

**FEDERAL GOVERNMENT
PROFESSIONAL SERVICES MARKET**

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FEDERAL GOVERNMENT PROFESSIONAL SERVICES MARKET

ABSTRACT

The federal market demand for professional services will continue to sustain a 20% average annual growth rate in the 1985-1990 forecast period. The market is expected to increase from \$2.8 billion in 1985 to \$6.9 billion in 1990.

The federal professional services market has become increasingly competitive in the past few years, with substantial pressure from small business and minority-owned firms as well as aerospace firms. In addition, the market continues to be highly price sensitive, with progressively narrower margins and more tightly controlled overhead.

This professional services report analyzes the federal government market for professional services and describes the competitive environment.

This report contains 112 pages, including 26 exhibits.



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I INTRODUCTION

I INTRODUCTION

- This report on computer-related professional services within the federal government was prepared as a part of the 1985 Market Analysis and Planning Service (MAPS) for the information services industry.
- This study was conducted at the request of INPUT clients who concurred with INPUT that the professional services marketplace within the federal government is rich in opportunities for vendors, but at the same time fraught with business risks created by the unique user requirements in the federal government and by the acquisition practices followed.
- Research for this report is based upon an analysis of the INPUT Procurement Analysis Reports, previous INPUT research conducted from 1984 through 1985, discussions with INPUT's Federal Information Systems and Services Program (FISSP) clients, interviews with federal government agencies, and interviews with vendors of software products and professional services who market to the federal government.

A. SCOPE

- INPUT's objective in this report is to analyze current market conditions and vendor activities in order to identify key issues and trends to support vendor decisions regarding entry or expansion in this marketplace.

- This report covers those professional services and system products programs listed in the OMB/GSA/NBS Five-Year-Plan for government fiscal year (GFY) 1984 to 1989, related federal agency long-range Automated Data Processing (ADP) plans, and federal agency GFY 1984 and 1985 Information Technology Budgets.
- Classified systems, particularly those in the intelligence community, and weapons systems are specifically excluded from the analyses.
- All monetary figures are in current dollars and are related to government fiscal years unless otherwise noted.

B. REPORT METHODOLOGY

- The OMB/GSA/NBS Five-Year Plan analysis for the INPUT Procurement Analysis Report, prepared as a part of the FISSP, was reviewed for programs initiated during the period of interest.
- The available agency Long-Range ADP Plans for GFY 1984-1988 and GFY 1985-1989 were researched to identify plans for major professional services contracts.
- Three previous reports from FISSP were reviewed for key issues and trends. These reports, cited along with other related INPUT reports in Appendix C, were:
 - Federal Government Professional Services Market, 1985-1990.
 - Federal Systems Integration Market, 1985-1990.
 - Federal ADP Facilities Management Markets, 1985-1990.

C. REPORT ORGANIZATION

- This report has been organized into the following sections:
 - Executive Summary.
 - Market Analysis and Forecast.
 - Competitive Environment.
 - Recommendations.

- Several appendices are provided to aid in report use:
 - Definitions.
 - Glossary of Federal Acronyms.
 - Related INPUT Reports.

II EXECUTIVE SUMMARY



II EXECUTIVE SUMMARY

- This executive summary is designed in a presentation format to:
 - Help the busy reader quickly review key findings.
 - Provide a ready-to-go executive presentation, complete with script and visual aids.
- Key points of the report are summarized in Exhibits II-1 through II-8. On the left-hand page facing each exhibit is a script explaining the contents of the exhibit.

A. OVERVIEW

- The federal government professional services market will continue to be strong for the remainder of the decade. The government need to improve both the quality and quantity of ADP-supported services presents unique opportunities for vendors.

- Key among the forces that will sustain this market are the following factors.
 - The federal workforce is heavily committed to maintaining existing software systems and inadequately staffed to develop much needed new systems.

 - Pressure to reduce the federal budget deficit makes efficiency and innovation paramount.

 - Executive directives now require federal agencies to utilize contractors rather than perform the work in-house if outside contracting proves to be cost effective.

 - Technology, particularly in the area of microprocessor hardware, is advancing at a rate that requires the importation of expertise to solve problems.

STRONG PROFESSIONAL SERVICES MARKET PROSPECTS

- **Federal Commitment to Maintain Existing Software**
- **Pressure to Increase Efficiency**
- **Directives to Use Contractors**
- **New Solutions Through Technology**

B. MARKET FORECAST - PROFESSIONAL SERVICES

- INPUT estimates that the federal government professional services market will increase from \$2.8 billion in 1985 to \$6.9 billion in 1990, an average annual growth rate of 20%.

- The principal components of this market are:
 - Software development, also called programming and analysis in the federal sector, which at one-third is the largest sector of the expenditures for professional services.

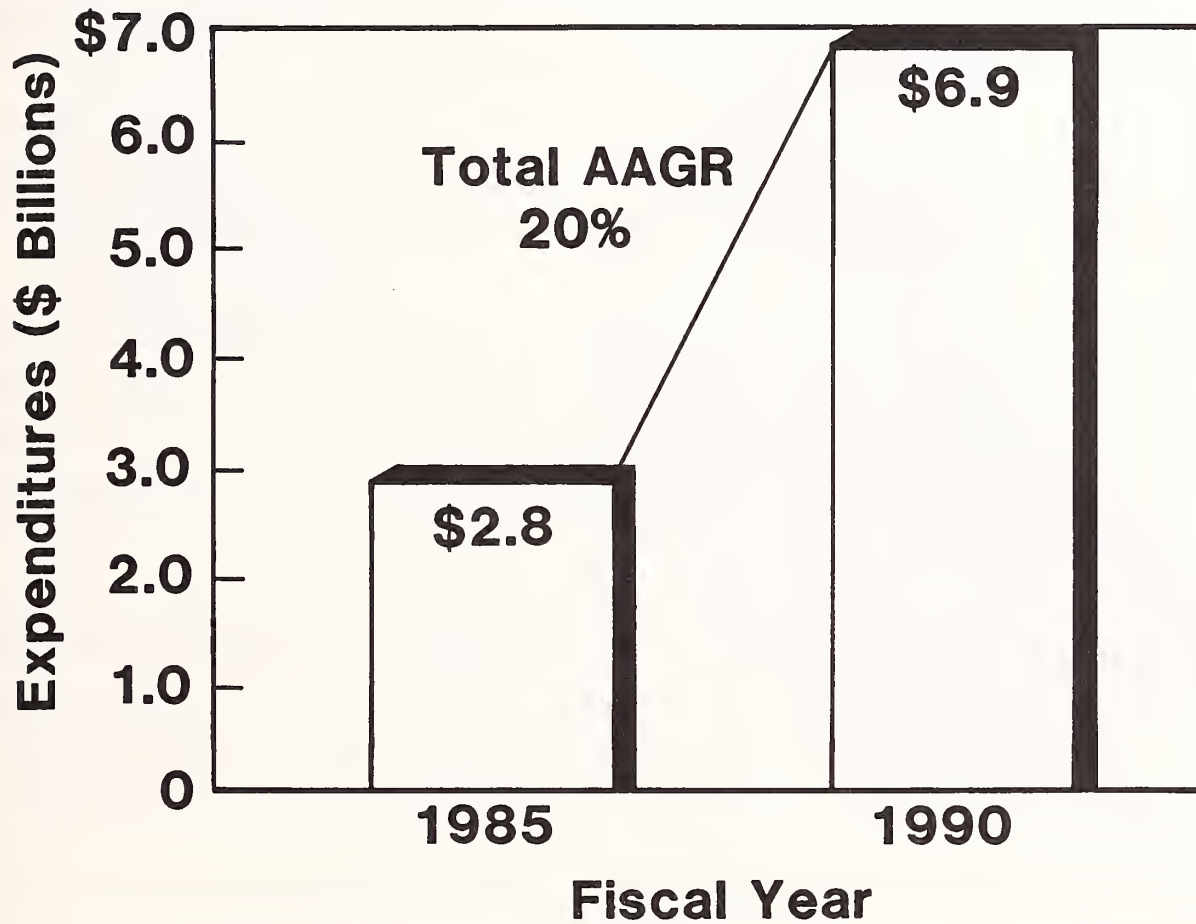
 - Systems integration, which includes subsets of consulting, design, engineering, and analysis.

 - Facilities management of government-owned or leased automatic data processing equipment (ADPE) which includes vendor operation, maintenance, and, sometimes, overall resource management.

 - Design and consulting, ranging from special studies to the preparation of specifications of information technology resources required to meet specific government needs.

 - Education and training of managers, professionals, and technicians using a range of resources that varies from manuals to computer-based education in automatic data processing.

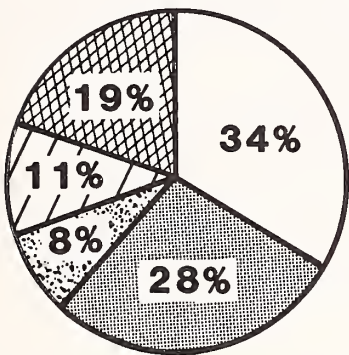
FEDERAL GOVERNMENT PROFESSIONAL SERVICES MARKET GFY 1985-1990



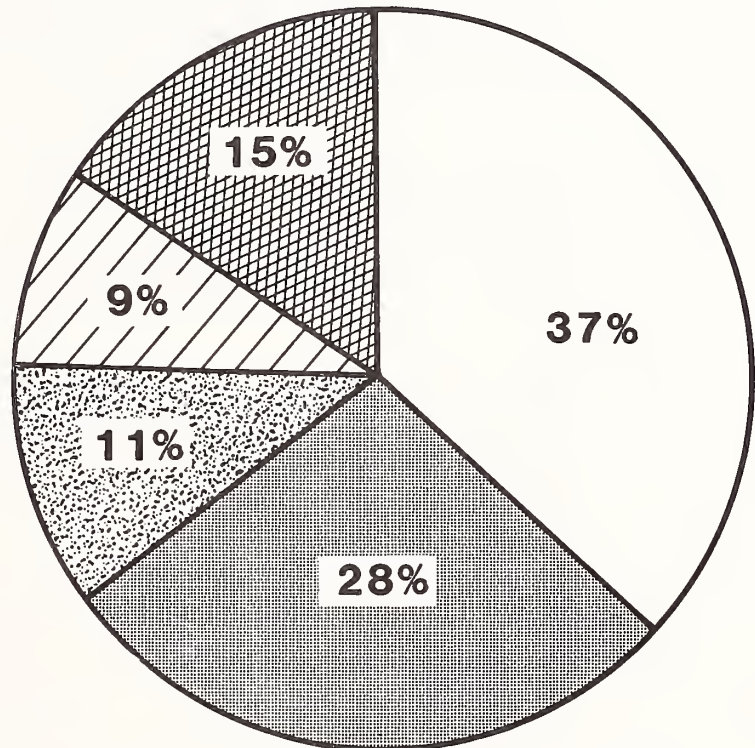
C. MARKET FORECAST - PROFESSIONAL SERVICES ACTIVITIES

- Software development (programming and analysis) will continue to be the largest segment of the federal government professional services market through 1990. There will be a continuing demand for outside contractor support of government staff.
- Systems integration activities will receive the second largest portion of the market as the government continues in a period of systems upgrades and replacements through the remainder of the decade.
- Facilities management is a mature segment of the professional services market. As federal workers become trained, this segment will decrease.
- Consulting is expected to decrease in size compared to other professional services activities since much of the design work on major systems has been completed. This segment should increase in the early 1990s, however, as new technologies will require a reconsideration of the systems currently planned or being installed.
- The fastest growing category is that of education and training for both professional staff (programmers and analysts) and end users. Many users are being exposed to computer systems that allow them to develop their own applications.






FEDERAL GOVERNMENT PROFESSIONAL SERVICES MARKET BY TYPE OF SERVICE



GFY 1985



GFY 1990

-  Programming and Analysis
-  Systems Integration
-  Education and Training
-  Consulting
-  Facilities Management

D. MAJOR PROFESSIONAL SERVICES APPLICATIONS

- While there are different application needs within an agency and between agencies, the major expenditures will be for applications that provide new management information systems. These applications represent upgrades or expansion of capabilities relating to day-to-day operations of federal ADP.
- Data management capabilities and data base management systems will become particularly popular as agencies attempt to organize their information resources and meet the ever-growing end-user demands.
- Administrative and logistics systems are required to bring these types of applications up to a level of efficiency realized in the commercial marketplace.
- With increasing congressional pressure on agencies to institute better money management practices, financial applications have also become target initiatives.
- Scientific applications are most prevalent in energy, weapons development, and physical science projects.
- Office automation applications should be particularly fruitful for vendors who offer solutions for the integration of incompatible hardware and the need for end-user support.

FEDERAL GOVERNMENT PROFESSIONAL SERVICES

- **Management Information Systems**
 - **Data Management**
 - **Administration and Logistics**
 - **Financial**
 - **Scientific**
 - **Office Automation**
-

E. AGENCY AND VENDOR RANKINGS OF SELECTION CRITERIA

- The relative importance of vendor selection criteria depends on the individual agency and its needs. Civil agencies rely on vendors to provide staff and application experience to cover the shortfall of ADP personnel. DoD, on the other hand, is under pressure to make important changes under tight budgets and looks to vendors who provide good prices and continuing support.
- INPUT research indicates, however, that vendors perceive these agency rankings differently. Vendors believe that their applications and federal experiences are key selection criteria.
- The discrepancies suggest that vendors should become more aware of specific agency needs and adapt strategies to match vendor capabilities with these needs, rather than attempting to modify the agency needs to meet an available solution.

RELATIVE IMPORTANCE OF PROFESSIONAL SERVICES VENDOR CHARACTERISTICS

| Comparative Rankings | | |
|--------------------------------|---------------------|--------------------------------|
| Civil Agencies | DoD Agencies | Vendors |
| Staff Experience | Price | Applications Experience |
| Applications Experience | Support | Federal Experience |

F. COMPETITIVE FORCES

- The federal government professional services market has become increasingly competitive in the past few years. Small businesses, minority-owned businesses, and large aerospace vendors represent three types of new competitors who have come to this market from nontraditional quarters.
- The continuing federal budget pressures as well as the growing amount of competition has created a price-sensitive market where the winners are working with progressively narrower margins, more tightly controlled overhead, and reduced management structure. Among the practices with which vendors must contend are:
 - "Should cost" estimates that agencies typically establish before reviewing bids.
 - Congressional pressure for fixed price contracts to avoid cost overruns that have been frequent in past awards.
 - "Most favored customer" regulations that require vendors to certify that the price quoted is the lowest price the vendor has received in the last six months and is at least 10% less than the vendor's comparable prices in commercial markets.
- Bid development now requires in-depth presolicitation intelligence and early executive management involvement. Companies that have failed to assess their prospects of an award accurately have found themselves wasting proposal dollars on increasing numbers of failures.

