Information
Services
Program
(ISP)

Information Systems Planning Report

Federal Government Sector

INPUT®

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INFORMATION SYSTEMS PLANNING REPORT

FEDERAL GOVERNMENT SECTOR

INPUT®

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Major Issues

A

Driving Forces

The federal government was the first wide-based employer of large data processing capabilities. Despite an inventory in excess of 22,000 CPUs, current I.S. resources are experiencing difficulty in meeting rising service demands.

- Public service functions, such as social security and welfare, health and human services continue to escalate under Congressional initiatives.
- Congress needs newer, more frequent and more timely data and analyses from the departments and agencies it oversees.
- Administrative initiatives continue to uncover areas of executive branch information processing that are missing or inadequate to meet new management expectations.

While not as pronounced as the early 1980s, the ADP Equipment (ADPE) inventory includes a significant number of early third generation machines that lack the flexibility, speed, and capacity of currently available technologies.

The combination of older ADPE and a very large inventory of custom software has driven maintenance costs up and extended repair times. GAO and NBS have estimated that about 70% of software life cycle costs go to maintenance and enhancement, and tie down an inordinate percentage of in-house I.S. staff.

Government personnel and managers requiring data processing support through end-user computing need dynamic response from data centers. Both volume and complexity are increasing, along with demands for more user-friendly computing support.

The need to share data, under the constraints of the Paperwork Reduction Act, and to interact to meet administration requirements, including the REFORM 88, CALS and SDI initiatives, are pressing for substantially improved connectivity. New standards are needed for uniform protocols, open system architectures and standard systems interconnections.

Administrative and Congressional demands for improved security measures concern both national security and individual privacy protection issues. Congress is also considering new computer theft and proprietary data protection measures. These driving forces are summarized in Exhibit I-1.

EXHIBIT I-1

FEDERAL GOVERNMENT SECTOR DRIVING FORCES

- Rising Service Demands
- Equipment Obsolesence
- High Maintenance Costs
- End-User Computing Needs
- Connectivity Requirements
- Improved Security/Privacy Demands
- Presidential Priority Programs

The large number of new and replacement information systems in the procurement process required a priority process to assume completion of those associated with key administrative initiatives. In the *FY 1988 Report on Management of the United States Government*, 15 systems have been designated "Presidential Priority Systems". In addition, 12 more systems have been designated as Future Priority Systems, which are committed to meet industry standards by 1990.

B

Issues and Objectives

Cost containment has become a major issue under the combined pressures of Congress and rising budget deficits. Competitors are encouraged to submit fixed price bids on most systems integration and I.S. upgrade projects, while satisfying other issues identified in Exhibit I-2.

EXHIBIT I-2

FEDERAL GOVERNMENT SECTOR ISSUES

- Cost Containment
- Acquisition Reforms
- Budget Deficit Control Measures
- Software Development Productivity
- Pending Standardization Initiatives
- Competition in Contracting Act

New acquisition, management and usage procedures have been incorporated in the Federal Information Resource Management Regulations (FIRMR). The reforms are intended to streamline the purchasing process while improving the amount of competition. A number of improvement initiatives are underway.

- GO FOR 12 is a joint agency program to reduce the acquisition process to 12 months.

- TRAIL BOSS is a proposed program for increasing the acquisition authority of selected government program managers.

- FAR (Federal Acquisition Regulations) Streamline is a new initiative to further reduce the volume of the regulations and employ conventional business terminology.

Budget Deficit Control, whether provided under the terms of the Gramm-Rudman-Hollings Act or direct Congressional action is expected to impact the rate and/or extent of I.S. modernization in the agencies.

The major departments and agencies are concerned by the rising costs of software development and the resulting elongated delivery schedules. A number of initiatives have been implemented, principally by the Defense Department, GSA and NASA.

- Software Engineering Institute, awarded to the Carnegie Mellon Institute, to investigate new productivity and documentation methods.

- Defense and NASA commitment to employ Ada as the primary language of embedded information systems, to reduce the demand for programmers for a wide variety of languages.

- GSA implemented the Office of Software Technology and initiated the Programmers Work Bench (PWB) project to enhance agency software development.

