive much press coverage but little significant funding.

There are also several other versions of this data that have been prepared for the Market Analysis Reports in the FSSMP Program. Using the OMB A-11 submission of an agency, INPUT can develop a general model of how that agency is likely to spend its money. (Because it is so political, there are no guarantees.)

Within some limits of realism, secondary market characteristics can also be identified. However, as the level of detail increases, the sources rapidly become more unreliable, even for past fiscal years.

C

Reconciliation of INPUT's 1993 and 1994 Forecasts

Outside forces can substantially change the direction of any market. In this market, the expected economic, physical and competitive factors are further skewed by domestic and international geopolitical forces that are highly unpredictable. Outside events, like the end of the Cold War, unstable political environment in Eastern Europe, the foreign trade imbalance, aftermath of Desert Storm and a difficult first half of the new Administration all complicate the forecasting process. Forecast reconciliation is used by INPUT to see how closely these factors have been considered.

Two parts of the forecast will be considered. Part I addresses the primary service modes, and Part II addresses the alternate markets.

Exhibit A-3

Federal IT Market Forecast, FYs 1994-1999, Database, Part II

INPUT Service Modes		Total 1994 Estim.	Total 1995 Forecast	Total 1996	Total 1997	Total 1998	Total 1999	CAGR '94-'99 (%)
Systems Integration Market	Professional Services	1.2	1.3	1.5	1.6	1.7	1.9	9
	Equipment Systems	2.0	2.1	2.3	2.6	2.7	2.8	7
	Software Products	0.3	0.3	0.3	0.4	0.4	0.5	11
	Other Services	0.2	0.2	0.2	0.2	0.3	0.3	12
	Subtotal	3.6	4.0	4.4	4.7	5.1	5.4	8
Office Information Systems	Processing Services	*	*	*	*	*	*	0
	Software Products	0.2	0.2	0.3	0.3	0.3	0.3	6
	Professional Services	0.2	0.2	0.3	0.3	0.3	0.3	9
	Turnkey Systems	0.1	0.1	0.1	0.1	0.1	0.1	3
	Equipment	0.9	0.9	1.0	1.0	1.0	1.1	3
	Subtotal	1.4	1.5	1.6	1.7	1.7	1.8	5

Exhibit A-3

Electronic Commerce/ EDI	Computer Equipment	0.1	0.1	0.1	0.1	0.1	0.1	4
	Software Products	0.1	0.1	0.1	0.1	0.1	0.1	4
	Professional Services	*	*	*	*	*	*	9
	Networks	*	*	*	*	*	*	13
	Subtotal	0.2	0.2	0.2	0.2	0.2	0.2	5
Computer Equipment Market	Micro-computers	1.5	1.6	1.7	1.9	1.9	2.0	5
	Workstations	0.5	0.6	0.6	0.7	0.8	0.8	9
	Midsize Systems	1.3	1.3	1.3	1.3	1.3	1.3	0
	Large-Scale Systems	2.8	2.9	2.9	3.0	3.1	3.2	3
	Super-computers	0.5	0.6	0.6	0.6	0.6	0.6	2
	Subtotal	0.6	0.6	0.6	0.6	0.7	0.7	3
Computer Security Market	Professional Services	0.2	0.2	0.2	0.2	0.3	0.3	6
	Software Products	*	*	*	*	*	*	1
	Equipment	0.4	0.4	0.4	0.4	0.4	0.4	1
	Subtotal	0.6	0.6	0.6	0.6	0.7	0.7	3

Exhibit A-3

Computer Equipment Maintenance	Large-Scale Systems	0.8	0.8	0.8	0.8	0.9	0.9	3
	Midsize Systems	1.1	1.2	1.2	1.3	1.3	1.4	4
	PCs/ Workstations	0.8	0.8	0.8	0.7	0.7	0.7	-2
	Ancillary Services	0.2	0.2	0.3	0.3	0.3	0.3	12
	Subtotal	2.9	3.0	3.0	3.1	3.2	3.3	3

*- Less than $100 million, Figures in $ billion

1. Part I Reconciliation

Part I compares the same primary service modes/markets as Exhibit A-2, which corresponds to the federal IT budget requests. Discussion will focus on those significant differences in money and as a percentage of the 1993 forecast. Each part will begin with examination of the FY 1994 near-term results and look at the out-year results for FY 1998. Exhibit A-4 shows this examination.

For FY 1994, the most significant difference is the overall shift toward professional services. Spending levels in FY 1993 began the increase, and FY 1995 budget numbers continued the growth. In large part, this is due to reductions in the federal workforce, particularly in Defense, and uncertain program direction in FY 1994 resulting from the Administration's National Performance Review. Many large programs are being delayed in anticipation of new priorities and approval of deficit reduction measures.

Processing services and maintenance are continuations of existing capabilities. In previous years they experienced substantial growth resulting from delays in other product/service markets. The decrease in maintenance and processing services anticipated for FY 1994 indicates a decision to replace or upgrade many installed computer systems.

The increases in software development (17%) and in turnkey systems (18%) suggest a move toward shorter application development times with products that have been tested successfully in the open market.

The variances are much smaller in the FY 1998 comparison. The overall market shows a decline of only $750 million from the 1993 forecast. The loss leaders appear to be leased circuits ($760 million) and network services ($389 million). Other significant losses occur in replacement systems ($334 million). Professional services, up by 29% for a variance of $817 million leads all growth categories. It was noted in Chapter IV of this report that a great deal of dependency was transfering to professional services.

The continued shortfall in processing services was also discussed in Chapter IV. The decline of this market is more rapid than thought earlier.

Overall, this year's FY 1994 estimate is only 2% ($377 million) lower than forecast for FY 1994 last year. This year's forecast for FY 1998 is only 3% ($750 million) lower than forecast for last year.

Exhibit A-4

Federal Market Forecast Reconciliation
1993 vs. 1994 Forecasts for FY 1994 and FY 1998, Part I

INPUT SERVICE MODES	FORECAST FOR FY 1994				FORECAST FOR FY 1998				'93-'98	'93-'98
	1993 ($ bil)	1994 ($ bil)	Var. ($mil)	Var. %	1993 ($ bil)	1994 ($ bil)	Var. ($ mil)	Var. %	CAGR '93(%)	CAGR '94(%)
Processing Services	0.2	0.1	-54	-28	0.2	0.1	35	20	-3	-3
Transactions	0.2	0.1	-44	-28	0.1	0.1	28	20	-3	-3
Utility/ Batch	*	*	-10	-27	*	*	6	18	-3	-3

Exhibit A-4

Professional Services	2.2	2.6	392	19	2.8	3.7	817	29	5	9
Software Development	1.4	1.7	242	17	2.0	2.4	405	20	7	9
Design & Consulting	0.4	0.5	80	19	0.6	0.7	167	30	5	9
Education & Training	0.3	0.4	68	20	0.3	0.5	244	82	2	8
Outsourcing	1.6	1.5	-95	-10	1.8	1.7	-54	-3	4	4
Systems Ops (COCO)	0.4	0.4	-35	-9	0.4	0.4	-29	-7	4	3
Systems Ops (GOGO)	1.2	1.1	-61	-5	1.4	1.3	-26	-2	4	4
Software Products	1.0	1.1	679	7	1.1	1.4	117	10	2	4
Application Software	0.7	0.7	44	7	0.8	0.8	18	2	4	4
Systems Software	0.4	0.4	23	6	0.4	0.4	98	28	-1	4
Comm/ Network	4.6	4.5	-106	-2	7.3	6.3	-979	-13	11	6
Leased Circuits	2.4	2.3	-75	-3	4.2	3.4	-760	-18	13	7
Equipment	0.5	0.5	-17	-3	0.6	0.5	-51	-9	3	0
Professional Services	0.4	0.4	33	8	0.4	0.6	220	60	-2	7
Network Services	1.3	1.2	-45	-4	2.2	1.8	-389	-18	13	7

Exhibit A-4

SI - Professional Services	1.2	1.2	518	4	1.6	1.7	157	10	7	8
Computer Systems	4.9	4.4	-482	-10	5.6	5.1	-517	-13	3	3
Turnkey Systems	1.5	1.4	-117	18	1.9	1.9	-4	31	5	7
New Systems	1.7	1.8	53	-19	1.3	1.1	-179	-27	-9	-9
Replacement Systems	1.6	1.2	-418	-19	2.4	2.2	-334	-26	11	11
Computer Maintenance	1.3	1.2	-99	-8	1.4	1.3	-57	-4	3	3
TOTAL CONTRACTED OUT	18.6	18.3	-377	-2	23.8	23.0	-750	-3	6	6

* - Less than $100 million

2. Part II Reconciliation

This reconciliation deals with more specific markets than in Part I, covering the same markets as Part II of the market forecast database (Exhibit A-3). This material is shown in Exhibit A-5, with none of the variances as great as they were in the Part I comparison, with the exception of maintenance, discussed in Part I.