COMPETITIVE FORCES

- **New Competitors**
 - **Small Businesses**
 - **Minority-Owned Firms**
 - **Aerospace Companies**
- **Price Sensitivity**
- **Presolicitation Intelligence**

G. MARKET OPPORTUNITIES

- Several trends in federal government acquisitions and application of information services are apparent and supported by the present administration.
 - End-user computing, employing a range of personal computers and small business minicomputers, will experience strong growth.
 - Education and training, although growing at a rapid rate, is only for those specialized vendors who understand and can produce quality educational courseware in a price-competitive environment.
 - Software application areas, both custom and packaged, have good prospects in graphics and office automation.
 - Hardware and software maintenance vendors should plan to take advantage of increases in these areas.

MARKET OPPORTUNITIES

- **End-User Computing**
 - **Education and Training**
 - **Graphics and Office Automation Software**
 - **Maintenance**
-

H. RECOMMENDATIONS

- Vendors should increase their intelligence-gathering activities and develop a thorough understanding of the target agency's needs and objectives that goes far beyond the contract requirements.
- Vendors should identify the conditions under which they can accept fixed-price contracts since the federal government has a growing preference for fixed price.
- Vendors should guard their reputation when doing business with the federal government. This factor has been extremely important to government agencies in the selection of vendors. As just one example, in 1984 nearly 200 companies were disbarred or suspended from doing business with the federal government.
- Vendors should adopt a strategy of strategic partnering which provides agencies with a perception of the vendor as a competent, single source of professional services.

RECOMMENDATIONS

- **Know the Agency**
- **Know Your Risk Levels**
- **Protect Your Reputation**
- **Develop Single-Source Perception**

III MARKET ANALYSIS AND FORECAST



III MARKET ANALYSIS AND FORECAST

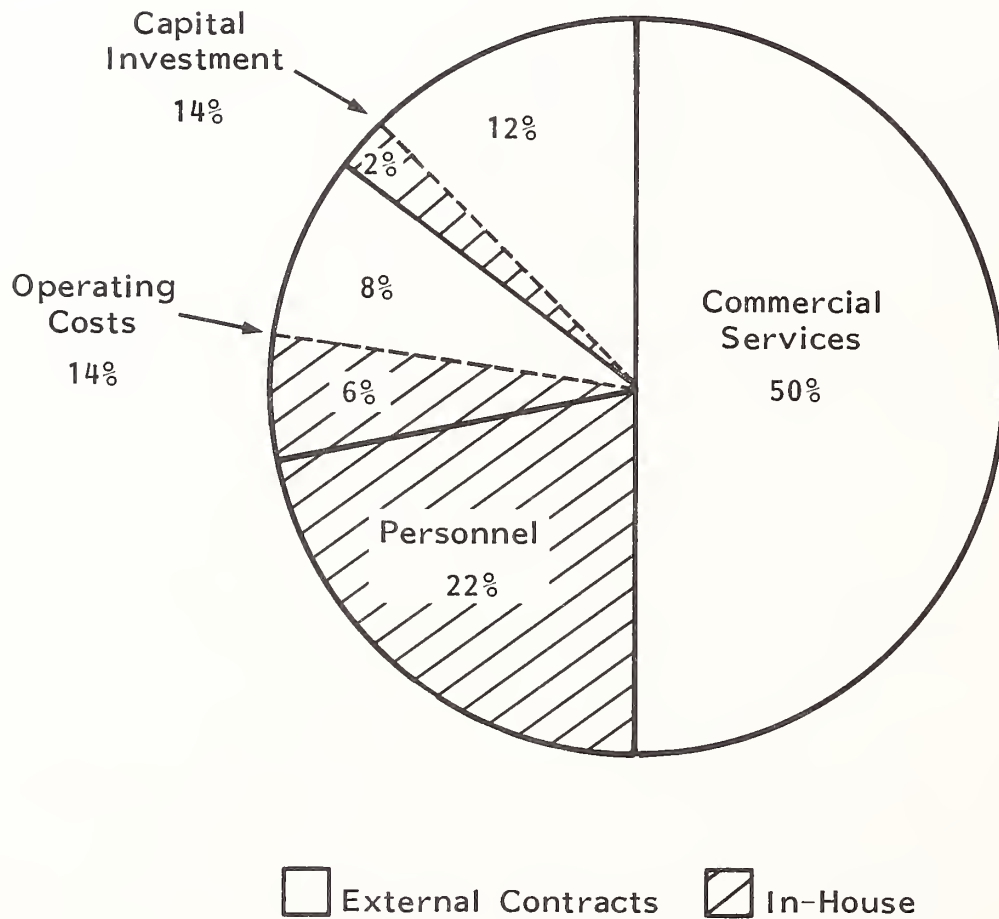
- The federal government information service market is best characterized by its large size and regulated acquisition practices. Vendors must understand these and other characteristics to realize successful penetration of this marketplace.
- In this section, federal information services are analyzed to provide the information necessary for fruitful entry or expansion of government-based business.

A. MARKET OVERVIEW

- The Information Technology (IT) that supports the various departments' missions may be categorized in terms of the basic components needed to acquire and operate IT, namely capital investments, commercial services, operating support, and personnel. These categories and their respective shares of the 1986 IT budget are displayed in Exhibit III-1.
- The types of activities supported under each of these categories are as follows:
 - Capital Investments. The lease or purchase of all ADP equipment, telecommunications equipment, software, and physical facilities.

EXHIBIT III-1

FEDERAL GOVERNMENT INFORMATION TECHNOLOGY
BUDGET DISTRIBUTION, GFY 1986



Source: Estimates from Office of Management and Budgets

- Commercial Services. Timesharing services, telecommunication services, facilities management, systems design and software development, consulting, software/hardware maintenance, education and training, and other external costs including requirements analysis, risk analysis, and studies of advanced technology.
 - Equipment Lease and Operating Costs. Day-to-day costs of operating information systems, including ADPE lease.
 - Personnel. Salary, benefits, and travel costs associated with personnel employed directly by the government.
- The focus of this report, professional services, includes several subsets of the commercial services category, namely:
 - Consulting services.
 - Education and training.
 - Programming and analysis (software development).
 - Facilities management (operation and management of government-owned/contractor-operated (GOCO) facilities).
 - Systems integration.

B. MARKET FORECAST

I. FORECAST ISSUES

- The federal government has a need to steadily improve the quality and quantity of ADP services through the remainder of the 1980s. This must be done, in part, to overcome the handicap of a rapidly aging ADP inventory. However, escalating costs for hardware and software and the constraints applied by budget and personnel reductions make the goal that much harder to achieve.

a. Budget and Personnel Constraints

- The federal government does not currently have the in-house staff required to support the quality or quantity of ADP-supported services required. When the federal government does not have the capability to perform work with in-house personnel, the government contracts the work to services vendors.
- Because of budget constraints, personnel hiring restrictions imposed by the Office of Personnel Management, inadequate in-house expertise, and OMB Circular A-76 which established policies for acquiring services and products needed by the government, there are strong indications that the government will make extensive use of professional services and other services contracts throughout the remainder of this decade.

b. ADPE Inventory Upgrade

- Much of the existing inventory of ADPE lacks flexibility, transaction speed, and memory to satisfy current and future requirements. Most of the current or planned acquisitions are aimed at upgrading this equipment and converting or replacing the software systems associated with the equipment.

- Two strategies seem to be unfolding. In one, the short-term acquisitions are considered stop-gap measures to decrease the current costs of ADP and the applications backlog created by older systems and reduced staffing levels. Later, these systems will be replaced again under a more long-ranging design. In the other, more recent strategy, agencies are designing or implementing in a step-by-step procedure systems that will carry them well into the 1990s.
- Under either strategy, the demand for professional services should be intense through the remainder of the 1980s.

c. Software Development and Maintenance

- An objective of the upgrades, of course, is reduction of the long-term costs of maintenance and software development. The Government Accounting Office (GAO) has estimated that 70% of the federal government's life cycle costs of software are related to maintenance.
 - As more software is developed by the government, more software maintenance will be required to keep that software functional. But, more flexible hardware coupled with the use of modern software (standard packages, disposable software) and productivity aids may offset the costs associated with the increased need.
 - One alternative course of action has been the exemplary program of standardizing languages within the DoD. Among federal agencies, DOD has witnessed a proliferation of software at the same time the programmer force has been shrinking. To reduce the rate of growth of software development and maintenance costs, DoD is seeking productivity improvements by using a single language, Ada. Over the next five years, the transition of field-deployable ADP systems to Ada will require significant investment of DoD resources that will be supported by professional services vendors with the capability to design, program, and maintain systems written in Ada.

d. Transition/Conversion to In-House Support

- When a professional services contract is completed, the government is faced with a choice: transfer the continuing support in-house or continue to obtain support from a vendor. While it is the preference of the government to transfer the support in-house as a means of reducing costs and minimizing reliance on contractors, the government agencies surveyed by INPUT indicate that there are actually many more plans to convert to outside contractor support than provide the support in-house.
- The reasons behind the government agency plans to convert in-house functions to outside contractor support are to:
 - Take advantage of expertise not available within the government.
 - Balance workloads and supplement in-house staffs.
 - Reduce costs.
 - Be expedient.
 - Satisfy the requirements of government policy, in particular OMB Circular A-76.

2. MARKET FORECAST BASE

- The Information Technology budgets for 1984 to 1986 are shown in Exhibit III-2. The IT budget, which includes both ADP and telecommunications, has shown an increasing growth rate: from 1982 to 1983 it grew 15%, from 1983 to 1984 it grew 18%, and from 1984 to 1985 growth was 19%. However, the recently released Office of Management and Budget (OMB) estimate for GFY 1986 indicates only a 4.2% growth over 1985.

EXHIBIT III-2

INFORMATION TECHNOLOGY BUDGETS
GFY 1984-1986

| BUDGET CATEGORY | 1984 Budget Share | | 1985 Budget Share | | 1986 Budget Share | |
|-------------------------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|
| | (\$ Billions) | (Percent) | (\$ Billions) | (Percent) | (\$ Billions) | (Percent) |
| Capital Investment | \$2.0 | 16% | \$2.9 | 20% | \$2.1 | 14% |
| Equipment Lease and Operation | 1.8 | 15 | 1.9 | 13 | 2.1 | 14 |
| Commercial Services | 5.4 | 44 | 6.4 | 44 | 7.6 | 50 |
| Personnel | 3.0 | 25 | 3.4 | 23 | 3.3 | 22 |
| Total | \$12.2 | 100% | \$14.6 | 100% | \$15.1 | 100% |

- Much of the slower growth is accounted for by reduced personnel costs, not outside products and services.
- Expenditures for external contracts (see Exhibit III-3) will likely peak around the 1986 expected level of 71% and remain fairly constant through the forecast period. The dramatic period of increased emphasis in outside contracting is over after increases of 20% (1982-1983), 21% (1983-1984), and 38% (1984-1985).
- Funding for professional services is provided through several budget categories of federal government agencies: research and development, procurement, and operations and maintenance.
 - Both support and direct investigation may be funded by research and development (R&D) elements.
 - Professional services acquired through procurement funding may be separately identified or included in an overall information system acquisition.
 - Professional services oriented toward operation and maintenance or facility management are not specifically identified within O&M or administrative budget elements of the agencies.
- Identification of professional services funding also varies according to the size of the opportunity and the required announcement mechanism.
 - Most medium and smaller professional services projects and tasks valued at less than \$2 million are rarely identified in agency budget documents.

EXHIBIT III-3

PROPORTION OF I.T. BUDGET EXTERNALLY CONTRACTED
GFY 1985-1986

| BUDGET CATEGORY | 1985 | | | 1986 | | |
|--------------------------------|---------------|--------------------|---------------|---------------|--------------------|---------------|
| | IT Budget | External Contracts | | IT Budget | External Contracts | |
| | (\$ Billions) | (Percent) | (\$ Billions) | (\$ Billions) | (Percent) | (\$ Billions) |
| Capital Investments | \$2.9 | 82% | \$2.3 | \$2.2 | 87% | \$1.9 |
| Equipment Lease and Operations | 1.9 | 73 | 1.4 | 2.2 | 57 | 1.2 |
| Commercial Services | 6.4 | 100 | 6.4 | 7.6 | 100 | 7.6 |
| Personnel | 3.4 | 0 | 0 | 3.3 | 0 | 0 |
| Total | \$14.6 | - | \$10.1 | \$15.3 | - | \$10.7 |

- New professional services opportunities that are larger than \$1-2 million are listed in at least one of the following federal government documents.
 - . OMB/GSA Five-Year Plan, which is developed from agency budget requests submitted in compliance with OMB Circular A-11.
 - . Agency long-range information resource plans developed in response to reporting requirements of the Paperwork Reduction Act of 1980. (These documents may not be publicly circulated.)
 - . Agency annual operating budget requests submitted to both congressional oversight and appropriations committees based on the OMB A-11 information.
 - . OMB Circular A-76 agency support services review schedules for cost comparisons of in-house versus contractor performance on a site-by-site, year-by-year basis.
 - . Commerce Business Daily for specific professional service opportunities, for qualification as a bidder, and to obtain a copy of the RFP or RFQ.
 - . Five-Year Defense Plan, which is not publicly available, and the supporting documentation of the separate military departments and agencies. Segments usually available include:
 - R-1: RDT&E Budget Requests.
 - P-1: Procurement Budget Request.
 - Classified program documentation available to qualified Department of Defense (DoD) contractors.

3. MARKET FORECAST BY PROFESSIONAL SERVICES MODE

- The federal government professional services market is expected to grow from \$2.9 billion in 1985 to \$6.9 billion in 1990 at an average growth rate (AAGR) of 20%, as illustrated in Exhibit III-4. The need for contractor assistance to support the federal government's ADP rebuilding goals will continue to make professional services the largest externally-contracted information services segment of the federal government.

a. Consulting Services

- Consulting services in the federal market provide support to information systems and/or services. Examples of government consulting service contracts are:
 - Feasibility studies.
 - ADP requirements analyses.
 - System audits.
 - System Engineering and Technical Direction (SETD).
 - System Engineering and Technical Assistance (SETA).
- Consulting services are expected to increase from \$320 million in 1985 to \$650 million by 1990, at an AAGR of 15%. The primary growth factor is the need of agencies for assistance in producing the technical justification for planned improvements in information technology resources during this period. The agencies are understaffed in the technical planning and evaluation areas.

EXHIBIT III-4

FEDERAL GOVERNMENT PROFESSIONAL SERVICES MARKET
BY TYPE OF SERVICE

| PROFESSIONAL SERVICES CATEGORY | Market Size (\$ Millions) | | | | | | AAGR (%) |
|-----------------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|-------------|
| | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | |
| Consulting Services | \$321 | \$369 | \$425 | \$488 | \$561 | \$646 | 15% |
| Education and Training | 226 | 289 | 370 | 474 | 607 | 777 | 28 |
| Programming and Analysis | 970 | 1,183 | 1,444 | 1,761 | 2,149 | 2,622 | 22 |
| Systems Integration | 800 | 960 | 1,152 | 1,382 | 1,659 | 1,991 | 20 |
| Facilities Management | 560 | 633 | 715 | 808 | 913 | 1,032 | 13 |
| Total | \$2,877 | \$3,434 | \$4,106 | \$4,913 | \$5,889 | \$7,068 | 20% |

b. 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 training of user personnel in system operation, programming, and software maintenance. The government normally contracts for:
 - Training programs.
 - Books and manuals.
 - Seminars.
 - Automated training systems.
- This submode is expected to attain an AAGR of 28% over the 1985-1990 period. The principle focus of training will be the large number of fourth generation replacement systems for ADP architectures of the IBM 360-370 era. The dynamics of end-user computing, local area networks, distributed processing, and new software will require retraining of more than half of the current federal ADP work force.

c. Programming and Analysis

- Programming and analysis services, also called software development, includes:
 - Hardware and/or software system design.
 - Custom software development.
 - Modification of commercial software products.