In anticipation of issuing several new standards to improve interoperability and connectivity, NBS, GSA, DCA and key civilian agencies are reviewing several initiatives, including GOSIP (Government Open System Interconnection Profile), POSIX (Proposed Official version of UNIX) and simplification of a myriad of protocols.

The Competition in Contracting Act (CICA) provided both improvements and some impediments to the information resource acquisition process:

- Created a new and accelerated protest procedure under the GSA Board of Contract Appeals.

- Created the function of Competitive Ombudsman to assure full competition wherever possible.

- Established or reaffirmed procedures for protecting small businesses from unwarranted restrictions.

Integration of voice, image, text and data interchange within a single digital system is a key objective of GSA's FTS 2000 telecommunications project in the 1990s. An all-digital system would more readily permit encryption for security reasons and more cost-effective use of fiber optic transmission methods.

Improved, user-friendly data processing resources are key objectives of most current systems projects. A primary objective is improved data base availability, with affiliated protective measures in both hardware and software that respond to end-user needs.

GAO, GSA and NBS are pressing agencies to employ off-the-shelf or readily adaptable software products for a wide range of government

EXHIBIT I-3

FEDERAL GOVERNMENT SECTOR OBJECTIVES

- Voice-Data Integration
- Improved End-User Support
- Increased Software Product Applications
- Relational Data Bases
- Departmental Information Processing
- Transparent Connectivity
- Decision Support Systems

applications that closely resemble commercial processes. Objectives include:

- Reduced software development time and cost.
- Improve maintainability of software.
- Improve transportability of applications between processors.

There is increasing pressure for installation of relational data bases, equipped with SQL, to meet the data retrieval requirements of a widening community of end-users, which may also include the public.

The emphasis on IS departmental processing is improvement of services to end users, with purchased products, improved and timely data bases, and technical support.

The ultimate objective of current federal initiatives is implementation of systems with transparent connectivity with users and other systems.

One additional objective is the implementation of interface devices between office automation equipment and centralized data bases and other files to provide decision support systems to government executives.

C

Impact of Technology

Although the federal government supported the development of new information resource technology, a number of national issues and budget constraints delayed government implementation. Five key areas still in various stages of development that are expected to impact system deployment are listed in Exhibit I-4.

EXHIBIT I-4

FEDERAL GOVERNMENT SECTOR IMPACT OF TECHNOLOGY

- Supercomputer Improvements
- Digital Voice Systems
- Artificial Intelligence/Expert Systems
- Open System Architecture
- New Optical Memory Technology

The federal government's need for and support of research on supercomputers has been given additional impetus by the race with the Japanese, the demands for SDI processing and the extended boundaries of physics and medical research. With increasing parallelism as one avenue of processing, pressures are increasing for other computers to write the required code.

New solid state developments and strides in voice recognition computers are offering new ways for entering data and encryption of voice communications for protection. A number of agencies need digital voice systems for authentication and operation in difficult environments.

Artificial intelligence, or more specifically, expert systems, have already been employed in limited applications. New approaches that use AI include software development, process monitoring and simulation.

Open system architecture, long an objective of military systems that are assembled in building block fashion, will now become the standard in non-military systems. Open systems improve the prospects of expansion and modification without requiring replacement of the basic processors.

New optical memory technology, such as CD-ROM, and large-scale laser disks support implementation of large personnel and financial systems, logistics and maintenance systems, to support a "less-paper" bureaucracy.

II

New Applications

II

New Applications

The sheer volume of transactions and complexity of operations within the federal government sector demands a changing focus of applications to apply new developments to a range of information service problems.

EXHIBIT II-1

FEDERAL GOVERNMENT SECTOR NEW APPLICATIONS

- EDI - Networks and Services
- Computer-Aided Acquisition and Logistic Systems (CALS)
- End-User Computer Networks
- Automated Tax Processing
- Standardized Financial, Payroll and Personnel Systems
- AI Applied to Software Development and Simulation Modeling
- Speech Processing

Key among the emerging applications in Electronic Document Interchange (EDI) which accelerates the accurate interchange of procurement, logistics, data collection and funds transactions. Since EDI uses conven-

tional data processing and telecommunications capabilities, the emphasis in the federal sector will be development of vendor-furnished networks, software and services to facilitate EDI implementation.