Exhibit A-5

Federal Market Forecast Reconciliation
1993 vs. 1994 Forecasts for FY 1994 and FY 1998, Part II

INPUT SERVICE MODES	FORECAST FOR FY 1994				FORECAST FOR FY 1998				'93-'98	'93-'98
	1993 ($ bil)	1994 ($ bil)	Var. ($mil)	Var. %	1993 ($ bil)	1994 ($ bil)	Var. ($ mil)	Var. %	CAGR '93(%)	CAGR '94(%)
Systems Integration	3.8	3.6	-174	-5	5.2	5.1	-142	-3	7	7
Professional Services	1.2	1.2	-51	-4	1.6	1.7	143	9	7	8
Computer Equipment	2.2	2.0	-237	-11	2.9	2.7	-175	-6	6	6
Software Products	0.4	0.3	-18	-5	0.4	0.4	-4	-1	10	9
Other Services	0.2	0.2	-20	-1	0.3	0.3	-6	-2	11	10
Office Info Systems	1.4	1.4	-4	0	1.6	1.7	138	9	2	3
EC/EDI	0.2	0.2	-3	0	0.2	0.2	2	1	3	4

Exhibit A-5

Computer Equipment	7.2	6.7	-515	-7	8.1	7.7	-465	-6	2	3
Micro-computers	1.7	1.5	-119	-7	1.9	1.9	26	1	3	5
Workstations	0.5	0.5	30	6	0.9	0.8	-48	-6	10	10
Midsize Systems	1.4	1.3	-31	-2	1.5	1.3	-199	-13	-1	-2
Large-Scale Systems	3.3	2.8	-466	-14	3.3	3.1	-210	-6	1	3
Super-computers	0.4	0.5	69	-9	0.6	0.5	-32	-6	6	7
Computer Security	0.6	0.6	72	12	0.7	0.7	17	3	1	2
Computer Maintenance	3.1	2.8	-292	-9	3.4	3.2	-187	-6	4	3
Large-Scale Systems	0.8	0.8	-55	-7	0.9	0.9	-50	-6	3	3
Midsize Systems	1.2	1.1	-130	-11	1.4	1.3	-77	-5	5	5
PCs/ Workstations	0.8	0.8	-41	-5	0.7	0.7	-41	-6	-1	-2
Ancillary Services	0.2	0.2	-42	-19	0.3	0.3	-19	-6	13	12

In Part II, the computer equipment market lost funding included in other primary markets, resulting in a negative variance of $515 million, a 7% drop from the 1993 forecast.

For two years in a row, this market has lost ground in larger proportions than forecast. As noted earlier in Chapter IV, competitive markets are forcing lower unit costs. Because this condition should increase by FY 1998, the variance is expected to increase with an overall drop in costs of $465 million.

Significant downward adjustments continue to occur in the systems integration mode. This year's forecast for FY 1994 spending is $174 million less than (or 9% reduction in) 1993's forecast for FY 1994 spending.

Other service modes of the market show a similar reduction in percent of spending except workstations, supercomputers and computer security. All segments of this mode show relatively minor variations in the FY 1994 comparisons for the two years.

The largest FY 1998 negative variance of $465 million for computer equipment is supported by reductions across all platforms except microcomputers. Midsize and large-scale platforms lead the decline as more and more applications are developed for desktop and network processors. The negative variance of $142 million in systems integration is mostly the result of a significant decrease in computer equipment as part of a systems integration contract. Professional services is an offsetting positive variance of systems integration.

B
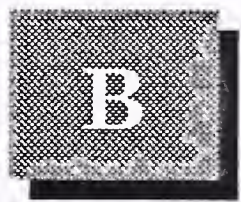
Definitions

The definitions in this appendix include hardware, software, services and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.

The federal government's unique, non-technical terminology, associated with applications, documentation, budgets, authorization and the procurement/acquisition process, is included in Appendix C, *Glossary of Federal Acronyms*.

A
Overall Definitions and Analytical Framework

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

- Processing of specific applications using vendor-provided systems (called *Processing Services*)

- A combination of hardware, packaged software and associated support services that will meet a specific application processing need (called *Turnkey Systems*)

- Packaged software (called *Software Products*)

- People services that support users in developing and operating their own information systems (called *Professional Services*)

- Bundled combinations of products and services where the vendor assumes responsibility for the development of a custom solution to an information system problem (called *Systems Integration*)

- Services that provide operation and management of all or a significant part of a user's information systems functions under a long-term contract (called *Systems Operations*)

- Services associated with the delivery of information in electronic form, typically network-oriented services such as value-added networks, electronic mail and document interchange, on-line databases, on-line news and data feeds, video text, etc. (called *Network Services*)

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

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

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

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

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

- Double counting, which can occur by estimating total vendor revenues when there is significant reselling within the industry (e.g., software sales to turnkey vendors for repackaging and resale to users)

- Missed counting, which can occur when users sales go through indirect channels such as mail order retailers.

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

Of the eight product/service markets defined by INPUT, five are considered primary products or services:

- Processing Services

- Network Services

- Professional Services

- Applications Software Products

- Systems Software Products

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

- Turnkey Systems

- Systems Operations

- Systems Integration

Section B describes the product/service markets and their structure in more detail.

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

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

B
Industry Structure and Product/Service Markets

1. Services Categories

Exhibit B-1 presents the structure of the information services industry. Several of the product/service markets can be grouped into higher-level *Service Categories*, based on the kind of problem the user needs to solve. These categories are:

- *Business Application Solutions* (BAS)—Prepackaged or standard solutions to common business applications. These applications can be either industry-specific (e.g., mortgage loan processing for a bank), cross-industry (e.g., payroll processing) or generic (e.g., utility time sharing). In general, BAS services involve minimal customization by the vendor and allow the user to handle a specific business application without having to develop or acquire a custom system or system resources. The following product/service markets are included under BAS:

  - Processing Services

  - Applications Software Products

  - Turnkey Systems

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

  - Systems Operations

- Systems Integration

Each of the remaining three product/service markets represents a separate service category:

- Professional Services

- Network Services

- Systems Software Products

Note: These service categories are a new concept introduced in 1990. They are purely an aggregation of lower-level product/service market data and do not change the underlying product/service markets or industry structure.

2. Software Products

There are many similarities between the applications and systems software product/service markets. Both involve user purchases of software packages for in-house computer systems. Included are lease and purchase expenditures, 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 here.

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

Exhibit B-1

Information Services Industry Structure – 1994

Systems Software Products
- Mainframe
- Minicomputer
- Workstation/PC

Applications Software Products
- Mainframe
- Minicomputer
- Workstation/PC

Turnkey Systems
- Equipment
- Software Products
- Professional Services

Professional Services
- IS Consulting
- Business Process Reengineering
- Education & Training
- Software Development Maintenance

Systems Integration
- Equipment
- Software Products
- Professional Services
- Other

Outsourcing
- Platform Operations
- Applications Operations
- Desktop Services
- Network Management
- Applications Management

Processing Services
- Transaction
- Utility
- Other

Network-Based Services
- Electronic Information Services
- Network Applications

MMMF

- Software products have several subcategories, as indicated below and shown in Exhibit B-2.

3. Systems Software Products

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

- *Systems Control Products*—Software programs that function during application program execution to manage computer system resources and control the execution of the application program. These products include operating systems, emulators, network control, library control, windowing, access control and spoolers.