- Software testing of both custom and commercial packages.
 - Software conversion.
 - Maintenance of operating and applications software.
 - Independent verification and validation (IV&V) of software packages prepared by other vendors.
- This service mode is expected to be the second fastest growing during this period, at an AAGR of 22%, and is the largest submode in professional services. The current and continuing shortfall in programming skills of the federal government sector is the most significant factor behind the projected growth. Government staff limits and the backlog of software maintenance tasks at most government data centers also contribute to the demand for vendor assistance in this service mode.
 - This segment will remain strong until the agencies retrain or replace their current staffs and resolve the software maintenance problems associated with earlier custom software practices and manual software development procedures.

d. Facilities Management/Operations and Maintenance

- Professional services facilities management (PSFM) is also referred to as Government-Owned/Contractor-Operated (GOCO). GOCO also includes standalone operations and maintenance (O&M) contracts, which differ from PSFM in that they have less or no direct management/control of the facility. The computing equipment is owned or leased by the government, not the PSFM or O&M vendor; the vendor provides the staff to operate, maintain, and manage the government's facility. Typical contract tasks include:

- Operation and management.
 - Hardware maintenance.
 - Third-party maintenance.
 - Software maintenance.
 - Site preparation and installation.
- This submode is not expected to grow as fast as the other professional services because it is considered a mature market in the federal government. The currently projected AAGR is 13% between 1985 and 1990, reaching the \$1 billion level in 1990.

e. Systems Integration

- Systems integration (SI) services are associated with the design and implementation of ADP/telecommunications systems by separately contracted vendors, rather than by a prime contractor as in turnkey (integrated) system products. Typical tasks that may be contracted in this submode include:
 - Systems Engineering and Integration (SE&I).
 - Systems Engineering and Technical Assistance (SETA).
 - Systems Integration (SI).
 - Systems Work Packages (SWP).
 - Hardware (and operating systems software) supplier.

- SI is usually associated with custom hardware/software projects, particularly with high risk efforts such as substantial system upgrades and replacements.
- The newer projects include the design and provision of networks to inter-connect the main site and off-site components correctly and not trust to chance the provision of appropriate transmission media and its supervision equipment.
- Substantial education and training efforts, especially where the project involves the replacement of second or early third-generation systems, have been planned for most of the large programs.
- Post-implementation support after the initial system goes on-line will be required to incorporate later changes and maintain the system until the in-house staff can be trained up to the new system level.
- The different forms of contracts found in SI awards reflect the government's desire for risk-reduction contracting to lessen "surprises" and the frequent "bad press" associated with large overruns and system failures.
- The OMB Circular A-11 submissions for the five-year 1985-1990 information technology budget forecast indicated an AAGR of 20%, to reach \$2 billion by 1990.
 - For systems with life cycle costs (LCC) in excess of \$20-30 million, agencies are using multiple contractors to spread the risk.
 - For systems with LCCs that are less than \$5-10 million, agencies are planning to use a single prime contractor or packaged integrated system supplier.
 - Agencies are frequently undecided about the appropriate contracting route for systems between \$5 and \$30 million LCC.

- The forecast is based on funding needed to satisfy the system upgrade or replacement requirements for an ADP inventory that is rapidly exceeding the current six-year lifetime of third-generation systems.

4. MARKET FORECAST BY FEDERAL AGENCY

- The programs analyzed in this report are typical of this market, but the list is not all-inclusive.
 - Most professional services contracts are multi-year documents, employing options or contract modifications to remain in force with a given vendor for a specific period.
 - With only a few exceptions, most services contracts are limited to three to five years in duration and require that the services be recompeted publicly.
 - Contracts for professional services range in value from less than \$10,000 to more than \$700 million, but the majority of contracts fall in the less than \$2 million category.
- Exhibit III-5 provides a survey of likely amounts of professional services to be contracted by each agency. The first column lists projects or contract tasks that were initially planned for contract action in government fiscal year 1985, but were incomplete or expected to be unobligated by September 30, 1985. Current information suggests that the programs will happen in early GFY 1986.
- The outer fiscal year lists for GFY 1988-1990 are small because budgetary data forecasts are incomplete or unavailable. With only a relatively few exceptions, most professional support services contracts now in force are likely to be extended or recompeted and reissued through at least GFY 1990.

EXHIBIT III-5

PROFESSIONAL SERVICES OBLIGATIONS BY AGENCY, 1985-1990

| AGENCY | OBLIGATIONS BY AGENCY, (\$ Millions) | | | | | |
|--------------------------|--------------------------------------|----------------|--------------|--------------|--------------|-------------|
| | 1985-1986 | 1986 | 1987 | 1988 | 1989 | 1990 |
| Defense Agencies | | | | | | |
| Air Force | \$177 | \$303 | \$ 40 | \$ 17 | \$ 26 | \$ 8 |
| Army | 53 | 892 | - | 38 | - | - |
| Navy | 8 | 131 | 26 | 101 | - | - |
| Marines | - | 4 | - | - | - | - |
| DoD | 19 | 85 | 22 | 15 | - | - |
| Subtotal Defense | \$257 | \$1,415 | \$ 88 | \$171 | \$ 26 | \$ 8 |
| Civil Agencies | | | | | | |
| Agriculture | \$ 4 | \$ 91 | - | - | \$ 4 | - |
| Commerce | - | 36 | 5 | - | - | - |
| Energy Protection Agency | - | - | 57 | - | - | - |
| General Services Admin. | - | - | 49 | 204 | 165 | - |
| Health & Human Services | 11 | 10 | - | 5 | - | - |
| Housing & Urban Dev. | - | - | 8 | - | 8 | - |
| Interior | 14 | - | - | 8 | - | - |
| Justice | 10 | 168 | - | - | 25 | - |
| NASA | 26 | 80 | 40 | 137 | - | - |
| Office Personnel Mgmt. | 11 | - | - | - | - | - |
| State | - | 48 | - | - | - | - |
| Transportation | - | 10 | - | - | - | - |
| Treasury | 31 | 123 | 1 | - | - | - |
| Veterans Administration | 4 | - | - | - | - | - |
| Subtotal Civil | \$111 | \$566 | \$160 | \$354 | \$202 | \$ 0 |
| Grand Total | \$368 | \$1,981 | \$248 | \$525 | \$228 | \$ 8 |

- The information presented in Exhibits III-6 identifies obligations for professional services by mode for GFY 85 budgets and was extracted from the Office of Management and Budget Circular A-11 report. Exhibit III-6 does not cover the entire federal government but does include an extensive sampling of obligations.
- The NASA is the largest user of consulting, education, and training, followed by the Air Force, Navy, and Health and Human Services.
- The Air Force and the Navy are together the largest users of programming and analysis services, followed by NASA and Health and Human Services.

5. MARKET FORECAST BY APPLICATION AREAS

- The various government agencies surveyed utilize professional services contracting for many different applications. In both DoD and Civil agencies, the predominant applications for which professional services are contracted are associated with general data processing in support of management and administrative requirements. These areas are shown in Exhibits III-7 and III-8 for GFY 1985.
 - Major opportunities exist for applications that provide new management information systems. These applications represent upgrades or expansion of capabilities relating to day-to-day operations of federal ADP and also represent at least one-fifth of the different applications needs of both Civil and DoD agencies.
 - Data management capabilities and data base management systems will become particularly popular as agencies attempt to organize their information resources and meet the ever-growing end-user demands. DoD agencies in particular will require applications in this area.

EXHIBIT III-6

OBLIGATIONS FOR PROFESSIONAL SERVICES
BY TYPE OF SERVICE AND AGENCY, GFY 1985

| AGENCY | CONSULTING, EDUCATION AND TRAINING (\$ Millions) | PROGRAMMING AND ANALYSIS (\$ Millions) | OPERATIONS AND MAINTENANCE (\$ Millions) |
|-------------------------|---|--|---|
| Defense Agencies | | | |
| Air Force | \$ 40 | \$365 | \$195 |
| Army | - | 70 | 129 |
| Navy | 38 | 150 | 149 |
| DoD | 22 | 11 | 16 |
| Total Defense | \$100 | \$596 | \$489 |
| Civil Agencies | | | |
| Agriculture | \$ 6 | \$ 16 | \$ 22 |
| Commerce | 16 | 12 | 20 |
| General Services Admin. | 1 | 81 | 16 |
| Health & Human Services | 25 | 154 | 154 |
| Housing & Urban Dev. | 1 | 9 | 10 |
| Interior | 2 | 28 | 22 |
| Justice | 9 | 17 | 42 |
| NASA | 55 | 191 | 209 |
| State | - | 48 | - |
| Transportation | 5 | 33 | 20 |
| Treasury | 7 | 3 | 51 |
| Total Civil | \$127 | \$592 | \$566 |
| Grand Total | \$227 | \$1,188 | \$1,055 |

EXHIBIT III-7

FEDERAL GOVERNMENT PROFESSIONAL SERVICES APPLICATION AREAS

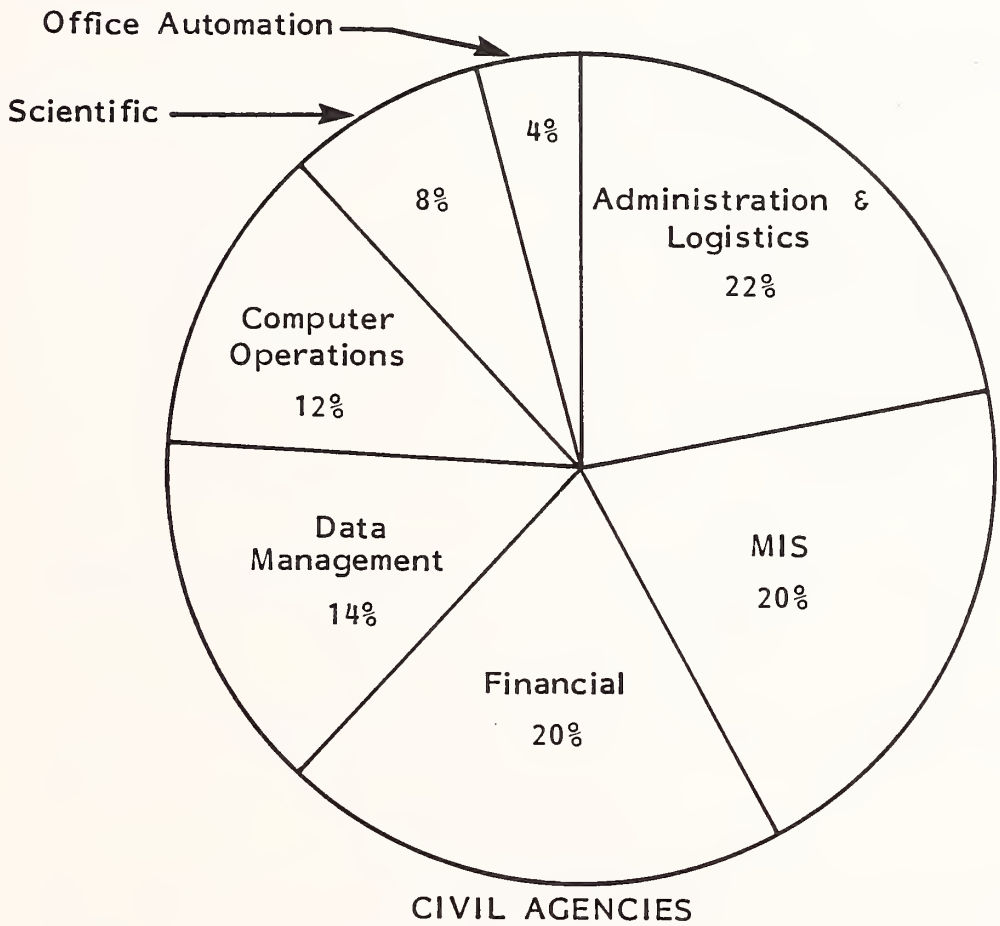
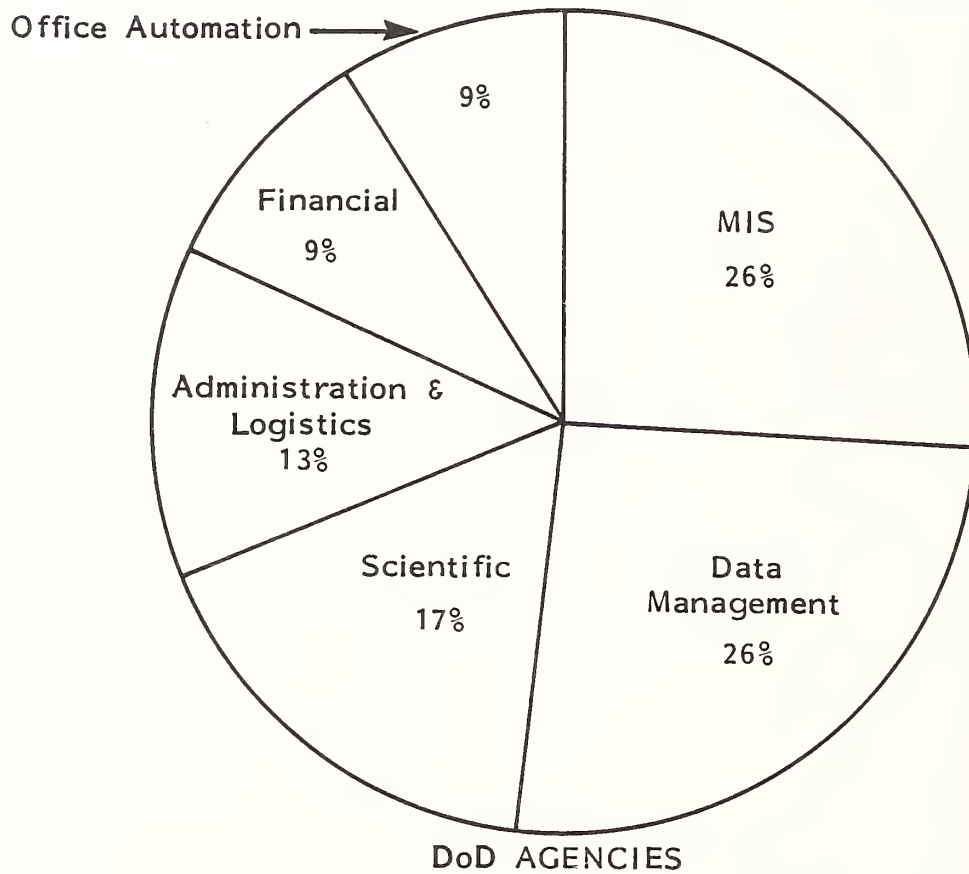


EXHIBIT III-8

FEDERAL GOVERNMENT PROFESSIONAL SERVICES APPLICATION AREAS



- Administrative and logistic systems are required to bring these types of applications up to a level of efficiency realized in the commercial marketplace. While often believed to be an application indigenous to DoD, Civil agencies seem to require even more support in this area.
- With increasing congressional pressure on agencies to institute better money management practices, financial applications have also become target initiatives, particularly in Civil agencies.
- Scientific applications are most prevalent in energy, weapons development, and physical science projects of DoD.
- Office automation applications, while commanding a smaller share of the various applications, should be particularly fruitful for vendors who offer solutions for the integration of incompatible hardware and the need for end-user support.