- *Operations Management Tools*—Software programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Included are performance measurement, job accounting, computer operation scheduling, disk management utilities and capacity management.

- *Applications Development Tools*—Software programs used to prepare applications for execution by assisting in designing, programming, testing and related functions. Included are also traditional programming languages, 4GLs, data dictionaries, database management systems, report writers, project control systems, CASE systems and other development productivity aids. Also included are system utilities (e.g., sorts) that are directly invoked by an applications program.

4. Applications Software Products

- *Industry-Specific Applications Software Products*—Software products that perform functions related to solving business or organizational needs unique to a specific vertical market and sold to that market only. Examples include demand deposit accounting, MRPII, medical record keeping, automobile dealer parts inventory, etc.

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

Exhibit B-2

Software Products

```
                          ┌─────────────────┐
                          │     Systems     │
                          │    Software     │
                          └─────────────────┘
          ┌──────────────────────┼──────────────────────┐
┌─────────────────┐    ┌─────────────────┐    ┌─────────────────────┐
│     Systems     │    │   Data Center   │    │    Applications     │
│     Control     │    │   Management    │    │  Development Tools  │
└─────────────────┘    └─────────────────┘    └─────────────────────┘
```

Systems Control

• Access Control
• Communications Monitors
• Micro-Mainframe Links
• Network Control
• Operating Systems
• Security Systems
• System Library Control
• Windowing Systems
• Other

Data Center Management

• Capacity Management
• Computer Operations
  Scheduling
• Data Center Management
• Disk Management
• Downtime/Repair
  Monitoring Management
• Job Accounting
• Performance Monitors
• Tape Management
• Utilities
• Other

Applications Development Tools

Program Development and Production Tools

• Applications Generators
• Assemblers
• Automatic Documentation
• Configuration Management
• Debugging Aids
• Languages
  (All Generations)
• Systems Development
  Control
• Retrieval Systems
• Translators
• 4GL
• I-CASE
• Other

Database Management Systems

• Database Management
  Systems
• Data Dictionaries
• Other

5. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged or custom application software into a single system developed to meet a specific set of user requirements. Value added by the turnkey system vendor is primarily in the software and support services provided. Most CAD/CAM

systems and many small business systems are turnkey systems. Turnkey systems utilize standard computers and do not include specialized hardware such as word processors, cash registers, process control systems or embedded computer systems for military applications.

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

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

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

Turnkey systems are divided into two categories:

- *Industry-Specific Systems*—Include systems that serve a specific function for a given industry sector, such as automobile dealer parts inventory, medical record keeping or discrete manufacturing control systems.

- *Cross-Industry Systems*—Include systems that provide a specific function that is applicable to a wide range of industry sectors, such as financial planning systems, payroll systems or personnel management systems.

6. Processing Services

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

- *Transaction Processing*—A client uses vendor-provided information systems including hardware, software and/or data networks at vendor site or customer site to process transactions and update client databases. Transactions may be entered in one of four modes:

- *Interactive*—Characterized by the interaction of the users with the system for data entry, transaction processing, problem solving and report preparation: the user is on-line to the programs/files stored on the vendor's system.

- *Remote Batch*—Where the user transmits batches of transaction data to the vendor's system, the vendor is allowed to schedule job execution according to overall client priorities and resource requirements.

- *Distributed Services*—Users maintain portions of an application database and enter or process some transaction data at their own site, while also being connected through communications networks to the vendor's central systems for processing other parts of the application.

- *Carry-in Batch*—Users physically deliver work to a processing services vendor.

Utility Processing—Vendor provides basic software tools (language compilers, assemblers, DBMSs, graphics packages, mathematical models, scientific library routines, etc.), generic applications programs and/or databases, enabling clients to develop their own programs or process data on vendor's system.

Other Processing Services—Vendor provides services usually at a vendor site such as scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services, backup and disaster recovery, etc.

7. Systems Operations

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

- *Professional Services*—The vendor provides personnel to operate client-supplied equipment. Prior to 1990, this was a submarket of the Professional Services product/service market.

- *Processing Services*—The vendor provides personnel, equipment and (optionally) facilities. Prior to 1990, this was a submarket of the Processing Services product/service market.

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

There are two general levels of systems operations:

- *Platform/network operations*—where the vendor operates the computer system and/or network without taking responsibility for the applications.

- *Application operations*—where the vendor takes responsibility for the complete system, including equipment, associated telecommunications networks and applications software.

Note: Systems Operations was introduced as a product/service market in 1990.

8. Systems Integration (SI)

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

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

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

- Program management, including subcontractor management

- Needs analysis

- Specification development

- Conceptual and detailed systems design and architecture

- System component selection, modification, integration and customization

- Custom software design and development

- Custom hardware design and development

- Systems implementation, including testing, conversion and post-implementation evaluation and tuning

- Life cycle support, including:

  - System documentation and user training

  - Systems operations during development

  - Systems maintenance

  - Financing

9. Professional Services

This category includes consulting, education and training as well as software development:

- *Consulting*—These services include management consulting (related to information systems), information systems consulting, feasibility analysis and cost-effectiveness studies and project management assistance. Services may be related to any aspect of information systems, including equipment, software, networks and systems operations.

- *Education and Training*—Products and services related to information systems and services for the professional user, including computer-aided instruction, computer-based education and vendor instruction of user personnel in operations, design, programming and documentation.

- *Software Development*—Services include user requirements definition, systems design, contract programming, documentation and implementation of software performed on a custom basis. Conversion and maintenance services are also included.

10. Network Services

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

11. Electronic Information Services

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

The two kinds of electronic information services are:

- *On-line Databases*—These are structured, primarily numerical data on economic and demographic trends, financial instruments, companies, products, materials, etc.

- *News Services*—Includes unstructured, primarily textual information on people, companies, events, etc.

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

12. Network Applications

Value-Added Network (VAN) Services—Enhanced transport services that involve adding such functions as automatic error detection and

correction, protocol conversion and store-and-forward message switching to the provision of basic network circuits.

Originally, VAN services were provided solely by specialized VAN carriers (Tymnet, Telenet, etc.). Today these services are also offered by traditional common carriers (AT&T, Sprint, etc.). Meanwhile, the VAN carriers have also branched into the traditional common carriers' markets and are offering unenhanced basic network circuits as well.

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

- *Electronic Data Interchange (EDI)*—Includes application-to- . application exchange of standardized business documents between trade partners or facilitators. This exchange is commonly performed using VAN services. Specialized translation software is typically employed to convert data from organizations' internal file formats to EDI interchange standards; this software may be provided as part of the VAN service or may be resident on the organization's own computers.

- *Electronic Information Exchange (EIE)*: also known as Electronic Mail (E-mail)—Involves the transmission of messages across an electronic network managed by a services vendor, including facsimile transmission (FAX), voice mail, voice messaging and access to Telex, TWX and other messaging services. This also includes bulletin board services.

- *Other Network Services*—This segment contains video text and pure network management services. Video text is actually more a product/service market than an application. Its prime focus is on the individual as a consumer or in business. These services provide interactive access to databases and offer the inquirer the capability to send as well as receive information for such purposes as home shopping, home banking, travel reservations, etc.

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

C

Hardware/Hardware Systems

- *Hardware*—Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals*—Includes all input, output, communications and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals.

- *Input Devices*—Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors and analog-to-digital converters.

- *Output Devices*—Includes printers, CRTs, projection television screens, micrographics processors, digital graphics and plotters.

- *Communication Devices*—Includes modem, encryption equipment, special interfaces and error control.