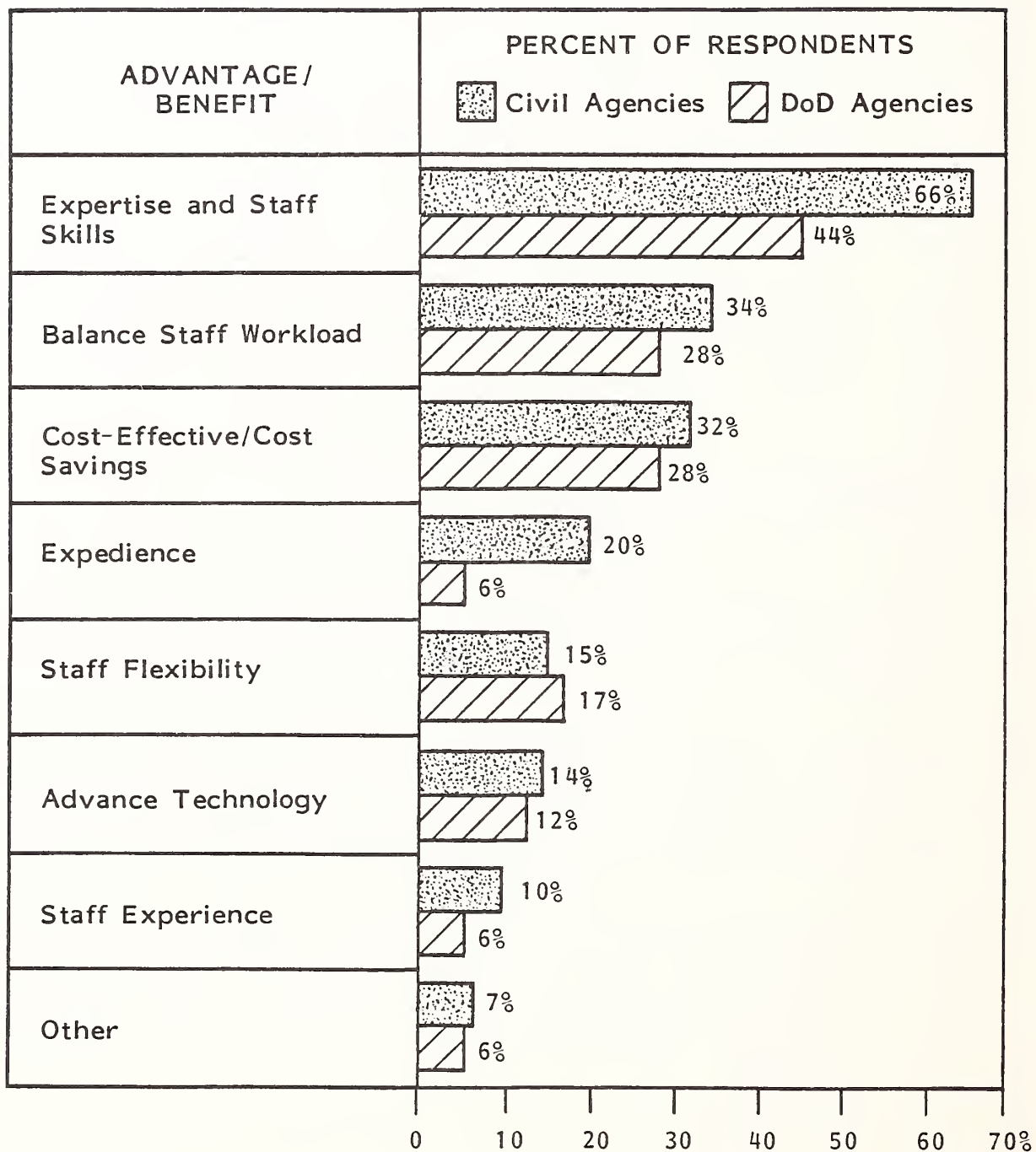
C. AGENCY REQUIREMENTS

I. ADVANTAGES/DISADVANTAGES OF CONTRACTING FOR PROFESSIONAL SERVICES

- The major reason the Civil agencies and DoD use professional services contracts is because the contractors provide experience and expertise that are not available to the agency internally, as shown in Exhibit III-9.
 - Professional services contracts are also used because they give the agency the ability to balance workloads without increasing or decreasing government staff as requirements are added and/or removed.

EXHIBIT III-9

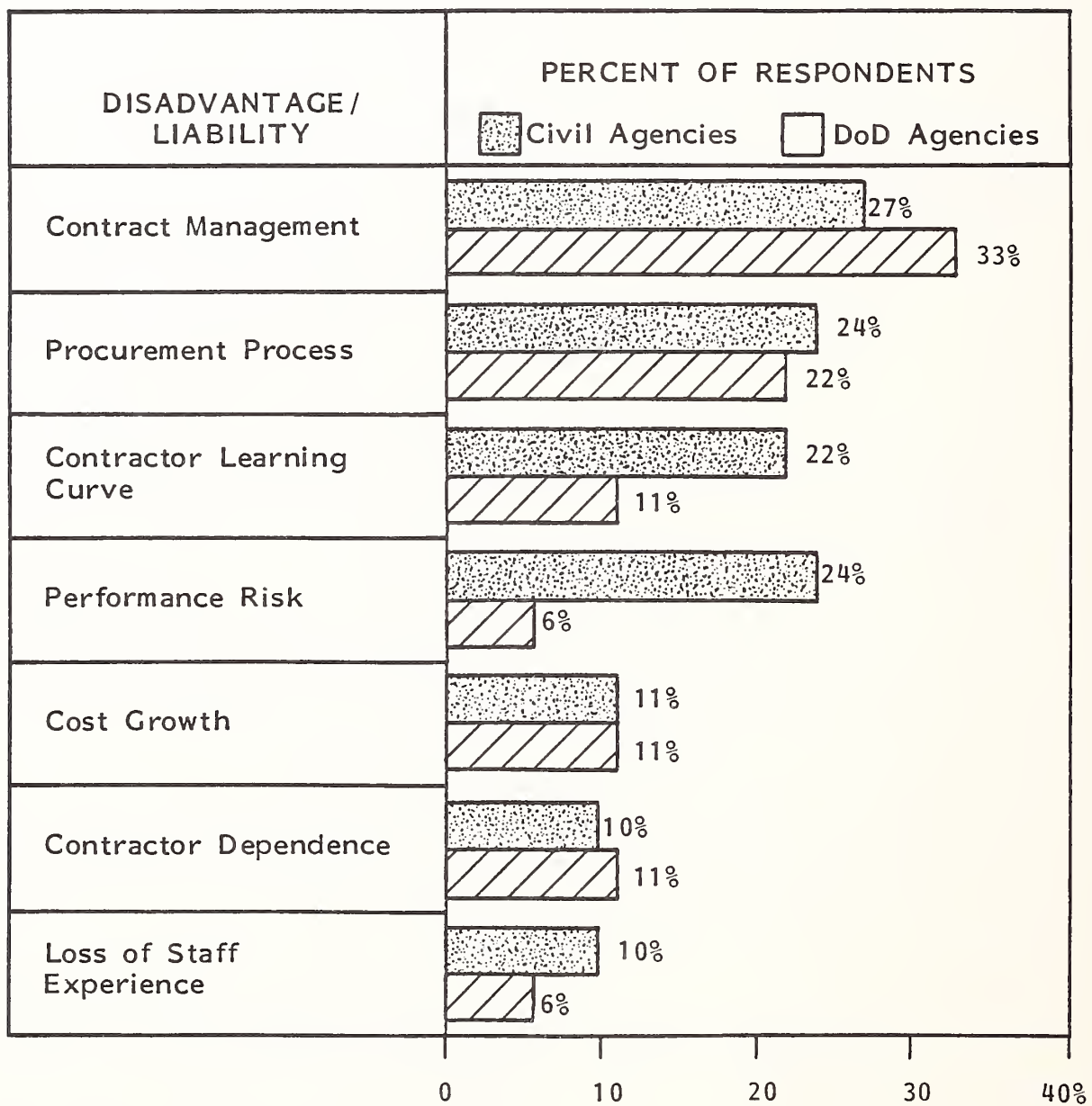
AGENCY VIEWS OF ADVANTAGES/BENEFITS OF PROFESSIONAL SERVICES



- Some government respondents believe that contractor labor is less expensive than performing the same task with government employees, especially when fixed-price contracting enables the government to put a ceiling on the overall cost.
- Objectivity, which includes the ability of the contractor to take an unbiased approach to a problem without being affected by internal agency politics, is a less important benefit.
- The Civil agencies consider expediency advantageous. Expediency, in terms of accelerated schedules and fewer problems with government rules, regulations, and policies than if the work were to be performed in-house, is considered a benefit of outside contracting. This is particularly true in Civil agencies which have fewer in-house personnel than their DoD counterparts.
- The complexity and senior staff demands for managing contracts is the number one disadvantage of using professional services vendors, as shown in Exhibit III-10.
 - Performance risk, or the concern on the part of government agencies that the contractor will deliver an acceptable product on time, is considered a significant liability by Civil agencies.
 - The problems associated with procurement, including the long lead time required for contracting and the risk of protest by losing bidders, is considered a second disadvantage.
 - The learning curve, or the time it takes contractors to "come up to speed" on the problem, is also considered a disadvantage.
- Although, as described in the previous section of this report, the agencies could not accomplish all of their assigned work without contractor support, it

EXHIBIT III-10

AGENCY VIEWS OF DISADVANTAGES/LIABILITIES OF PROFESSIONAL SERVICES



is considered by some to be a disadvantage to become dependent on a contractor. The argument is that contracting for professional services weakens the agency's ability to do further work because the contractor ends up with most of the expertise in this functional area of work.

2. FEDERAL REGULATIONS AND POLICIES

- Professional services are acquired under a variety of regulations.
 - In an attempt to expedite the federal acquisition process--which can take as long as two years for major acquisitions--new Federal Acquisitions Regulations (FARs) were adopted in 1984. The FARs regulate the purchasing procedure of all professional services for ADP and communications not included under the Federal Information Resource Management Regulations (FIRMR). The FARs apply to professional services to support:
 - Mission--critical computer resources of DoD.
 - Public service-oriented statutory systems such as air traffic control and biomedicine.
 - Classified systems of the intelligence community.
- The FIRMR, also made effective in 1984, provides a single regulation for the acquisition, management, and use of information technology. Several recent changes to FIRMR include:
 - Competition in Contracting Act (CICA), which provides expanded legal powers for protest action via GSA Board of Contract Appeals and GAO, increases the opportunity to negotiate contracts, and establishes seven more restrictive categories of exceptions that permit sole-source awards.

- Small Business Equal Competition Act (SBECA) of 1984, which requires publication in the CBD of an agency's intent to award sole-source contracts or GSA's intent to modify FIRMR or FAR in a manner that would require an increase in paperwork or eliminate competition from small businesses.
- The OMB A-109 policy is still in effect, but only for larger (\$100-500 million) contracts or acquisition of "controversial" systems. The A-109 acquisition procedure requires early participation of potential prime bidders and some of the principal first-tier sub-contractors.
- There are several policies that also impact professional services acquisition practices.
 - OMB Policy A-76 (Policies for Acquiring Commercial Industrial Products and Services Needed by the Government) recommends government reliance on the private sector for goods and services. This policy has now become the administration's productivity improvement program (PIP), putting even more emphasis on cost-effective performance of ADP and other services.
 - The policy requires conduct of a comparison of the cost of in-house staff versus contractor performance of services (including professional services) whenever an agency plans a major upgrade, replacement, or new start of ADP resources.
 - OMB A-76 comparisons are usually applied to facilities management and site operation and maintenance contracts and rarely to system design and software development projects.
 - To gain efficiency, the policy supports transition from the earlier "body-shop"-type to "mission-completion" contracting.

Under the latter, the vendor determines the staffing leads and skills mix to perform the tasks.

- The Defense Appropriations Act of 1984 included a "Buy-Not-Lease" mandate. Although the DoD mandate was not funded in GFY 1985, if enacted, it could have far-reaching implications in DoD where more than \$2.1 billion of currently leased ADPE is scheduled to be replaced in the next three years.
 - The mandate dictated competitive acquisition of replacement systems where the purchase option would acquire obsolete equipment. Professional services vendors could be asked to bid on system design and system integration opportunities.
 - Because of the additional funding that would be directed toward purchase of equipment, one possibility is a slowdown in the upgrading process to new, more modern equipment and an increase in the amount of maintenance required to keep obsolete equipment (and the software designed to run on that equipment) operational until it is replaced.
 - Competitive replacement of leased systems could also offer opportunities for code conversion, new software development, and training.
- Reduced emphasis on the use of small business contracting, in particular the 8(a) program, has eroded the small-business share of government business, as evidenced by the drastic decline of contracting by the Departments of Education, Health and Human Services, and Labor, according to the House Small-Business Committee. The inclusion of a small business sub-contracting plan in large ADP system bids is required by DoD, NASA, and Transportation.

IV COMPETITIVE ENVIRONMENT

IV COMPETITIVE ENVIRONMENT

- The opportunities for professional services vendors within the federal government marketplace, while attractive, must be weighed against the market's competitive characteristics. In this section, the issues surrounding government contracting are presented from a vendor's point of view. In addition, consideration is given to vendors currently in this market as a means of "sizing" the competition.

A. COMPETITIVE FORCES

I. VENDOR SELECTION CRITERIA

- The process of selecting a vendor for a professional services contract is one of professional evaluation. The bid selection criteria, showing some variation among agencies and even among specific projects within each agency, usually involves, in order:
 - Proposed technical solution.
 - Cost.
 - Vendor reputation.

- Risk containment procedures.
- Contract type.
- While agencies and vendors agree on the order of importance of these bid selection criteria, Civil agencies, DoD agencies, and vendors totally disagree on the relative importance of characteristics of successful contractors (see Exhibit IV-1).
- The largest differences between the rankings of Civil and DoD agencies reflect unique characteristics and needs.
 - DoD agencies tend to be more price and hardware sensitive than Civil agencies.
 - To meet the importance of these sensitive issues, DoD is generally willing to reduce their expectations for the vendor's staff and application experience. And, since DoD has a larger, more experienced stable of in-house personnel, this trade-off is not particularly risky.
 - Civil agencies, on the other hand, have smaller, less capable staffs and need to utilize as much vendor experience as possible and are willing to pay the price for same.
- While vendors should appreciate these agency differences and reflect them in bid preparation, they must be even more sensitive to the larger differences between their views of important vendor characteristics and those of the agencies, both Civil and DoD.
 - As shown in Exhibit IV-1, support is rated as the least important characteristics by vendors while ranking second or third for agencies.

EXHIBIT IV-1

RANKINGS OF CHARACTERISTICS OF SUCCESSFUL CONTRACTORS

| CHARACTERISTIC | RANKING | | |
|-----------------------------------|----------------|--------------|---------|
| | CIVIL AGENCIES | DoD AGENCIES | VENDORS |
| Price | 5 | 1 | 3 |
| Support | 3 | 2 | 9 |
| Staff Experience | 1 | 5 | 5 |
| Software Development Experience | 3 | 3 | 4 |
| Application/Functional Experience | 2 | 5 | 1 |
| Hardware Experience | 6 | 3 | 8 |
| Integration Experience | 7 | 7 | 7 |
| Federal Contract Experience | 8 | 7 | 2 |
| Agency Experience | 9 | 9 | 6 |

Rating: 1 = Most Important (), 9 = Least Important ()

- Vendors should emphasize their support capabilities and preference in their bids. Unfortunately, it is INPUT's experience that most professional service vendors cannot provide evidence of customer satisfaction since they do not carry out systematic surveys in this area.

2. AGENCY SATISFACTION LEVELS

- The vendor actions resulting from these discrepancies lead agencies to have lower levels of satisfaction than would be desired. And, compared to agency-vendor ratings of satisfaction in other types of federally contracted service, the level of satisfaction felt by agencies contracting for professional services is quite low.
- As indicated in Exhibit IV-2, DoD agencies seem less satisfied with the performance of professional services vendors than are Civil agencies. DoD's greatest concerns are missed delivery schedules and cost overruns.
- While vendors believe the government is reasonably satisfied overall, the agencies' satisfaction levels estimated by the vendors themselves are not very high.
 - In at least two characteristics, cost and delivery schedule, vendors acknowledged that agency satisfaction levels were very low.
 - This represents a fundamental problem for professional services vendors. Unless they can improve the perceived satisfaction levels to higher levels, the potential growth in the market may not be realized.

3. CONTRACTING VEHICLES

- Vendors provide professional services to the government under a variety of contract types.

EXHIBIT IV-2

LEVEL OF SATISFACTION WITH PROFESSIONAL SERVICES VENDORS

| FACTOR | RELATIVE SATISFACTION* | | |
|--------------------------------|------------------------|-----|--------|
| | CIVIL | DoD | VENDOR |
| Responsiveness to Agency Needs | 3.5 | 3.3 | 3.5 |
| Quantity of Work | 3.5 | 3.1 | 3.3 |
| Quality of Work | 3.4 | 3.1 | 3.5 |
| Development Visibility | 3.2 | 3.0 | 2.5 |
| Project Management | 3.1 | 3.0 | 3.3 |
| Delivery Schedule | 3.3 | 2.5 | 2.5 |
| Cost | 3.2 | 2.6 | 2.5 |

*Rating: 1 = Not Satisfied at All; 5 = Very Satisfied

- Cost-plus contracts provide for vendor costs to be paid and a fee added that is either negotiated (cost-plus-fixed-fee) or based upon the performance of the contractor in satisfying the contract requirements (cost-plus-award-fee). Cost-plus contracts regulate the margin of profit allowed, but clearly place the risk with the government.
 - Fixed-price contracts commit vendors to perform and complete a contract at a predetermined price ceiling.
 - To a significant extent, the profitability associated with a fixed-price contract is dependent upon the vendor's ability to accurately appraise, in advance, the cost of providing services. Managing fixed-price contracts successfully requires an extremely well written and detailed statement of work and project scope. The risk of completion is placed on the vendor.
- Level of effort (LOE) or time and materials (T&M) contracts provide for an hourly billing plus the reimbursement by the government for travel, supplies, equipment, and other materials required to satisfy the terms of the contract. In many competitive situations, vendors are required to combine their contract with a "not-to-exceed" clause that essentially imposes cost ceilings on the contract.
- Civil and DoD agencies indicate a clear preference for fixed-price contracts for professional services, as shown in Exhibit IV-3.
 - However, there is a significant difference in the second most preferred approach: Civil agencies uniformly prefer "Cost-Plus" contracts, whereas the DoD tends to prefer "Level of Effort" contracts (otherwise known as "Time and Materials").
 - Many respondents recognize the inherent difficulties of pricing programming and analysis projects by preferring "Cost-Plus" or "Level-of-Effort" contracts in this area.

EXHIBIT IV-3

PREFERENCE FOR PROFESSIONAL SERVICES CONTRACT TYPES

| PROFESSIONAL SERVICES CATEGORY | CIVIL | | | DoD | | | VENDOR | | |
|--------------------------------|-------|---|---|-----|---|---|--------|---|---|
| | C | F | L | C | F | L | C | F | L |
| Consulting Services | 2 | 1 | - | 1 | - | 2 | 1 | 3 | 2 |
| Education & Training | 2 | 1 | - | 1 | - | 2 | 2 | 1 | 3 |
| Programming & Analysis | 1 | 2 | - | 2 | 1 | 2 | 1 | 3 | 2 |
| Facilities Management | | | | | | | | | |
| Operations & Maintenance | 2 | 1 | 3 | 3 | 1 | 2 | 1 | 2 | 3 |
| Hardware Maintenance | 2 | 1 | 3 | 2 | 1 | 2 | 1 | 2 | - |
| Software Maintenance | 2 | 1 | - | 2 | 1 | 2 | 1 | 1 | 2 |
| Systems Integration | 1 | 2 | - | 1 | 1 | 2 | 1 | 2 | 3 |

Note: C = Cost Plus, F = Fixed Fee, L = Level of Effort

- On the other hand, vendors generally prefer cost-plus or level-of-effort contracts without cost ceilings over fixed price because those contract forms minimize the financial risk to the vendor. This particularly applies to programming and analysis contracts where the financial risks are substantial.

4. DISADVANTAGES/LIABILITIES OF CONTRACTING

- Vendors view the disadvantages and liabilities of contracting for professional services in ways similar to those of the government agencies cited earlier.
 - The major disadvantage identified by the vendors is associated with the actual procurement process. Vendors consider the government procurement process long and inflexible. They believe the government has a problem in evaluating quality versus price and there is always the threat of a protest if the lowest priced bidder does not win.
 - Dependence on the contractor is another major liability. If contracting does not allow the government in-house staff to build its skills, then when the contractor leaves the expertise leaves. When contracts are recompeted, some loss in continuity can occur if the incumbent is replaced and takes the core staff away.
 - Performance risk is viewed by the agencies as a liability, vendors believe, because agencies are not able to control contractor personnel.
 - Contract management is also considered a significant disadvantage. Some vendors stated that dealing with the complexities and legal obligations of a contract pose problems.

B. THE PROFESSIONAL SERVICES VENDOR COMMUNITY

- Most of the largest vendors of professional services to the government derive a significant percentage of their total professional services revenue either directly from the federal government or as subcontractors to other companies performing work under government contracts.
 - This dependency upon the federal government has had a profound effect upon vendors' earnings, management, organizational structure, and employees, and on the commercial market.
 - Government vendors of professional services tend to attract and recruit into their management ranks a high proportion of ex-government employees who understand how to navigate the complexities and deal with the competitiveness of government procurements.
- Government vendors enjoy a high rate of systems enhancements, extensions, and maintenance contract awards associated with initial awards. Many of these follow-on contracts are awarded on a sole-source, noncompetitive basis, due to the vendor's unique experiences and knowledge of the recently completed system.

1. PROFESSIONAL SERVICES VENDORS

- Exhibit IV-4 is a list of the largest federal government professional services vendors identified in INPUT's U.S. Information Services Annual Report for 1985.

2. SPECIALIZED VENDORS

- Other professional services vendors include the "Big Eight" accounting firms, especially for financial, budget, and accounting applications.

EXHIBIT IV-4

FEDERAL GOVERNMENT PROFESSIONAL SERVICES VENDORS

| 1984 RANK | PROFESSIONAL SERVICES VENDOR | PROFESSIONAL SERVICES REVENUE DERIVED FROM FEDERAL GOVERNMENT | |
|--------------|--|---|---------------|
| | | (Percent) | (\$ Millions) |
| 1 | Computer Sciences | 59% | \$201 |
| 2 | Burroughs | 70 | 156 |
| 3 | Martin Marietta | 65 | 135 |
| 4 | MITRE | 100 | 106 |
| 5 | Arthur Andersen | 26 | 104 |
| 6 | EDS | 70 | 102 |
| 7 | IBM | 50 | 100 |
| 8 | Logicon | 80 | 97 |
| 9 | Batelle | 100 | 85 |
| 10 | Planning Research Corporation | 70 | 84 |
| 11 | CACI | 85 | 77 |
| 12 | SAIC | 59 | 62 |
| 13 | Syscon | 87 | 61 |
| 14 | Systems and Computer Technology | 84 | 49 |
| 15 | Bendix | 100 | 49 |
| 16 | Lockheed | 100 | 48 |
| 17 | Systems and Applied Sciences Corporation | 100 | 48 |
| 18 | Telos | 100 | 45 |
| 19 | Control Data | 54 | 43 |
| 20 | Peat, Marwick, Mitchell | 40 | 42 |

- A sizeable portion of computer hardware manufacturers' income is derived from the maintenance of the equipment they sell to clients. The maintenance of ADPE by the original manufacturer is not included in this report except where it falls under a professional services facilities management contract.
- Colleges and universities compete with private industry for professional services work from the federal government. The most numerous of these contracts are for consulting services, but in some cases the size of the contract can be substantial. One such very large contract is for the operations and maintenance of the Department of Energy's Lawrence Livermore Laboratories. This is contracted to the University of California.
- Several organizations that were set up by the government as "Not for Profit" also compete with private industry for professional services work. The largest of these, MITRE Corporation, has been included within the group of major vendors. Sandia, a Not-for-Profit subsidiary of AT&T, operates two large nuclear research facilities of the Department of Energy, including ADP centers.
- Some government data centers with unique skills and/or available capacity also compete with private industry for government contracts. Government agencies have the choice of whether to contract outside or to use available government centers, including capability in other agencies. In many cases the cost may be the same, but by staying "in-house," the agency saves the time and effort required to competitively put a contract into place.

V RECOMMENDATIONS

V RECOMMENDATIONS

- The need for outside contractors to support the professional services requirements of the federal government is evidenced by the increasing budget allocations, the need to expand federal ADP capabilities through a modernization program, and the implementation of policies that freeze federal staffing levels and move more information service support functions to the private sector.
- The growing opportunities for professional services vendors are not, however, free of business challenges. To be successful, vendors must understand the risks of contracting with the government, be prepared to support the ADP objectives of the agencies, and be prepared to offer ADP solutions that require multi-vendor bids.

A. KNOW THE AGENCY

- In any situation where outside services are used after a period of in-house support there is a tendency on the part of the user to be skeptical of the results. The skepticism may be compounded in the federal government where a bottom line business orientation has not been a way of life and where the external perception is generally one of largess and incompetence.

- Federal government contracting agencies are sensitive to these issues. They realize the need--and benefits--of using professional services vendors but have not always been satisfied with the results nor comfortable with the vendor dependency that frequently results.
- To be successful, vendors must understand and be sensitive to these concerns. In short, vendors must know the contracting agency. Below are several questions that might be addressed by vendors contemplating submission of a bid on a professional services opportunity.
 - What is the current and future functional mission of the agency?
 - How does ADP support that mission?
 - What discrepancies exist between the mission(s) and ADP resource capabilities to support that mission?
 - How is that discrepancy likely to change as the requirements for ADP change?
 - What short- and long-term ADP improvement plans does the agency have?
 - How does the current opportunity address the projected short- and long-term discrepancies?
 - What is the current capability and what is the direction of the agency on the data collection, data using continuum? Or, said another way, does the agency concentrate on tools (hardware, software) or the functions these tools are to perform?
 - How large a circle of end users does the agency have or plan to have?

- What are the implicit requirements of this contract opportunity in terms of:
 - Education and training?
 - Long-term support?
 - Maintenance reduction?
 - ADP efficiency goals, including the reduction of duplication of systems, information resources, and in-house effort?
 - Level of in-house (government) staff support?
 - The integration of incompatible systems existing in numerous languages and running on various sizes and brands of machines?
- What capabilities (areas of expertise) or conditions (risk containment, costs, support, etc.) does the agency need that could be supplied by this vendor?
- What experience has the agency had (positive and negative) that should be reinforced or diluted.
- These questions offer only a starting point. To develop a full picture of the agency, vendors, particularly those unknown to an agency, should spend considerable time with appropriate agency representatives marketing their capabilities. This must be done during the bid development process but should also be a standard practice of intelligence gathering performed without regard to specific opportunities.

B. UNDERSTAND THE RISKS

- As the federal government struggles to improve ADP performance in the face of many constraints, agencies will pass uncertainties and risks on to vendors. Vendors, in turn, must live with the uncertainties and develop means of containing these risks.

I. UNCERTAINTIES

- There are numerous factors that create uncertainty in at least the funding levels of planned and awarded programs (see Exhibit V-1).
 - The factor with the most significant potential impact on vendors is government directives and policies. The emphasis on contracting out and in particular the use of OMB A-76 and new acquisition regulations, information services policies, and trade policies all affect funding and terms and conditions of contracting.
 - The availability of government personnel is the second most important risk factor. The shortage resulting from congressionally imposed limits on agency budgets and the lack of sufficient numbers of specialists and managers who support contracting out could be reversed by strong federal employee union activities.
 - Vendors also considered political uncertainty a factor. Elections and the emphasis on changing popular issues impacts ADP spending. The current focus on threats to world peace and the rising budget deficit overshadows technology issues.
 - Budget changes, both increases and decreases, and budget policy are other important influences that affect the timing, priority, and near-term funding of professional services projects.

EXHIBIT V-1

RANKING OF FACTORS AFFECTING
FUTURE GOVERNMENT SPENDING FOR PROFESSIONAL SERVICES

| FACTOR | RANK * |
|---|--------|
| Government Directives and Policies | 1 |
| Government Personnel Availability | 2 |
| Political Uncertainty (Elections, Domestic versus Foreign Policy) | 3 |
| Budget Policy Changes (Reform 88, Grace Commission, etc.) | 4 |
| Budget Changes (Authorization, Appropriation, Apportionment) | 4 |

*Rank based on frequency of mention by respondents.