- *Storage Devices*—Includes magnetic tape (reel, cartridge and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

- Terminals—Three types of terminals are described below:

  A. *User Programmable*—also called intelligent terminals, including the following:

  - Single-station or standalone

  - Multistation, shared processor

  - Teleprinter

  - Remote batch

  B. User Nonprogrammable

  - Single-station

  - Multistation, shared processor

- Teleprinter

C. Limited Function—originally developed for specific   needs, such as point-of-sale (POS), inventory data collection, controlled access and other applications

- *Hardware Systems*—Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- *Microcomputer*—Combines all of the CPU, memory and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in various forms including:

  - Integrated circuit package

  - Plug-in boards with increased memory and   peripheral circuits

  - Console including keyboard and interfacing connectors

  - Personal computer with at least one external storage device directly addressable by the CPU

  - An embedded computer that may take a number of shapes or configurations

- *Workstations*—Include high-performance, desktop, single-user computers employing (primarily) Reduced Instruction Set Computing (RISC). Workstations provide integrated, high-speed, local network-based services such as database access, file storage and back-up, remote communications and peripheral support. Typical workstation products are provided by Apollo (now a unit of Hewlett-Packard), Sun, Altos, DEC (the MicroVAX) and IBM. These products usually cost more than $15,000. However, at this writing many companies have recently announced sizable price cuts.

- *Midsize Systems*—Describe superminicomputers and the more traditional business minicomputers. Due to steadily improving design and technology, the latter have outgrown traditional definitions (which defined small systems as providing 32-bit to 64-

bit word lengths at prices ranging from $15,000 to $350,000). Increasingly, minicomputers and workstations meet the 32-bit definition, and may go beneath the $15,000 lower price limit. Typical midrange systems include IBM System/3X, 43XX, AS/400 and 937X product lines, DEC PDP and VAX families (excluding MicroVAX families), and competitive products from a wide range of vendors, including HP, Data General, Wang, AT&T, Prime Concurrent, Gould, Unisys, NCR, Bull, Harris, Tandem, Stratus and many others.

- *Large Computer*—Is presently centered on storage controllers, but likely to become bus-oriented and consist of multiple processors or parallel processor. Intended for structured mathematical and signal processing and typically used with general-purpose, Von Neumann-type processors for system control. This term usually refers to traditional mainframes and supercomputers.

- *Supercomputer*—Includes high-powered processors with numerical processing throughput that is significantly greater than the fastest general-purpose computers, with capacities in the 100-500 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words and on-line storage in the one-to-four gigabyte class, are labeled Class V to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

- Real Time—Generally used for signal processing in military applications

- Non-Real Time—For scientific use in one of three configurations:

  - Parallel processors

  - Pipeline processor

  - Vector processor

- *Supercomputer*—Also applied to micro, mini and large mainframe computers with performance substantially higher than attainable by Von Neumann architecture.

- *Embedded Computer*—A dedicated computer system designed and implemented as an integral part of a weapon, weapon system or platform; critical to a military or intelligence mission such as

command and control, cryptological activities or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. These systems may vary in capacity from microcomputers to parallel processor computer systems.

D

General Definitions

Analog—Signal or transmission-type with continuous waveform representation

ASCII—(American National Standard Code for Information Interchange) Eight-bit code with seven data bits and one parity bit

Asynchronous—Communications operation (such as transmission) without continuous timing signals; synchronization is accomplished by appending signal elements to the data

Bandwidth—Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity

Baud—Number of signal events (discrete conditions) per second; typically used to measure modem or terminal transmission speed

Byte—Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or numeral)

CBX (Computerized Branch Exchange)—A PABX based on a computer system, implying programmability and usually voice and data capabilities

Central Processing Unit (CPU)—The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions

Centrex—Central office telephone services that permit local circuit switching without installation of customer premises equipment; could be described as shared PBX service

Circuit Switching—Connects two or more network stations and permits exclusive circuit use until the connection is released; typical of

the voice telephone network, where a circuit is established between the caller and the called party

CO (Central Office)—Local telco site for one or more exchanges

CODEC (Coder/decoder)—Equivalent to modem for digital devices

Constant Dollars—Growth forecasts in constant dollars make no allowance for inflation or recession; dollar value is based on the year of the forecast unless otherwise indicated

Computer System—Combination of computing resources required to perform the designed functions; may include one or more CPUs, machine room peripherals, storage systems and/or applications software

CPE (Customer Premises Equipment)—DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company; may include switchboards, PBX, data terminals and telephone answering devices

CSMA/CD (Carrier Sense Multiple Access/Collision Detect)—Contention protocol used in local-area networks, typically with a multipoint configuration

Current Dollars—Estimates or values expressed in current-year dollars that, for forecasts, would include an allowance for inflation

Data Encryption Standard (DES)—Fifty-six-bit key, one-way encryption algorithm adopted by NIST in 1977, implemented through hardware ("S-boxes") or software and designed by IBM with NSA guidance

Datagram—A self-contained packet of information that does not depend on the contents of preceding or following packets and has a finite length

DCA (IBM's Document Content Architecture)—Protocols for specifying document (text) format that are consistent across a variety of hardware and software systems within IBM's DISOSS

DCE (Data Circuit-terminating Equipment)—Interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain and terminate a connection, including signal conversion and coding

DDCMP (Digital Data Communications Message Protocol)—Data link protocol used in Digital Equipment Company's DECNET

DECNET—Digital Equipment Company's network architecture

Dedicated Circuit—A permanently established network connection between two or more stations; contrast with switched circuit

DEMS (Digital Electronic Message Service)—Nationwide common carrier digital networks that provide high-speed, end-to-end, two-way transmission of digitally encoded information using the 10.6 GHz band

DIA (IBM's Document Interchange Architecture)—Protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS

Digital—Signal or transmission type using discontinuous, discrete quantities to represent data

DISOSS (IBM's Distributed Office Support System)—Office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision

Distributed Data Processing—The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's needs

DTE (Data Terminal Equipment)—Hardware which is a data source, link or both, such as video display terminals that convert user information into data transmission, and reconvert data signals into user information

EBCDIC (Extended Binary Coded Decimal Interchange Code)—Eight-bit code typically used in IBM mainframe environments.

EFT (Electronic Funds Transfer)

Encryption—Electric, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points

Engineering Change Notice (ECN)—Product improvements after production

Engineering Change Order (ECO)—The follow-up to ECNs, including parts and a bill of materials to effect the change in the hardware

Equipment Operators—Individuals operating computer-controlled consoles and/or peripheral equipment (Bureau of Labor Statistics)

Erasable Disk—A type of hybrid, magneto-optic disk that allows users to erase data previously written; erasable disks are used for applications where data may need to be updated periodically

Ethernet—Local-area network developed by Xerox PARC using baseband signaling, CSMA/CD protocol and coaxial cable to achieve a 10-mbps data rate

Facsimile—Transmission and reception of graphic data, usually fixed images of documents, through scanning and conversion of a picture signal

FDM (Frequency Division Multiplexing)—A multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels

FEP (Front-End Processor)—Communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers

Field Engineer (FE)—Field engineer, customer engineer, service person and maintenance person are used interchangeably and refers to the individual who responds to a user's service call to repair a device or system

Full-Duplex—Bi-directional communications, with simultaneous, two-way transmission

General-Purpose Computer System—A computer designed to handle a wide variety of problems, including machine room peripherals, systems software and small business systems

Half-Duplex—Bi-directional communications, but only in one direction at a time

Hardware Integrator—Develops system interface electronics and controllers for the CPU, sensors, peripherals and all other ancillary hardware components; the hardware integrator also may develop

control system software in addition to installing the entire system at the user site

HDLC (High-level Data Link Control)

Hertz—Number of signal oscillations (cycles) per second, abbreviated Hz

IBM Token Ring—IBM's local-area network using baseband signaling and operating at 4 mbps on twisted-pair copper wire; actually a combination of star and ring topologies—IEEE 802.5-compatible

IDN (Integrated Digital Network)—Digital switching and transmission; part of the evolution to ISDN

Independent Suppliers—Suppliers of machine room peripherals, though usually not suppliers of general-purpose computer systems

Information Processing—Data processing as a whole, including use of business or scientific computers.

Installed Base—Cumulative number or value (cost when new) of computers in use

Interconnection—Physical linkage between devices on a network

Interoperability—The capability to operate with other devices on a network; different from interconnection, which merely guarantees a physical network interface

ISDN (Integrated Services Digital Network)—Completely digital, integrated voice and nonvoice public network service; not clearly defined through any existing standards, although FCC and other federal agencies are developing CCITT recommendations

Keypunch Operators—Individuals operating keypunch machines (similar to electric typewriters) to transcribe data from source materials onto punch cards

Lease Line—Permanent connection between two network stations; also known as dedicated or nonswitched line

Machine Repairers—Individuals who install and periodically service computer systems

Machine Room Peripherals—Peripheral equipment generally located close to the central processing unit

Mainframe—The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more

MAP (Manufacturing Automation Protocol)—Seven-layer communications standard for factory environments promoted by General Motors/EDS; adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture

Mean Time to Repair—The mean of elapsed time from the arrival of the field engineer on the user's site to the time when the device is repaired and returned to user service

Mean Time to Respond—The mean of elapsed time from the user's call for services and the arrival of the field engineer on the user's site

Message—A communication intended to be read by a person; the quality of the received document need not be high, only readable and graphic materials are not included

MMFS (Manufacturing Messaging Format Standard)—Application-level protocol included within MAP

Modem—A device that encodes information into electronically transmittable form (MOdulator) and restores it to original analog form (DEModulator)

NCP (Network Control Program)—Software used in IBM 3705/3725 FEPs for control of SNA networks

Node—Connection point of three or more independent transmission points that may provide switching or data collection

Off-Line—Pertaining to equipment or devices that can function without direct control of the central processing unit

On-Line—Pertaining to equipment or devices under direct control of the central processing unit

Optical Disk—Storage device that uses laser technology to record data; optical disks provide high storage capacity, but cannot be overwritten

OSI (ISO reference model for Open Systems Interconnection)—Seven-layer architecture for application, presentation, session, transport, network, data link and physical services and equipment

OSI Application Layer - Layer 7—Providing user applications services for data processing

OSI Data Link Layer - Layer 2—Providing transmission protocols, including frame management, link flow control and link initiation/release

OSI Network Layer - Layer 3—Providing call establishment and clearing control through the network nodes

OSI Physical Layer - Layer 1—Providing the mechanical, electrical, functional and procedural characteristics to establish, maintain and release physical connections to the network

OSI Presentation Layer - Layer 6—Providing data formats and information such as data translation, data encoding/decoding and command translation

OSI Session Layer - Layer 5—Establishes, maintains and terminates logical connections for the transfer of data between processes

OSI Transport Layer - Layer 4—Providing end-to-end terminal control signals such as acknowledgments

Overseas—Not within the geographical limits of the continental United States, Alaska, Hawaii and U.S. possessions

PABX (Private Automated Branch Exchange)—Hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises

PAD (Packet Assembler-Disassembler)—A device that enables DTE not equipped for packet switching operation to operate on a packet switched network

PBX (Private Branch Exchange)—Hardware that provides local circuit switching on the customer premise

PCM (Pulse-Code Modulation)—Modulation involving conversion of a waveform from analog to digital form through coding

PDN (Public Data Network)—A network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public

Peripherals—Any unit of input/output equipment in a computer system, exclusive of the central processing unit

PPM (Pulse Position Modulation)

Private Network—A network established and operated for one user or user organization

Programmers—Persons mainly involved in designing, writing and testing computer software programs

Protocols—The rules for communication system operation that must be followed if communication is to be effected and protocols may govern portions of a network or service; in digital networks, protocols are digitally encoded as instructions to computerized equipment

Public Network—A network established and operated for more than one user with shared access, usually available on a subscription basis (see related international definition of PDN)

Read-Only—A type of disk that is prerecorded and can be used for retrieving data; a read-only disk cannot be overwritten and a read-only system will retrieve and display stored data, but the system cannot alter the stored data

Read/Write—A type of disk that can be read and written upon and a read/write system will read and display stored data and alter data already recorded

Scientific Computer System—A computer system designed to process structured mathematics (such as Fast Fourier Transforms), and complex, highly redundant information (such as seismic data, sonar data and radar), with large, on-line memories and very high-capacity output

SDLC (Synchronous Data Link Control)—IBM's data link control for SNA and supports a subset of HDLC modes

SDN (Software-Defined Network)

Security—Physical-, electrical- and computer- (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations

Service Delivery Point—The location of the physical interface between a network and customer/user equipment

Simplex—Unidirectional communications

Smart Box—A device for adapting existing DTE to new network standards such as OSI and includes PADs and protocol convertors, for example

SNA (Systems Network Architecture)—Seven-layer communications architecture designed by IBM; layers correspond roughly but not exactly to OSI model

Software—Computer programs

Supplies—Includes materials associated with the use of operations of computer systems, such as printer paper, keypunch card, disk packs and tapes

Switched Circuit—Temporary connection between two network stations established through dial-up procedures

Synchronous—Communications operation with separate, continuous clocking at both sending and receiving stations

Systems Analyst—Individual who analyzes problems to be converted to a programmable form for application to computer systems

Systems House—Vendor that acquires, assembles and integrates hardware and software into a total system to satisfy the data processing requirements of a user; the vendor may also develop systems software products for license to users; the systems house vendor does not manufacture mainframes

Systems Integrator—Systems house vendor that develops systems interface electronics, applications software and controllers for the CPU, peripherals and ancillary subsystems that may have been provided by a contractor or the government (GFE); this vendor may

either supervise or perform the installation and testing of the completed system

T1—Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels

TDM (Time Division Multiplexing)—A multiplexing method that interleaves multiple transmissions on a single circuit by assigning a different time slot to each channel

Token Passing—Local-area network protocol that allows a station to transmit only when it has the "token", an empty slot on the carrier

TOP (Technical Office Protocol)—Developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP

Turnkey System—System composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application

Twisted-Pair Cable—Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs

User—One who is using a product or service to accomplish his or her own functions; the user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing and installation; alternately, the user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor

Verification and Validation—Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all the functions specified by the user

Voice-Grade—Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system, nominally a 4 KHz user

VTAM (Virtual Telecommunications Access Method)—Host-resident communications software for SNA networks

WORM (Write-Once, Read-Many)—Type of disk that can be created one time; once written on, the disk can only be read, otherwise data will be destroyed

Write-Once—A type of disk that can be created one time; once written on, the disk can only be read and cannot be rewritten

E
Other Considerations

When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures are then categorized according to the users' perception of the purchase.

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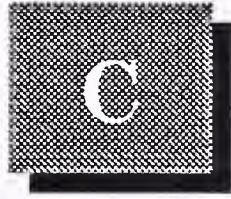
Glossary of Federal Abbreviation

The federal government's procurement language uses a combination of abbreviations, acronyms, phrases and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering and law with new applications and technology.

Abbreviations and contract terms that INPUT encountered most often in program documentation and interviews for this report are included here, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency abbreviations have been included to the extent they are employed in this report.

A

Federal Agency Abbreviations

AAS	Automatic Addressing System
AATMS	Advanced Air Traffic Management System
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHz Satellite Program)
ACT-1	Advanced Computer Techniques (Air Force)
ACWP	Actual Cost of Work Performed
Ada	DoD high-order language
ADA	Airborne Data Acquisition

ADL	Authorized Data List
ADNET	Anti-Drug Network
ADS	Automatic Digital Switches (DCS)
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association
AFR	Air Force Regulation
AGE	Aerospace Ground Equipment
AIP	Array Information Processing
AIPC	Automated Information Processing Center
AIS	Automated Information System
AMD	Acquisition Management Directorate
AMPE	Automated Message Processing Equipment
AMPS	Automated Message Processing System
AMSDL	Acquisition Management Systems Data List
ANG	Army National Guard
AP(P)	Advance Procurement Plan
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch
APR	Agency Procurement Request
ARB	Acquisition Review Board
ARPANET	DARPA network of scientific computers
ASP	Aggregated Switch Procurement
ASR	Acquisition Strategy Report

ATLAS	Abbreviated Test Language for All Systems (for ATE Automated Test Equipment)
Authorization	In the legislative process programs, staffing and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army
BA	Basic Agreement or Budget Authority
BAFO	Best And Final Offer
Base level	Procurement, purchasing, and contracting at the military installation level
BCA	Board of Contract Appeals
BCE	Baseline Cost Estimate
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder
BML	Bidders Mailing List qualified vendor information filed annually with federal agencies to automatically receive RFPs and RFQs in areas of claimed competence
BOA	Basic Ordering Agreement
B&P	Bid and Proposal vendor activities in response to government solicitation/specific overhead allowance
BPA	Blanked Purchase Agreement
Budget	Federal Budget, proposed by the president and subject to Congressional review