2. RISKS

- Federal government policies and professional services practices are two major sources of risk for vendors (see Exhibit V-2).
 - Changes in federal procurement/ acquisition regulations and level of enforcement can impact vendors positively or negatively. The new FIRMRs are expected to be more competitive and to increase the number of vendors in the market, at a cost in lost shares to those already in the market.
 - Improvement of IT Program stability and funding should reduce vendor investment costs frequently related to long-drawn-out programs that have slippery funding status and repetitive "Best and Final Offer" cycles.
 - Maturity of some portions of the professional services market, such as code conversion and GOCO facilities management, narrows the allowable cost envelope for successive contract bidders. Incumbents cannot assume that cost and profit recovery will come automatically in recompetition of their support services contracts.
 - Federal government agencies employ professional services contracts to overcome personnel shortages. Vendors are also faced with overcoming labor pool shortages in specific hardware and software systems and/or in particular geographical areas. Failure to resolve these requirements in the pre-bid stage can be expensive in both overhead and management costs after award.
 - Continuing changes in national small business policies and initiatives have affected, and will continue to affect, the revenues of larger vendors and those classified as "Small Business." Programs and

EXHIBIT V-2

RANKING OF FACTORS AFFECTING
VENDOR PROFESSIONAL SERVICES REVENUES
IN THE FEDERAL MARKET

| FACTOR CATEGORY | SIGNIFICANCE* |
|---|---------------|
| Procurement/Acquisition Regulations | 1 |
| Program Stability and Funding | 2 |
| Services Market Maturity | 3 |
| Availability and Cost of Skilled Personnel | 4 |
| Small Business Policies (Set-Asides, 8(a) Programs, etc.) | 5 |
| Financial Resources of New Competitors | 6 |

*Significance based on frequency of mention by respondents.

projects earmarked as "Small Business Set Aside" or selected by SBA as an 8(a) program are denied to slightly larger vendors as well as the really large firms, reducing their effective market. Failure to identify some fair amount of prospects for small business can have a devastating impact on new/small business organizations.

- In the federal government professional services market, some of the more recent entrants are looking for diversification of investment resources as well as recoverable overhead funds to support pre-bid marketing and sales.
- A third source of risk is the contracting vehicle. Vendors must resign themselves to the fact that the federal government prefers to do business on a fixed-price basis. Vendors must find and put into practice methods of pricing and managing professional services contracts that allow them to minimize the risk of performance on a fixed-price basis or they will not be able to compete successfully in the government marketplace.
- Some professional services activities are inherently less risky. O&M, for example, represents a growing market that, while not always as attractive as developing state-of-the-art systems, is less risky and often financially more rewarding.

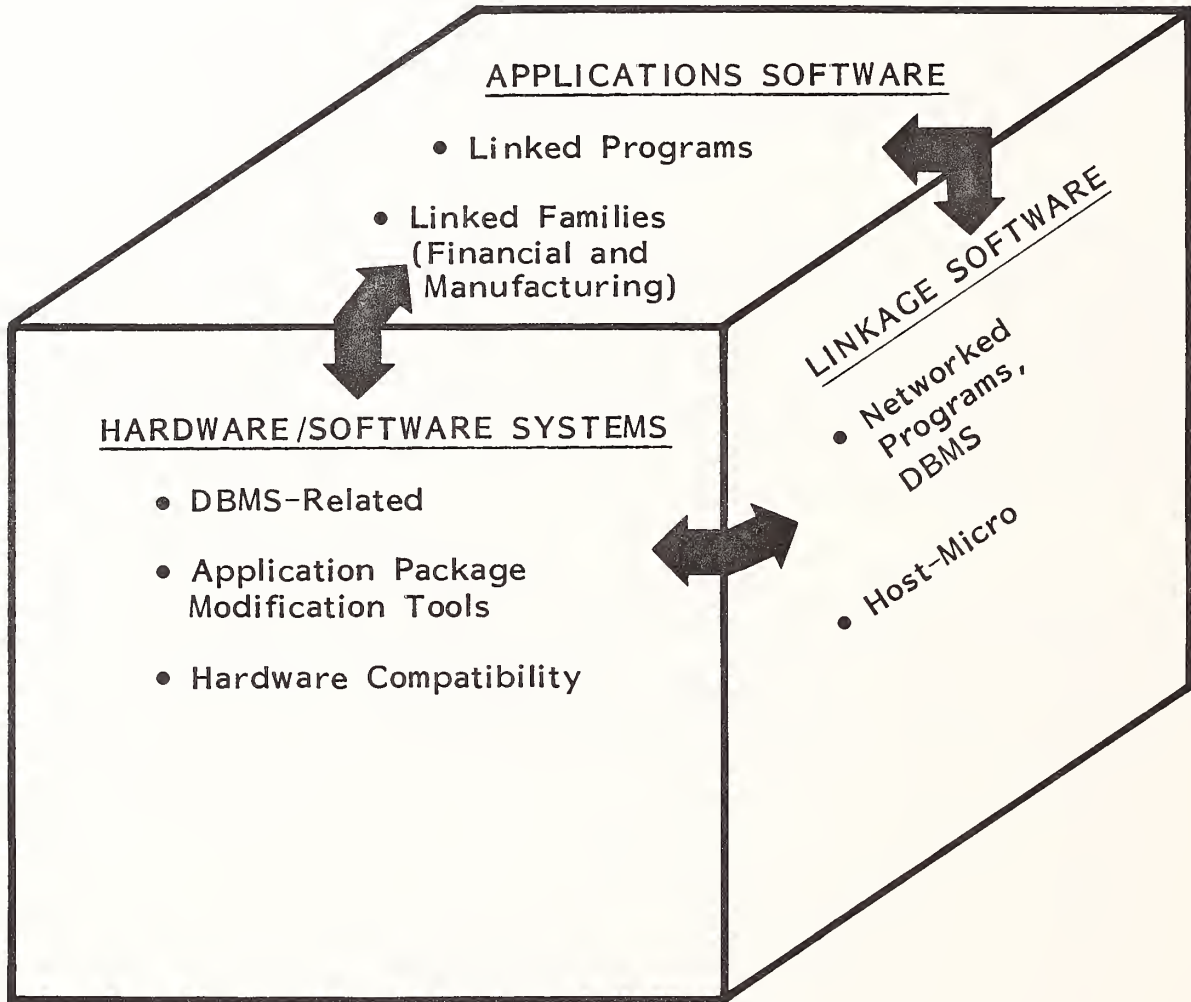
C. DEVELOP STRATEGIC PARTNERS

- A changing technology has brought forth a new ADP environment where the focus on the function--rather than the tools--is ever-increasing. Manifestation of this impact includes a variety of concepts.
 - Super systems that integrate several business functions as well as FGLs, DBMS, and code generators.

- Data bases that range from the personal to the corporate.
 - Micro-mainframe links and other extensions to intelligent workstations.
 - End-user computing, spawned by proliferating microcomputers, with demands for prototyping and unique applications.
 - Security, data protection, and privacy systems.
- With the promise of widespread automation in mind, agencies are increasing their requirements for multi-dimensional systems such as the one depicted in Exhibit V-3. Few professional services vendors are able to meet these demands by themselves, and even fewer have the R&D capability to advance their capabilities in newer technologies while spending to capture and successfully complete assignments.
 - The answer to these challenges lies in strategic partnering. This concept suggests that the unique requirements of a targeted agency or opportunity be used to guide the professional services vendor's selection of products, services, and capabilities needed to satisfy these requirements. Whether the products/services are developed in-house or licensed or purchased from another vendor, the goal is to satisfy the user requirements in a manner that offers the user the appearance of the vendor as a single source of service for a wide spectrum of professional services requirements, including post-award services such as training, documentation, maintenance, and ongoing support. By envisioning linkages that make sense to the user, vendors have greater control to shape deals.
 - There are negatives associated with strategic partnering, however, for:
 - Partnering cannot compensate for fundamental vendor weaknesses and, in fact, may accentuate them by creating mutual dependencies.

EXHIBIT V-3

THE THREE-DIMENSIONAL WORLD OF PROFESSIONAL SERVICES



- Partnering in a reactive mode clouds the dynamics (positive and negative) that ensues when companies are sharing a vital part of their business with another, perhaps otherwise competitive, vendor. Such clouding prohibits management from engendering the intensity and drive that make partnering work.
- Partnering may be a long process that, unless started early, will result in a missed opportunity. Early partnering is critical when the window of opportunity is narrow.
- Partnering sometimes calls for teaming with competitors. This not only violates business instincts but may create conflicts with other parts of the organization if these other groups assess the partnering strategy as the result of their own failure to deliver the product/services required.

D. RECOMMENDATIONS RECAP

- Vendors should penetrate potential agency customers vertically to better understand the agency mission and functions and solve the agency problems, not modify the problem to meet an available solution.
- Vendors should be aware that, especially in Civil agencies, their reputation is an important factor in whether they can win work with an agency. The government is a "small" community, and a questionable reputation in one agency can impede getting work in another. Overcoming a "poor" reference can take a long time.
- It is extremely important that vendors regularly and systematically survey their agency customers to determine problems, satisfaction levels, trends, and

opportunities. This should not be done through the field staff but by a central organization. In at least part of the survey, an independent third party should be employed to prevent biases and provide objective standards.

- Vendors can make more effective use of their marketing budget if they emphasize their marketing in areas that are politically popular. Congress reacts to programs that gain or hold votes, and current budgets are more likely to emphasize domestic issues and spending programs than technology.
- Vendors should manage proposal development carefully to ensure containment of the risks of unsuccessful performance.
- Vendors should establish strategic partner relationships based on user requirements and position themselves as competent "single-service" professional services vendors.

APPENDIX A: DEFINITIONS

APPENDIX A: DEFINITIONS

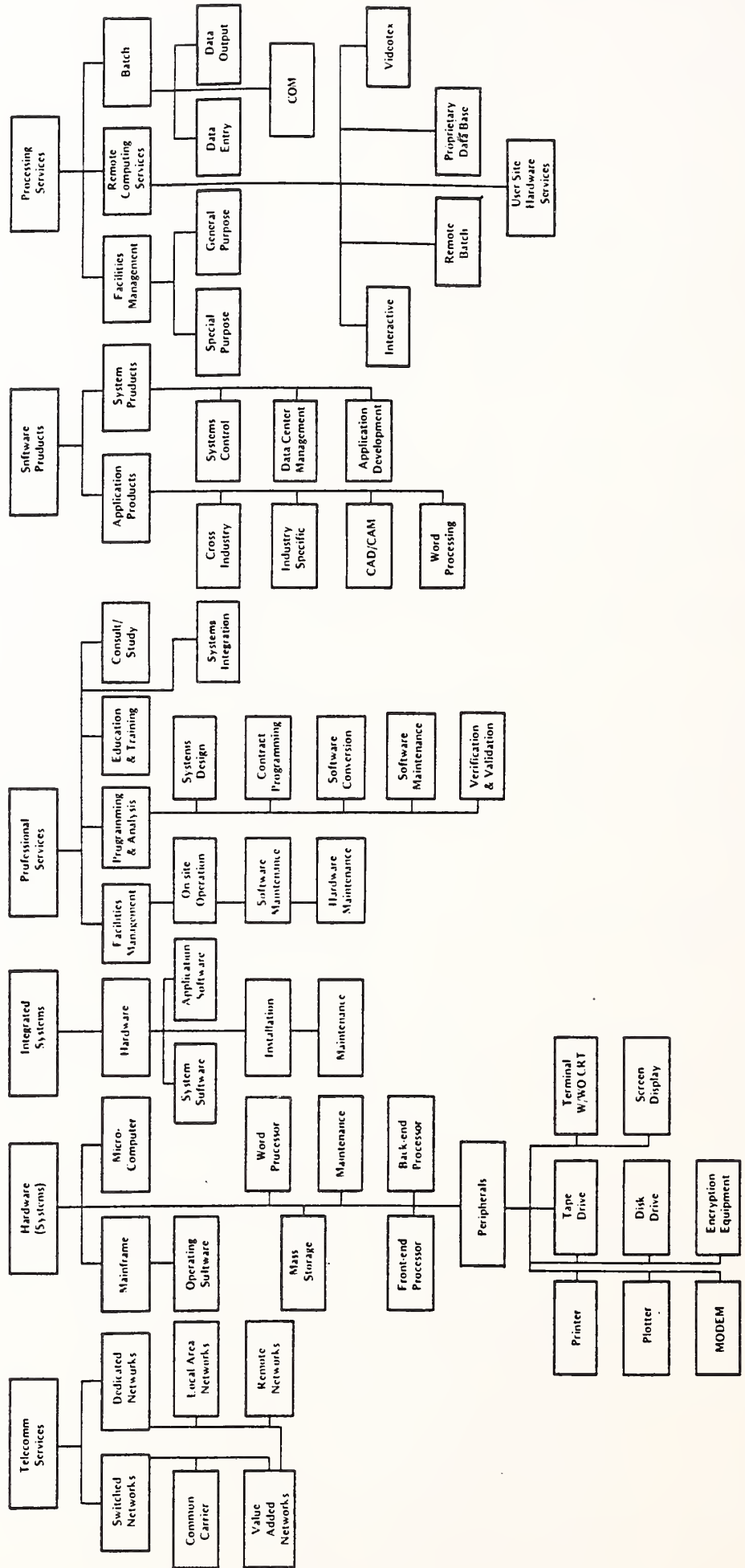
- To accommodate the range of programs described in the OMB Five-Year Plan and agency long-range information technology plans, the definitions include hardware and telecommunications categories. Additionally, alternate service mode terminology employed by the federal government in its procurement process is defined, along with INPUT's regular terms of reference, as shown in Exhibit A-1.
- The federal government's unique nontechnical terminology that is associated with applications, documentation, budgets, authorization, and the procurement/acquisition process is included in Appendix B: Glossary of Federal Government Acronyms.

A. SERVICE MODES

- PROCESSING SERVICES - Remote computing services, batch services, and processing facilities management.
 - REMOTE COMPUTING SERVICES (RCS) - Provision of data processing to a user by means of terminals at the user's site(s). Terminals are connected by a data communications network to the vendor's central computer. The most frequent contract vehicle for RCS in the federal government is GSA's TSP (Teleprocessing Services Program). There are four submodes of RCS:

EXHIBIT A-1

FEDERAL INFORMATION SYSTEMS AND SERVICES PROGRAM
SYSTEMS AND SERVICES



- INTERACTIVE (timesharing) - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing: the user is on-line to the program/files.
- REMOTE BATCH - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements.
- PROPRIETARY DATA BASE - Characterized by the retrieval and processing of information from a vendor-maintained data base. The data base may be owned by the vendor or by a third party.
- USER SITE HARDWARE SERVICES (USHS) - These offerings provided by RCS vendors place programmable hardware on the user's site (rather than the EDP center). Some vendors in the federal government market provide this service under the label of Distributed Data Services. USHS offers:
 - Access to a communications network.
 - Access through the network to the RCS vendor's larger computers.
 - Local management (and storage) of a data base subset that will service local terminal users via the connection of a data base processor to the network.
 - Significant software as part of the service.
- BATCH SERVICES - These include data processing performed at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those

sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- PROCESSING FACILITIES MANAGEMENT (PFM) (also referred to as "Resource Management," "Systems Management," or "COCO" - contractor-owned, contractor-operated) - The management of all or part of a user's data processing functions under a long-term contract (not less than one year). This would include remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.
- PROFESSIONAL SERVICES - Made up of services in the following categories:
 - CONSULTING SERVICES - Information systems and/or services management consulting, program assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.
 - EDUCATION AND TRAINING - Products and/or services related to information systems and services for the user, including CAI (computer-aided instruction), CBE (computer-based education), and vendor instruction of user personnel in operations, programming, and maintenance.
 - PROGRAMMING AND ANALYSIS (also known as Software Development Services) - Include system design, contract or custom programming, code conversion, independent verification and validation (also called IV&V), and benchmarking. These services may also include follow-on and software maintenance.
 - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) (also referred to as GOCO - Government-Owned, Contractor-Operated) - The computing equipment is owned or leased by the government, not the PSFM vendor; the

vendor provides the staff to operate, maintain, and manage the government's facility. Submodes include:

- OPERATION AND MAINTENANCE (also called O&M) - Vendor operation and maintenance of government-owned ADP/telecommunications equipment in a government-owned/leased facility (on-site) without vendor management of facility.
- HARDWARE AND/OR SOFTWARE MAINTENANCE - Vendor-furnished services provided after installation and acceptance by the government, where the vendor may not be the original supplier (third-party maintenance or TPM) and may use either on-site or on-call personnel to perform services.
- SYSTEMS INTEGRATION - Services associated with systems design, integration, and installation and government acceptance of ADP/telecommunications systems may be provided with related engineering activities such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).
- INTEGRATED SYSTEMS (also known as Turnkey Systems) - An integration of systems and applications software with hardware packaged as a single entity. The value added by the vendor is primarily in the software. Most CAD/CAM systems and many small business systems are integrated systems. This does not include specialized hardware systems such as word processors, cash registers, and process control systems.
- SOFTWARE PRODUCTS - This category includes user purchases of applications and systems packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement and maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. There are several subcategories of software products, as indicated below.