BY	Budget Year or Base Year
C2	Command and Control
C3	Command, Control and Communications
C4	Command, Control, Communications and Computers
C3I	Command, Control, Communications and Intelligence
CAB	Contract Adjustment Board or Contract Appeals Board
CADE	Computer-Aided Design and Engineering
CADS	Computer-Assisted Display Systems
CAIS	Computer-Assisted Instruction System
CALS	Continuous Acquisition and Life-cycle Support (formerly, Computer-Aided Acquisition and Logistics Support)
CAPS	Command Automation Procurement Systems
CAS	Contract Administration Services or Cost Accounting Standards
CASB	Cost Accounting Standards Board
CASP	Computer-Assisted Search Planning
CBD of	(Commerce Business Daily)—U.S. Department Commerce publication listing government contract opportunities and awards
CBO	Congressional Budget Office
CCEP	Commercial Comsec Endorsement Program
CCDR	Contractor Cost Data Reporting
CCN	Contract Change Notice or Configuration Change Notice

CCPDS	Command Center Processing and Display Systems
CCPO	Central Civilian Personnel Office
CDA	Central Design Activity
CDR	Critical Design Review
CDRL	Contractor Data Requirement List
CFE	Contractor-Furnished Equipment
CFM	Contractor Furnished Material
CFR	Code of Federal Regulations
CICA	Competition in Contracting Act (1984)
CIG	Computerized Interactive Graphics
CIM	Corporate Information Management or Center for Information Management
CINCs	Commanders-in-Chief
CIR	Cost Information Reports
CM	Configuration Management
CMI	Computer-Managed Instruction
CNI	Communications, Navigation and Identification
CO	Contracting Office, Contract Offices, Contracting Officer or Change Order
COC	Certificate of Competency (administered by the Small Business Administration) or Certificate of Compliance
COCO	Contractor-Owned, Contractor-Operated
CODSIA	Council of Defense and Space Industry Associations

COMSAT	Communications Satellite Corporation
CONUS	Continental United States
COP	Capability Objective Package
COSMIC	Computer Software Management Information Center (NASA)
COTR	Contracting Officer's Technical Representative
COTS	Commercial Off-The-Shelf (Commodities)
CP	Communications Processor
CPAF	Cost-Plus-Award-Fee Contract
CPFF	Cost-Plus-Fixed-Fee Contract
CPIF	Cost-Plus-Incentive-Fee Contract
CPR	Cost Performance Reports
CPSR	Contractor Procurement System Review
CR	Cost Reimbursement (Cost-Plus Contract)
CSA	Combat or Computer Systems Architecture
CSIF	Communications Services Industrial Fund
C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec")
CWAS	Contractor Weighted Average Share in Cost Risk
CWBS	Contract Work Breakdown Structure
DAB	Defense Acquisition Board
DABBS	Defense Acquisition Bulletin Board System
DAC	Defense Acquisition Circular
DAL	Data Accession List

DAR	Defense Acquisition Regulations
DARC	Defense Acquisition Regulatory Council
DARPA	Defense Advanced Research Projects Agency
DAS	Data Acquisition System
DBHS	Data Base Handling System
DBOF	Defense Business Operating Fund
DCA	Defense Communications Agency (see DISA)
DCAA	Defense Contract Audit Agency
DCAS	Defense Contract Administration Services
DCASR	DCAS Region
DCC	Digital Control Computer
DCS	Defense Communications System
DDA	Dynamic Demand Assessment (Delta Modulation)
DDC	Defense Documentation Center
DDL	Digital Data Link—A segment of a communications network used for data transmission in digital form
DDS	Defense Distribution System
DECCO	Defense Commercial Communications Office
DECEO	Defense Communications Engineering Office
D&F	Determination and Findings—Required documentation for approval of a negotiated procurement
DFARS	DoD FAR Supplement
DFAS	Defense Finance and Accounting Service

DIA	Defense Intelligence Agency
DISA	Defense Information Systems Agency (Formerly DCA)
DHHS	Department of Health and Human Services
DIDS	Defense Integrated Data Systems
DISC	Defense Industrial Supply Center
DITSO	Defense Information Technology Systems Office
DLA	Defense Logistics Agency
DMA	Defense Mapping Agency
DMR	Defense Management Review
DMRD	Defense Management Review Decision
DNA	Defense Nuclear Agency
DO	Delivery Order
DOA	Department of Agriculture (also USDA)
DOC	Department of Commerce
DoD	Department of Defense
DoDD	Department of Defense Directive
DOE	Department of Energy
DOI	Department of Interior
DOJ	Department of Justice
DOS	Department of State
DOT	Department of Transportation
DPA	Delegation of Procurement Authority (granted by GSA under FPRs)
DPC	Defense Procurement Circular

DPF	Defense Processing Facility
DQ	Definite Quantity Contract
DQ/PL	Definite Quantity/Price List Contract
DR	Deficiency Report
DRFP	Draft Request For Proposal
DSCS	Defense Satellite Communication System
DSN	Defense Switched Network
DSP	Defense Support Program (WWMCCS)
DSS	Defense Supply Service
DTC	Design-To-Cost
DTIC	Defense Technical Information Center
DTN	Defense Transmission Network
DVA	Department of Veterans Affairs
ECP	Engineering Change Proposal
ED	Department of Education
EEO	Equal Employment Opportunity
8(a) Set-Aside	Agency awards direct to Small Business Administration for direct placement with a small, socially/economically disadvantaged company
EMC	Electro-Magnetic Compatibility
EMCS	Energy Monitoring and Control System
EO	Executive Order issued by the President
EOQ	Economic Ordering Quantity
EPA	Economic Price Adjustment

EPA	Environmental Protection Agency
EPMR	Estimated Peak Monthly Requirement
EPS	Emergency Procurement Service (GSÁ) or Emergency Power System
ETR	Estimated Time to Repair
ESTSC	Energy Science and Technology Software Center (DOE)
EUC	End-User Computing, especially in DoD
FA	Formal Advertising
FAC	Federal Acquisition Circular
FAR	Federal Acquisition Regulations
FCA	Functional Configuration Audit
FCC	Federal Communications Commission
FCDC	Federal Contract Data Center
FCPC	Federal Computer Products Center.
FCRC	Federal Contract Research Center
FDPC	Federal Data Processing Center
FDR	Formal Design Review
FEDSIM	Federal (Computer) Simulation Center (GSA)
FEMA	Federal Emergency Management Agency
FFP	Firm Fixed-Price Contract (also Lump Sum Contract)
FFRDC	Federally Funded Research & Development Center
FIPR	Federal Information Processing Resource
FIPS	Federal Information Processing Standard

FIPS PUBS	FIPS Publications
FIRMR	Federal Information Resource Management Regulations
FMS	Foreign Military Sales
FOC	Full Operating Capability
FOIA	Freedom of Information Act
FP	Fixed-Price Contract
FPAF	Fixed-Price Award Fee
FPIF	Fixed-Price Incentive Fee
FP-L/H	Fixed-PriceLabor/Hour Contract
FP-LOE	Fixed-PriceLevel-Of-Effort Contract
FPMR	Federal Property Management Regulations
FPR	Federal Procurement Regulations
FSC	Federal Supply Classification
FSG	Federal Supply Group
FSN	Federal Stock Number
FSS	Federal Supply Schedule or Federal Supply Service (GSA)
FSTS	Federal Secure Telecommunications System
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services
FTSP	Federal Telecommunications Standards Program—Administered by NCS; Standards are published by GSA

FTS	Federal Telecommunications System
FTS 2000	Replacement of the Federal Telecommunications System
FY	Fiscal Year
FYDP	Five-Year Defense Plan
G&A	General and Administrative (Expense)
GAO	General Accounting Office
GFE	Government-Furnished Equipment
GFM	Government-Furnished Material
GFY	Government Fiscal Year (October to September)
GIDEP	Government-Industry Data Exchange Program
GOCO	Government-Owned, Contractor-Operated
GOGO	Government-Owned, Government-Operated
GOSIP	Government Open Systems Interconnection Profile
GPO	Government Printing Office
GPS	Global Positioning System
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control
GS	General Schedule
GSA	General Services Administration
GSBCA	General Services Administration Board of Contract Appeals
HAC	House Appropriations Committee
HASC	House Armed Services Committee
HCFA	Health Care Financing Administration