- APPLICATIONS PRODUCTS - Software that performs processing that services user functions. The products are:
 - CROSS-INDUSTRY PRODUCTS - Used in multiple-user industry applications as well as in federal government sectors. Examples are payroll, inventory control, and financial planning.
 - INDUSTRY-SPECIALIZED PRODUCTS - Used in the specific federal government sector, such as planning, resource utilization, aircraft flight planning, military personnel training, etc. May also include some products designed to work in an industry other than the federal government, but applicable to specific government-performed commercial/industrial services, such as hospital information, vehicular fleet scheduling, electric power generation and distribution, CAD/CAM, etc.

- SYSTEMS PRODUCTS - Software that enables the computer/communications system to perform basic functions. They consist of:
 - SYSTEMS CONTROL PRODUCTS - Function during applications program execution to manage the computer system resource. Examples include operating systems, communication monitors, emulators, and spoolers.
 - DATA CENTER MANAGEMENT PRODUCTS - Used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.
 - APPLICATION DEVELOPMENT PRODUCTS - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include languages, sorts, productivity aids, compilers, data dictionaries, data base management systems, report writers, project control systems, and retrieval systems.

B. HARDWARE/HARDWARE SYSTEMS

- HARDWARE - Includes all ADP and telecommunications equipment that can be separately acquired by the government, with or without installation by the vendor, and not acquired as part of a system.
 - PERIPHERALS - Includes all input, output, communications, and storage devices, other than main memory, that can be locally connected to the main processor and generally cannot be included in other categories, such as terminals.
- INPUT DEVICES - Includes keyboards, numeric pads, card readers, bar-code readers, lightpens and trackballs, tape readers, position and motion sensors, and A-to-D (analog-to-digital) converters.
- OUTPUT DEVICES - Includes printers, CRTs, projection television screens, microfilm processors, digital graphics, and plotters.
- COMMUNICATION DEVICES - Modems, encryption equipment, special interfaces, and error control.
- STORAGE DEVICES - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, drums, solid state (integrated circuits), and bubble and optical memories.
 - TERMINALS - There are three types of terminals used in federal government systems:
 - USER PROGRAMMABLE (also called "intelligent terminals"):
 - Single-station or standalone.
 - Multistation-shared processor.

- Teleprinter.
- Remote batch.
- USER NONPROGRAMMABLE:
 - Single-station.
 - Multistation-shared processor.
 - Teleprinter.
- LIMITED FUNCTION - Originally developed for specific needs, such as POS (point of sale), inventory data collection, controlled access, etc.
- HARDWARE SYSTEMS - For the purposes of this report, hardware systems include all processors from microcomputers to super (scientific) computers. Hardware systems require type- or model-unique operating software to be functional, but the 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- or 16-bit computer on a chip, in the form of:
 - Integrated circuit package.
 - Plug-in board with more memory and peripheral circuits.
 - Console, including keyboard and interfacing connectors.
 - Personal computer with at least one external storage device directly addressable by CPU.

- An embedded computer, which may take a number of shapes or configurations.
- MINICOMPUTER - Usually a 12-, 16-, or 32-bit computer, which may be provided with limited applications software and support and may represent a portion of a complete large system.
 - Personal business computer.
 - Small laboratory computer.
 - Nodal computer in a distributed data network or remote data collection network or connected to remote microcomputers.
- MIDICOMPUTER - Typically a 32- or 64-bit computer, with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications, also called a general-purpose computer.
- LARGE COMPUTER - Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors (CPUs) or parallel processors; they are intended for structured mathematical and signal processing, and are generally used with general-purpose von-Neumann-type processors for system control.
- SUPERCOMPUTER - High-powered processors with numerical processing throughput that is significantly greater than the largest general-purpose computers, with capacities in the 10-50 MFLOPS (million floating point operations per second) range, in two categories:
 - REAL TIME - Generally used for signal processing in military applications.

- NONREAL TIME - For scientific use, with maximum burst-mode (not sustained speed) capacities of up to 100 MFLOPS, in one of three configurations:
 - Parallel processors.
 - Pipeline processor.
 - Vector processor.
- Newer supercomputers, with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class, are labelled Class IV to VI in agency long-range plans.
- EMBEDDED COMPUTER - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform, or is critical to a military or intelligence mission, such as command and control, cryptological activities, or intelligence activities. Characterized by MIL SPEC (military specification) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from microcomputers to parallel-processor computer systems.

C. TELECOMMUNICATIONS

- NETWORKS - Interconnection services between computing resources. Provided on a leased basis by a vendor, to move data and/or textual information from one or more locations to one or more locations.
- COMMON CARRIER NETWORKS (CCN) - Provided via conventional voice-grade circuits and through regular switching facilities (dial-up calling) with

leased or user-owned modems (to convert digital information to voice-grade tones) for transfer rates between 150 and 1,200 baud.

- VALUE-ADDED NETWORKS (VANs) - Provided by vendors through common carrier or special-purpose transmission facilities, with special features not available in the voice-grade switched public network:
 - DEDICATED NETWORK - Provides nonswitched interconnections between computing resources, such as:
 - Full-period, continuously connected communications interface, with machine-to-machine traffic flow.
 - Message-switched text/data flow between specified CPUs or terminals, as determined by information included in the header (front-end) of the message or data block.
 - PACKET-SWITCHED - Provides means for delivery of pre-determined blocks of data/text through a common-carrier-type switched network.
 - MESSAGE-SWITCHED - Similar to the dedicated network in message delivery methods, but not restricted to a single user.
- LOCAL AREA NETWORK (LAN) - Restricted limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. One of two types:
 - BASEBAND - Voice bandwidth at voice frequencies (same as telephone, teletype system), limited to a single sender at any given moment and limited to speeds of 75 to 1,200 baud, in serial mode.

- BROADBAND - Employs multiplexing techniques to increase carrier frequency between terminals, to provide:
 - Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).
 - Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).
 - High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).
- TRANSMISSION MEDIA - Varies with the supplier (vendor) and with the distribution of the network and its access mode to the individual computing resource location.
 - MODE - may be either:
 - ANALOG - Typified by the predominantly voice-grade network of AT&T's DDD (Direct Distance Dialing) and by operating telephone company distribution systems.
 - DIGITAL - Where voice, data, and/or text are digitized into a binary stream.
 - MEDIA varies with distance, availability, and connectivity:
 - WIRE - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair) and balanced line, to four-wire full-duplex balanced lines.
 - CARRIER - Multiplexed signals on two-wire and four-wire networks to increase capacity by FDM.

- COAXIAL CABLE - HF (High Frequency) and VHF (Very High Frequency), single-frequency, or carrier-based system that requires frequent reamplification (repeaters) to carry the signal any distance.
- MICROWAVE - UHF (Ultra High Frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.
- OPTICAL FIBER - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers, and using TDM for multi-channel applications.
- SATELLITES - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.
- CELLULAR RADIO - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units; each radio serves a small area called a cell. The computer switches service connection to the mobile unit from cell to cell as the unit moves among the cells.

D. GENERAL DEFINITIONS

- BENCHMARK - Method of testing proposed ADP system solutions for a specified set of functions (applications) employing simulated or real data inputs under simulated operating conditions.
- BYTE - Approximately equivalent to the storage required for one alphanumeric character (i.e., one letter or number).

- CENTRAL PROCESSING UNIT (CPU) - The arithmetic and control portion of a computer, i.e., the circuits controlling the interpretation and execution of computer instructions.
- CONSTANT DOLLARS - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.
- COMPUTER SYSTEM - The combination of computing resources required to perform the designed functions, and which may include one or more CPUs, machine room peripherals, storage systems, and/or applications software.
- CONUS - Locations within the geographical limits of the CONTinental United States.
- CURRENT DOLLARS - Estimates or values expressed in current-year dollars, which, for forecasts, would include an allowance for inflation.
- DATA ENCRYPTION STANDARD (DES) - A specified encryption algorithm implemented by hardware design and used to protect data when stored in or transmitted between user locations.
- DISTRIBUTED DATA PROCESSING - Distributed processing is the deployment 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 characteristics.
- EMBEDDED COMPUTER - Computer system that is an integral part of a weapon, weapon system, or platform, or is critical to the direct fulfillment of a military or intelligence mission.
- ENCRYPTION - Electrical, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points.

- END USER - One who is using a product or service to accomplish his/her own functions. The end user may buy a system from the hardware supplier(s) and do his/her own programming, interfacing, and installation. Alternately, the end 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.

- ENGINEERING CHANGE NOTICE (ECN) - Product changes to improve the product after it has been released to production.

- ENGINEERING CHANGE ORDER (ECO) The follow-up to ECNs. They include parts and a bill of material to effect the change in hardware.

- EQUIPMENT OPERATORS - Individuals operating computer control consoles and/or peripheral equipment (BLS definition).

- FIELD ENGINEER (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

- GENERAL-PURPOSE COMPUTER SYSTEM - A computer designed to handle a wide variety of problems; includes machine room peripherals, systems software, and small business systems.

- HARDWARE INTEGRATOR - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator may also develop control system software in addition to installing the entire system at the end-user site.

- INDEPENDENT SUPPLIERS - Suppliers of machine room peripherals; usually do not supply general-purpose computer systems.

- INFORMATION PROCESSING - Data processing as a whole, including use of business and scientific computers.
- INSTALLED BASE - Cumulative number or value (cost when new) of computers in use.
- KEYPUNCH OPERATORS - Individuals operating keypunch machines (similar in operation to electric typewriters) to transcribe data from source material onto punch cards.
- MACHINE REPAIRERS - Individuals who install and periodically service computer systems.
- MACHINE ROOM PERIPHERALS - Peripheral equipment that is 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.
- MEAN TIME TO REPAIR - The mean of the elapsed times from the arrival of the field engineer on the user's site until the device is repaired and returned to the user.
- MEAN TIME TO RESPOND - The mean of elapsed times between when the user calls for service and when the field engineer arrives at the user's location.
- MESSAGE - A communication intended to be read by a person. The quality of the received document does not have to be high, only readable; graphic materials are not included.
- MODEM - A device that encodes information into electronically transmittable form (MODulator) and restores it to original form (DEMODulator).
- NETWORK - Electronic interconnection between a central computer site and remote locations; it may incorporate switching and/or regional data processing nodes.

- NODE - Connection point of three or more independent transmission points, which 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.
- OVERSEAS - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions.
- PERIPHERALS - Any unit of input/output equipment in a computer system, exclusive of the central processing unit.
- PROGRAMMERS - Persons mainly involved in designing, writing, and testing of computer software programs.
- PROTOCOLS - Digitally encoded instructions for computer-controlled digital switches in digital (data/text) networks that define treatment and identify sender and receiver.
- 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 throughput.
- 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.
- SOFTWARE - Computer programs.

- SUPPLIES - Includes materials associated with the use or operation of computer systems, such as print-out paper, keypunch cards, diskette packs, etc.
- 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 turnkey system to satisfy the data processing requirements of the end user. The vendor may also develop systems software products for license to end 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 acceptance testing of the completed system.
- TURNKEY SYSTEM - System composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.
- 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 of the functions specified by the user.

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 what the users perceive they are buying.

APPENDIX B: GLOSSARY OF FEDERAL ACRONYMS

APPENDIX B: GLOSSARY OF FEDERAL ACRONYMS

- The federal government's procurement language uses a combination of acronyms, phrases, and words that is further complicated by different agency definitions. Terms of accounting, business, economics, engineering, and law are further complicated by new applications and technology.
- Acronyms 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 acronyms have been included to the extent they are employed in this report.

A. ACRONYMS

- AAS Automatic Addressing System.
- AATMS Advanced Air Traffic Management System.
- ACO Administrative Contracting Offices (DCAS).
- ACS Advanced Communications Satellite (formerly NASA 30/20 GHz_Z Satellite Program).
- ACT-I Advanced Computer Techniques (Air Force).

- Ada DoD High-Order Language.
- ADA Airborne Data Acquisition.
- ADL Authorized Data List.
- ADP Automatic Data Processing.
- ADPE Automatic Data Processing Equipment.
- ADS Automatic Digital Switches (DCS).
- AFA Air Force Association.
- AFCEA Armed Forces Communications Electronics Association.
- AGE Aerospace Ground Equipment.
- AIP Array Information Processing.
- AMPE Automated Message Processing Equipment.
- AMPS Automated Message Processing System.
- AMSL Acquisition Management Systems List.
- ANSI American National Standards Institute.
- AP(P) Advance Procurement Plan.
- Appropriation Congressionally approved funding for authorized programs and activities of the Executive Branch.
- APR Agency Procurement Request.
- ARPANET DARPA Network of interconnected scientific computers.
- ATLAS Abbreviated Test Language for All Systems (for ATE-Automatic Test Equipment).
- Authorization In 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.
- AUTODIN AUTOMATIC Digital Network (of the Defense Communications System).
- BA Basic Agreement.
- BAFO Best And Final Offer.
- Base level Procurement, purchasing, and contracting at the military installation level.
- BCA Board of Contract Appeals.

- 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.
- BPE Best Preliminary Estimate.
- Budget Federal Budget, proposed by the President and subject to Congressional review.

- 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.
- CAD Computer-Aided Design.
- CADE Computer-Aided Design and Engineering.
- CADS Computer-Assisted Display Systems.
- CAIS Computer-Assisted Instruction System.
- CAM Computer-Aided Manufacturing.
- CAPS Command Automation Procurement Systems.
- CAS Contract Administration Services, or Cost Accounting Standards.
- CASB Cost Accounting Standards Board.
- CASP Computer-Assisted Search Planning.
- CBD Commerce Business Daily - publication of the U.S. Department of Commerce listing government contract opportunities and awards.
- CBEMA Computer and Business Equipment Manufacturers Association.
- CBO Congressional Budget Office.

- CCDR Contractor Cost Data Reporting.
- CCN Contract Change Notice.
- CCPDS Command Center Processing and Display Systems.
- CCPO Central Civilian Personnel Office.
- CCTC Command and Control Technical Center (JCS).
- CDR Critical Design Review.
- CDRL Contractor Data Requirements List.
- CFE Contractor-Furnished Equipment.
- CFR Code of Federal Regulations.
- CIG Computerized Interactive Graphics.
- CIR Cost Information Reports.
- CM Configuration Management.
- CMI Computer-Managed Instruction.
- CNI Communications, Navigation, Identification.
- CO Contracting Office, Contract Offices, or Change Order.
- COB Command Operating Budget.
- COBOL COmmon Business Oriented Language.
- COC Certificate of Competency (administered by Small Business Administration).
- COCO Contractor-Owned, Contractor-Operated.
- CODSIA Council of Defense and Space Industry Associations.
- CONUS CONTinental United States.
- COP Capability Objectives Package.
- COTR Contracting Officer's Technical Representative.
- 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.
- CPU Central Processor Unit.
- CR Cost Reimbursement (Cost Plus Contracts).
- CSA Combat or Computer Systems Architecture.

- C/SCSC Cost/Schedule Control System Criteria (also called "C"-Spec).
- CWAS Contractor Weighted Average Share in Cost Risk.

- DAL Data Accession List.
- DAR Defense Acquisition Regulations.
- DARPA Defense Advanced Research Projects Agency.
- DAS Data Acquisition System.
- DBHS Data Base Handling System.
- DBMS Data Base Management System.
- DCA Defense Communications Agency.
- DCAA Defense Contract Audit Agency.
- DCAS Defense Contract Administrative Services.
- DCASR DCAS Region.
- DCC Digital Control Computer.
- DCP Development Concept Paper (DoD).
- DCS Defense Communications System.
- DDA Dynamic Demand Assessment (Delta Modulation).
- DDC Defense Documentation Center.
- DDL Digital Data Link.
- DDN Digital Data Network.
- DDS Dynamic Diagnostics System.
- D&F Determination and Findings - required documentation for approval of a negotiated procurement.

- DIA Defense Intelligence Agency.
- DHHS Department of Health and Human Services.
- DIDS Defense Integrated Data Systems.
- DISC Defense Industrial Supply Center.
- DLA Defense Logistics Agency.
- DMA Defense Mapping Agency.
- DNA Defense Nuclear Agency.
- DO Delivery Order.
- DOA Department of Agriculture (also USDA).
- DOC Department of Commerce.

- 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.
- DQ Definite Quantity Contract.
- DQ/PL Definite Quantity Price List Contract.
- DR Deficiency Report.
- DSN Defense Switched Network.
- DSP Defense Support Program (WWMCCS).
- DSS Defense Supply Service.
- DTC Design-to-Cost.

- ECP Engineering Change Proposal.
- ED Department of Education.
- EEO Equal Employment Opportunity.
- EIA Electronic Industries Association.
- 8(a) Set-Aside Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.

- EMC Electro Magnetic Compatibility.
- EMCS Energy Monitoring and Control System.
- EO Executive Order - Order ISS by the President.
- EOQ Economic Ordering Quantity.
- EPA Economic Price Adjustment.
- EPA Environmental Protection Agency.
- EPMR Estimated Peak Monthly Requirement.
- EPS Emergency Procurement Service (GSA), or Emergency Power System.

- FA Formal Advertising.
- FAC Facility Contract.
- FAR Federal Acquisition Regulations.

- FCA Functional Configuration Audit.
- FCC Federal Communications Commission.
- FCDC Federal Contract Data Center.
- FCRC Federal Contract Research Center.
- FDPC Federal Data Processing Centers.
- FEDSIM Federal (Computer) Simulation Center (GSA).
- FEMA Federal Emergency Management Agency.
- FFP Firm Fixed-Price Contract (also Lump Sum Contract).
- FIPS-PUBS Federal Information Processing Standards Publications.
- FIRMR Federal Information Resource Management Regulations.
- FMS Foreign Military Sales.
- FOC Final Operating Capability.
- FOIA Freedom of Information Act.
- FP Fixed-Price Contract.
- FP-L/H Fixed-Price - Labor/Hour Contract.
- FP-LOE Fixed-Price - Level-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).
- FTS Federal Telecommunications System.
- FY Fiscal Year.
- FYDP Five-Year Defense Plan.

- 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.

- GPO Government Printing Office.
- GPS Global Positioning System.
- GS General Schedule.
- GSA General Services Administration.

- HPA Head of Procuring Activity.
- HSDP High-Speed Data Processors.
- HUD (Department of) Housing and Urban Development.

- 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 Bureau of Standards, Department of Commerce.
- IDAMS Image Display And Manipulation System.
- IDEP Interservice Data Exchange Program.
- IDN Integrated Data Network.
- IFB Invitation For Bids.
- IOC Initial Operating Capability.
- IOI Internal Operating Instructions.
- IQ Indefinite Quantity Contract.
- IR&D Independent Research & Development.
- IRM Information Resource Manager.
- IXS Information Exchange System.

- JOCIT JOVIAL Compiler Implementation Tool.
- JSIPS Joint Systems Integration Planning Staff.
- JSOP Joint Strategic Objectives Plan.
- JSOR Joint Service Operational Requirement.
- JUMPS Joint Uniform Military Pay System.

- LC Letter Contract.
- LCC Life Cycle Costing.
- LCMP Life Cycle Management Procedures (DD7920.1).
- LCMS Life Cycle Management System.
- L-H Labor-Hour Contract.
- LOI Letters of Interest.
- LRPE Long-Range Procurement Estimate.
- LSI Large-Scale Integration.

- MAISRC Major Automated Information Systems Review Council.
- MANTECH MANufacturing TECHnology.
- MAPS Multiple Address Processing System.
- 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.
- MOD Modification.
- MOL Maximum Ordering Limit (Federal Supply Service).
- MPC Military Procurement Code.
- MYP Multi-Year Procurement.

- NARDIC Navy Research and Development Information Center.
- NASA National Aeronautics and Space Administration.
- NCMA National Contract Management Association.
- NICRAD Navy-Industry Cooperative Research and Development.
- NIP Notice of Intent to Purchase.
- NMCS National Military Command System.
- NSA National Security Agency.
- NSF National Science Foundation.

- NSIA National Security Industrial Association.
- NTIS National Technical Information Services.

- Obligation "Earmarking" of specific funding for a contract, from committed agency funds.
- OCS Office of Contract Settlement.
- OFCC Office of Federal Contract Compliance.
- Off-Site Services to be provided near, but not on/in government facility.
- 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 & Repair.
- On-Site Services (nonpersonal) 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.

- OSHA Occupational Safety and Health Act.
- OSP Offshore Procurement.
- OTA Office of Technology Assessment (Congress).
- Out-Year Proposed funding for fiscal years beyond the Budget Year (next fiscal year).

- P-I 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.
- PCM Pulse Code Modulation.
- 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 Program Management Plan.
- PO Purchase Order, or Program Office.
- POM Program Objective Memorandum.
- PPBS Planning, Programming, Budgeting System.
- PPM Pulse Position Modulation.
- PR Purchase Request, or Procurement Requisition.
- PROM Programmable Read-Only Modules.
- 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.
- 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-I FY RDT&E Budget.
- RAM Reliability, Availability, and Maintainability.
- RC Requirements Contract.
- R&D Research & 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, & Engineering.
- 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.
- RTAS Real-Time Analysis System.
- RTDS Real-Time Display System.

- SA Supplemental Agreement.
- 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.
- 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.
- SIMP Systems Integration Master Plan.
- SIOP Single Integrated Operations Plan.
- SNAP Shipboard Nontactical ADP Program.
- Sole Source Contract award without competition.
- Solicitation Invitation to (submit a) bid.
- SOR Specific Operational Requirement.
- SOW Statement of Work (negotiated procurements).
- 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.
- SWO Stop-Work Order.
- Synopsis Brief description of contract opportunity in CBD, after D&F and before release of solicitation.

- TA/AS Technical Assistance/Analyst Services.
 - TDMA Time Division Multiple Access.
 - TEMPEST DoD techniques to inhibit unintentional electromagnetic radiation.
 - TILO Qualified Requirements Information Program - Army.
 - TM Time and Materials contract.
 - TOA Total Obligational Authority (Defense).
 - TOD Technical Objective Document.
 - TR Temporary Regulation (added to FPR, FAR).
 - TRACE Total Risk Assessing Cost Estimate.
 - TRCO Technical Representative of the Contracting Offices.
 - TREAS Department of Treasury.
 - TRP Technical Resources Plan.
 - TSP Teleprocessing Services Program (GSA).
-
- UCAS Uniform Cost Accounting System.
 - UPS Uninterruptable Power Source.
 - USA U.S. Army.
 - USAF U.S. Air Force.
 - USMC U.S. Marine Corps.
 - USN U.S. Navy.
 - U.S.C. United States Code.
 - U.S.P.S. United States Postal Service.
 - USRRB United States Railroad Retirement Board.
-
- VA Veterans Administration.
 - VE Value Engineering.
 - VHSIC Very High Speed Integrated Circuits.
 - VIABLE Vertical Installation Automation BaseLine (Army).
 - VICI Voice Input Code Identifier.
 - VLSI Very Large Scale Integration.
-
- WBS Work Breakdown Structure.
 - WGM Weighted Guidelines Method.

- WIN WWMCCS Intercomputer Network.
- WIS WWMCCS Information Systems.
- WS Work Statement - Offerer's description of the work to be done (proposal or contract).
- WWMCCS WorldWide Military Command and Control System.

B. 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-76 Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government.
- A-108* Responsibilities for the Maintenance of Records about Individuals by Federal Agencies.
- 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.

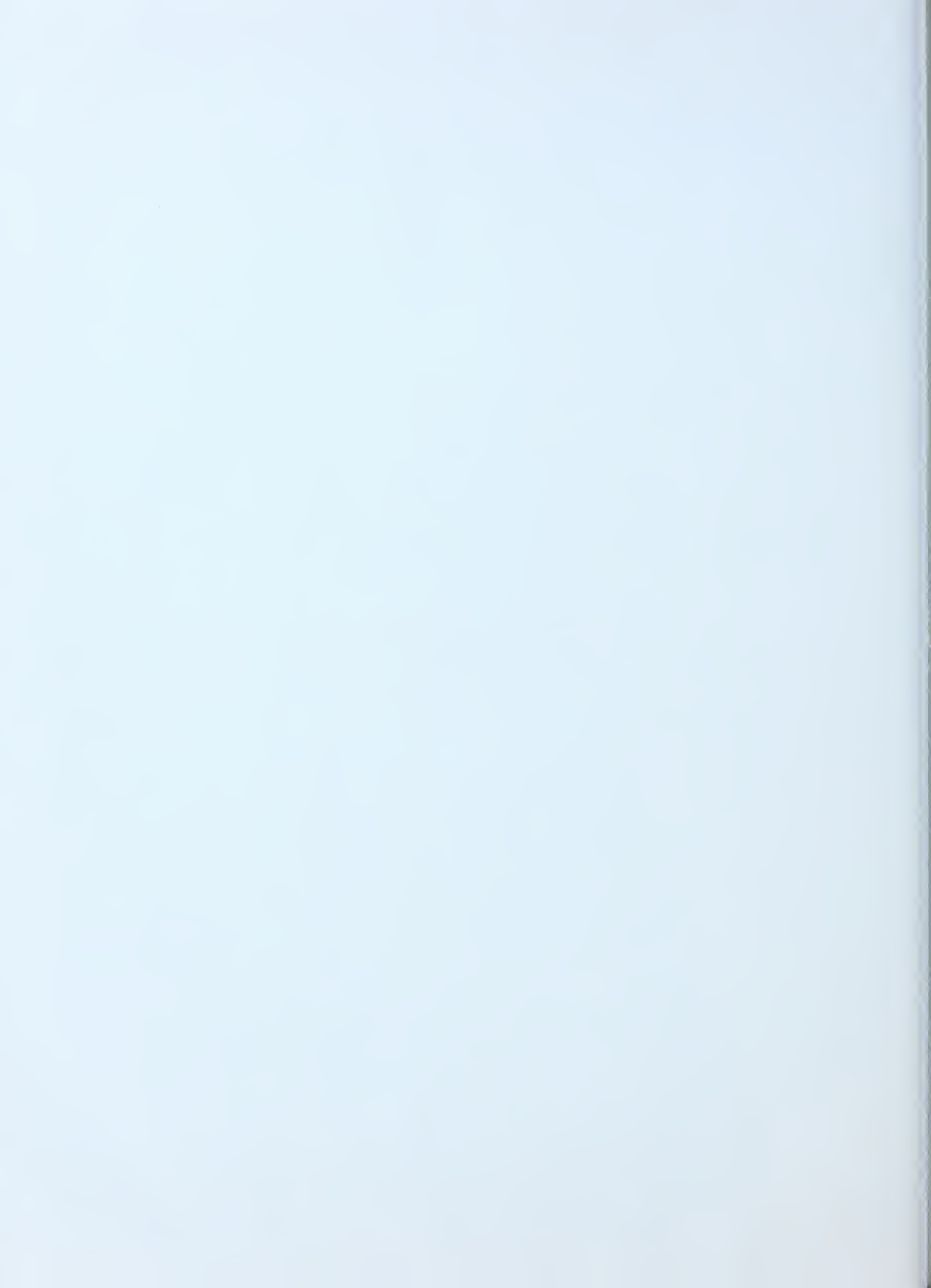
C. DEPARTMENT OF DEFENSE DIRECTIVES

- DD-5000.1 Major System Acquisitions.
- DD-5000.2 Major System Acquisition Process.

* These policies superceded by A- (as yet unnumbered) Management of Federal Information Resources.

- DD-5200.1 DoD Information Security Program.
- DD-5000.31 Interim List of DoD-Approved High-Order Languages.
- DD-5000.35 Defense Acquisition Regulatory Systems.
- DD-7920.1 Life Cycle Management of Automated Information (AIS).
- DD-7920.2 Major Automated Information Systems Approval Process.

APPENDIX C: RELATED INPUT REPORTS



APPENDIX C: RELATED INPUT REPORTS

A. ANNUAL MARKET ANALYSES

- U.S. Information Services Vertical Markets, 1984-1989
- U.S. Information Services Cross-Industry Markets, 1984-1989
- Procurement Analysis Reports, GFY 1985-1989

B. INDUSTRY SURVEYS

- Information Services Industry Annual Report - 1985
- Eighteenth Annual ADAPSO Survey of the Computer Services Industry - 1984
- Seventeenth Annual ADAPSO Survey of the Computer Services Industry - 1983
- Directory of Leading U.S. Information Services Vendors

C. PROFESSIONAL SERVICES MARKET REPORTS

- Management, Technology, and Strategy for Large Systems 1983
- End-User Experiences with Fourth-Generation Languages 1983
- Large System Vendor Competitive Analysis 1983
- Relational Data Base Management Developments 1983

- New Directions in Operating Systems, Communications, and DBMS 1982
- Market Opportunities in Network Services 1982
- The Merging of Hardware, Software, and Services 1981
- Market Trends in Professional Services 1981
- Information Services in 1990 - Management Brief 1981
- Federal Systems Integration Market, 1985-1990 1984

D. SOFTWARE MARKETS

- Software Products and Professional Services Markets, 1984-1989
- Integrated DBMS-Applications Software
- Professional Services Opportunities for Software Product Implementation