HHS	(Department of) Health and Human Services
HOL	Higher Order Language
HPA	Head of Procuring Activity
HSDP	High-Speed Data Processors
HUD	(Department of) Housing and Urban Development
I-CASE	Integrated Computer-Aided Software Engineering
IAR	Senior IRM Official
ICA	Independent Cost Analysis
ICAM	Integrated Computer-Aided Manufacturing
ICE	Independent Cost Estimate
ICP	Inventory Control Point
ICST	Institute for Computer Sciences and Technology, National Institute of Standards and Technology, Department of Commerce
IDA	Institute for Defense Analysis
IDAMS	Image Display And Manipulation System
IDEP	Interservice Data Exchange Program
IDIQ	Indefinite Delivery, Indefinite Quantity
IDN	Integrated Data Network
IFB	Invitation For Bids
IOC	Initial Operating Capability
IOI	Internal Operating Instructions
IPS	Integrated Procurement System
IQ	Indefinite Quantity Contract

IR&D	Independent Research & Development
IRM	Information Resources Management
IXS	Information Exchange System
IV&V	Independent Verification & Validation
JCS	Joint Chiefs of Staff
JCALS	Joint Computer-Aided Acquisition and Logistics Support
JFMIP	Joint Financial Management Improvement Program
JIT	Just-In-Time
JOCIT	Jovial Compiler Implementation Tool
JPO	Joint Program Office
JSIPS	Joint Systems Integration Planning Staff
JSOP	Joint Strategic Objectives Plan
JSOR	Joint Service Operational Requirement
JUMPS	Joint Uniform Military Pay System
JWAM	Joint WWMCCS ADP Modernization (Program)
LC	Letter Contract
LCC	Life Cycle Cost
LCMP	Life Cycle Management Procedures (DD7920.1)
LCMS	Life Cycle Management System
L-H	Labor-Hour Contract
LOI	Letter of Intent; Letter of Instruction
LRPE	Long-Range Procurement Estimate
LRIRP	Long-Range Information Resource Plan

LTD	Live Test Demonstration
LSI	Large-Scale Integration
MAISRC	Major Automated Information Systems Review Council (DoD)
MANTECH	Manufacturing Technology
MAPS	Multiple Address Processing System
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol
MASC	Multiple Award Schedule Contract
MDA	Multiplexed Data Accumulator
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition)
MILSCAP	Military Standard Contract Administration Procedures
MIL SPEC	Military Specification
MIL STD	Military Standard
MIPR	Military Interdepartmental Purchase Request
MLS	Multilevel Security
MNF	Multi-National Force
MOD	Modification
MOL	Maximum Ordering Limit (Federal Supply Service)
MPC	Military Procurement Code
MTBF	Mean-Time-Between-Failures
MTTR	Mean-Time-To-Repair

MYP	Multi-Year Procurement
NARDIC	Navy Research and Development Information Center
NASA	National Aeronautics and Space Administration
NBS	National Bureau of Standards (replaced by NIST)
NCA	National Command Authorities
NCMA	National Contract Management Association
NCS	National Communications System (evolving to DISN)
NDI	Non-Development Item
NICRAD	Navy-Industry Cooperative Research and Development
NIP	Notice of Intent to Purchase
NIST	National Institute of Science and Technology (was NBS)
NMCS	National Military Command System
NSA	National Security Agency
NSEP	National Security and Emergency Preparedness
NSF	National Science Foundation
NSIA	National Security Industrial Association
NTIA	National Telecommunications and Information Administration, Department of Commerce; (replaced the Office of Telecommunications Policy in 1970)
NTIS	National Technical Information Service
Obligation	"Earmarking" of specific funding for a contract from committed agency funds

OA	Obligational Authority
OBE	Overcome By Events
OCS	Office of Contract Settlement
OFCC	Office of Federal Contract Compliance
Off-Site	Services to be provided near but not in government facilities
OFMP	Office of Federal Management Policy (GSA)
OFPP	Office of Federal Procurement Policy
OIRM	Office of Information Resources Management
O&M	Operations & Maintenance
OMB	Office of Management and Budget
O,M&R	Operations, Maintenance and Readiness
On-Site	Services to be performed on a government installation or in a specified building
OPM	Office of Procurement Management (GSA) or Office of Personnel Management
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion
OSADBU	Office of Small and Disadvantaged Businesses.
OSHA	Occupational Safety and Health Act
OSI	Open System Interconnect
OSP	Offshore Procurement
OTA	Office of Technology Assessment (Congress)
Out-Year	Proposed funding for fiscal years beyond the budget year (next fiscal year)

P-1	FY Defense Production Budget
P3I	Pre-Planned Product Improvement (program in DoD)
PAR	Procurement Authorization Request or Procurement Action Report
PAS	Pre-Award Survey
PASS	Procurement Automated Source System
PCO	Procurement Contracting Officer
PDA	Principal Development Agency
PDM	Program Decision Memorandum
PDR	Preliminary Design Review
PIR	Procurement Information Reporting
PME	Performance Monitoring Equipment
PMP	Purchase Management Plan
PO	Purchase Order or Program Office
POE	Panel Of Experts
POM	Program Objective Memorandum
POSIX	Portable Open System Interconnection Exchange
POTS	Purchase of Telephone Systems
PPBS	Planning, Programming, Budgeting System
PR	Purchase Request or Procurement Requisition
PRA	Paperwork Reduction Act
PS	Performance Specification alternative to a Statement of Work, when work to be performed can be clearly specified

QA	Quality Assurance
QAO	Quality Assurance Office
QBL	Qualified Bidders List
QMCS	Quality Monitoring and Control System (DoD software)
QMR	Qualitative Material Requirement (Army)
QPL	Qualified Products List
QRC	Quick Reaction Capability
QRI	Quick Reaction Inquiry
R-1	FY Defense RDT&E Budget
RAM	Reliability, Availability and Maintainability; Random Access Memory
RC	Requirements Contract
R&D	Research and Development
RDA	Research, Development and Acquisition
RDD	Required Delivery Date
RD&E	Research, Development and Engineering
RDF	Rapid Deployment Force
RDT&E	Research, Development, Test and Engineering
RFB	Request For Bid
RFI	Request For Information
RFP	Request For Proposal
RFQ	Request For Quotation
RFTP	Request For Technical Proposals (Two-Step)
ROC	Required Operational Capability

ROI	Return On Investment
RSI	Rationalization, Standardization and Interoperability
RTAS	Real-Time Analysis System
RTDS	Real-Time Display System
SA	Supplemental Agreement
SAC	Senate Appropriations Committee
SADBU	Small and Disadvantaged Business Utilization
SAR	Selected Acquisition Report
SASC	Senate Armed Services Committee
SBA	Small Business Administration
SB Set-Aside	Small Business Set-Aside contract opportunities with bidders limited to certified small businesses
SCA	Service Contract Act (1964 as amended)
SCN	Specification Change Notice
SDB	Small/Disadvantaged Business
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Office
SDN	Secure Data Network
SDR	System Design Review
SEC	Securities and Exchange Commission
SE&I	Systems Engineering and Integration
SETA	Systems Engineering/Technical Assistance
SETS	Systems Engineering/Technical Support

SIBAC	Simplified Intragovernmental Billing and Collection System
SIC	Standard Industrial Classification
SIMP	Systems Integration Master Plan
SIOP	Single Integrated Operations Plan
Sole Source	Contract award without competition
Solicitation	Invitation to submit a bid
SOR	Specific Operational Requirement
SOW	Statement of Work
SSA	Source Selection Authority (DoD)
SSAC	Source Selection Advisory Council
SSEB	Source Selection Evaluation Board
SSO	Source Selection Official (NASA)
STINFO	Scientific and Technical Information Program Air Force/NASA
STU	Secure Telephone Unit
SWO	Stop-Work Order
Synopsis	Brief description of contract opportunity in CBD after D&F and before release of solicitation
TA/AS	Technical Assistance/Analysis Services
TCP/IP	Transmission Control Protocol/Internet Protocol
TEMPEST	Studies, inspections and tests of unintentional electromagnetic radiation from computer, communication, command and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs

TILO	Technical and Industrial Liason Office Qualified Requirement Information Program Army
TM	Time and Materials contract
TOA	Total Obligational Authority (Defense)
TOD	Technical Objective Document
TQM	Total Quality Management
TR	Temporary Regulation (added to FPR, FAR)
TRACE	Total Risk Assessing Cost Estimate
TRCO	Technical Representative of the Contracting Offices
TREAS	Department of Treasury
TRM	Technical Reference Model
TRP	Technical Resources Plan
TVA	Tennessee Valley Authority
UCAS	Uniform Cost Accounting System
UPS	Uniform Procurement System
USA	U.S. Army
USAF	U.S. Air Force
USC	United States Code
USCG	U.S. Coast Guard
USMC	U.S. Marine Corps
USN	U.S. Navy
USPS	United States Postal Service
USRRB	United States Railroad Retirement Board

VA	Veterans Affairs Department
VE	Value Engineering
VHSIC	Very High-Speed Integrated Circuits
VIABLE	Vertical Installation Automation Baseline (Army)
VICI	Voice Input Code Identifier
VTC	Video Teleconferencing
WAM	WWMCCS ADP Modernization Program
WBS	Work Breakdown Structure
WGM	Weighted Guidelines Method
WIN	WWMCCS Intercomputer Network
WITS	Washington Interagency Telecommunications System
WIS	WWMCCS Information Systems
WPI	Wholesale Price Index
WS	Work Statement Offerer's description of the work to be done (proposal or contract)
WWMCCS	WorldWide Military Command and Control System

B

# General and Industry Abbreviations

ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association (See ITAA)
ADP	Automatic Data Processing
ADPE	Automatic Data Processing Equipment
ANSI	American National Standards Institute

BOC	Bell Operating Company
CAD	Computer-Aided Design
CAM	Computer-Aided Manufacturing
CASE	Computer-Aided Software Engineering
CBEMA	Computer and Business Equipment Manufacturers Association
CCIA	Computers and Communications Industry Association
CCITT	Comite Consultatif Internationale de T_l_graphique et T_l_phonique; Committee of the International Telecommunication Union
COBOL	Common Business-Oriented Language
COS	Corporation for Open Systems
CPU	Central Processor Unit
DMBS	Data Base Management System
DRAM	Dynamic Random Access Memory
EIA	Electronic Industries Association
EPROM	Erasable Programmable Read-Only Memory
IEEE	Institute of Electrical and Electronics Engineers
ISDN	Integrated Services Digital Networks
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT
ITAA	Information Technology Association of America (Formerly ADAPSO)
ITU	International Telecommunication Union
LSI	Large-Scale Integration

MFJ	Modified Final Judgement
PROM	Programmable Read-Only Memory
RBOC	Regional Bell Operating Company
UNIX	Proprietary Operating System developed by AT&T; and now owned by UNIX Systems Laboratory, Novell, Inc.
UPS	Uninterruptable Power Source
VAR	Value-Added Reseller
VLSI	Very Large-Scale Integration
WORM	Write-Once-Read-Many times

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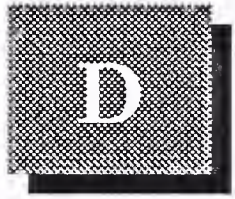
Policies, Regulations and Standards

A
OMB Circulars

A-11	Preparation and Submission of Budget Estimates
A-49	Use of Management and Operating Contracts
A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities
A-109	Major Systems Acquisitions
A-120	Guidelines for the Use of Consulting Services
A-121	Cost Accounting, Cost Recovery and Integrated Sharing of Data Processing Facilities
A-123	Internal Control Systems
A-127	Financial Management Systems
A-130	Management of Federal Information Resources
A-131	Value Engineering

B
GSA Publications

The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition and use of ADP and telecommunications information resources.

C

DoD Directives

DD-5000.1	Major System Acquisitions
DD-5000.2	Major System Acquisition Process
DD-5000.11	DoD Data Administration (C3I)
DD-5000.31	Interim List of DoD-Approved, High-Order Languages
DD-5000.35	Defense Acquisition Regulatory Systems
DD-5200.1	DoD Information Security Program
DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems
DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing and Evaluating Secure Resource Sharing ADP Systems
DD-7920.2	Major Automated Information Systems Approval Process
DD-7935	Automated Data Systems (ADS) Documentation
DoDD 3405.1	Computer Programming Language Policy
DoDD 5000.11	DoD Data Administration (C31)
DoDI 5000.12	Data Elements and Data Codes Standardization Procedure
DoDI 5000.18	Implementation of Standard Data Elements and Related Features
DoDD 5105.19	Defense Information Systems Agency
DoDD 5110.4	Washington Headquarters Services
DoDD 5118.3	Comptroller of the Department of Defense

DoDD 5137.1	Assistant Secretary of Defense (Command, Control, Communications and Intelligence)
DoDD 7740.1	DoD Information Resources Management Program
DoD 7740.1-G	DoD ADP Internal Control Guideline
DoDD 7740.2	Automated Information System (AIS) Strategic Planning
DoDI 7740.3	Information Resources Management (IRM) Review Program
DoDD 7750.5	Management and Control of Information Requirements
DoDI 7750.7	DoD Forms Management Program
DoDI 7920.2-M	Automated Information Systems (AIS) Life-Cycle Manual
DoDI 7920.4	Baselining of Automated Information Systems (AISs)
DoDI 7920.5	Management of End-User Computing (EUC)
DoDI 7930.1	Information Technology Users Group Program
DoDI 7930.2	ADP Software Exchange and Release
DoDD 7950.1	Automated Data Processing Resources Management
DoD 7950.1-M	Defense Automated Resources Management Manual of Information Requirements

D

Standards

ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NIST FIPS 71
CCITT G.711	International PCM standard

CCITT T.0	International standard for classification of facsimile apparatus for document transmission over telephone-type circuits
DEA-1	Proposed ISO standard for data encryption based on the NIST DES
EIA RS-170	Monochrome video standard
EIA RS-170A	Color video standard
EIA RS-464	EIA PBX standards
EIA RS-465	Standard for Group III facsimile
EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network
EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24
EIA RS-449	New EIA standard DTE to DCE interface that replaces RS-232-C
FED-STD 1000	Proposed federal standard for adoption of the full OSI reference model
FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46
FED-STD 1041	Equivalent to FIPS 100
FED-STD 1061	Group II facsimile standard (1981)
FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465
FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466
FED-STDs 1005	Federal standards for DCE coding and 1005A-1008 modulation
FIPS 46	NIST Data Encryption Standard (DES)

FIPS 81	DES Modes of Operation
FIPS 100	NIST standard for packet-switched networks; subset of 1980 CCITT X.25
FIPS 107	NIST standard for local-area networks, similar to IEEE 802.2 and 802.3
FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP)
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard
IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local-area networks
IEEE 802.3	Local-area network standard similar to Ethernet
IEEE 802.4	OSI-compatible standard for token bus local-area networks
IEEE 802.5	Local-area networks standard for token ring networks
IEEE P1003.1	POSIX standard, similar to FIPS 151
MIL-STD-	Physical interface protocol similar to RS-232 and 188-114CRS-449
MIL-STD-1777	IP-Internet protocol
MIL-STD-1778	TCP - Transmission Control Protocol
MIL-STD-1780	File transfer protocol
MIL-STD-1781	Simple mail transfer protocol (electronic mail)
MIL-STD-1782	TELNET - virtual terminal protocol
MIL-STD-1815A	Ada programming language standard
SVID	UNIX System Interface Definition
X.12	ANSI standard for electronic data interchange

X.21   CCITT standard for interface between DTE and DCE for synchronous operation on public data networks

X.25   CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks

X.75   CCITT standard for links that interface different packet networks

X.400   ISO application-level standard for the electronic transfer of messages (electronic mail)