The CALS (Computer-Aided Acquisition and Logistics Systems) Initiative of the Defense Department and NASA is a new application of automation of logistics to accomplish several goals:

- Integrate data life-cycle elements in a source-to-use network.
- Ensure compatibility of data interchange between logistic systems.
- Automate the acquisition elements of:
  - Stock order process;
  - Shipping document generation and handling;
  - Inventory analyses;
  - Technical order (repair) system;
  - Technical manual and documentation generation on demand basis.
- Demonstrate the initial design characteristics and criteria via selected projects.
- Involve industry and government in both the implementation and utilization of the systems.

The conventional approach of developing networks for I.S. centers to serve other centers and remote users is being invented by demand. Burgeoning end-user computing based on PCs is creating demand for sophisticated LANs for interconnection between users and links to data centers for data base access and software services. The I.S. facilities must comply with these demands or be by-passed in favor of commercial data sources.

Automated tax processing applications are being developed on several fronts:

- Internal automation at the IRS Regional Centers to provide enhanced capabilities for:
  - Rapid conversion of tax forms to electronic form;
  - Online retention of several year's returns;
  - Automated analyses to select returns that need detailed auditing (rather than sampling methods);
  - Automated preparation of refund payments.

- External automation of the tax return process on two levels:
  - Electronic filing of individual returns;
  - Electronic filing of small business returns, involving more forms;
  - Electronic fund transfers for tax payment and refunds.

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

- Financial systems must meet a single set of standards and produce compatible products by 1992.
- Payroll systems must meet new accuracy and timeliness standards, and be compatible within military and civilian agencies by 1990.
- Personnel systems must be upgraded to meet all of the EEO and privacy protection criteria by the early 1990s.

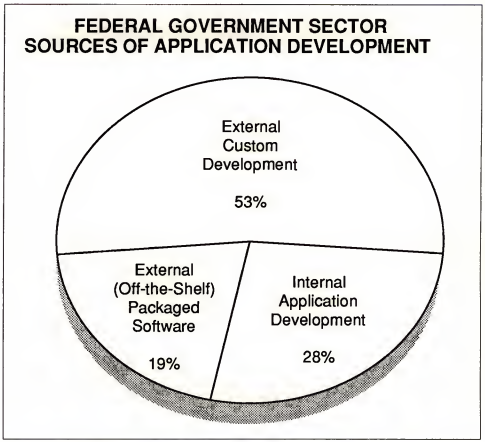
Artificial Intelligence/expert systems applications are moving to near-term implementation and availability in several areas:

- Defense has several pilot projects underway where AI can provide assistance to human control functions.
- AI is being employed to develop models for a number of applications, including the automated tax audit system, gaming for military training simulators, and automated logistics processes.
- AI is being tested for use in development of applications software, to include automated documentation generation and selection of alternatives that minimize future maintenance problems.

After several tests in cargo handling and customs identification problems, federal agencies are looking at a wide range of speech processing applications that go beyond the needs for voice encryption in security circumstances.

The federal government continues to be heavily dependent on custom development of new applications, partly based on a perceived need for government-unique solutions, and partly based on continuing dependence on a large inventory of early third-generation processors. This heavy dependence on outside development sources is illustrated in Exhibit II-2.

EXHIBIT II-2



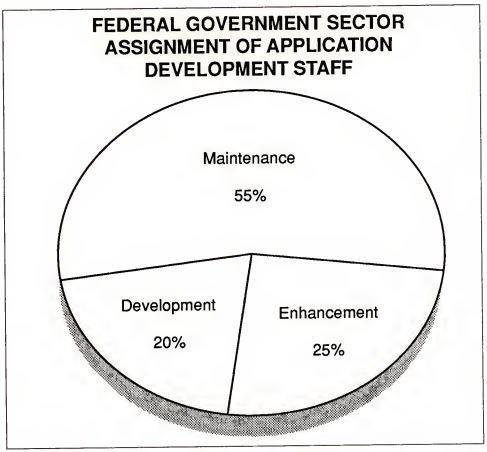
The externally developed, off-the-shelf software package source has been given a major impetus by the rapid growth of end-user personal computer usage. Packaged software has also become available for minicomputers, of which the government has a large inventory. The share of application development by this source is expected to continue to grow.

Demands on the internal (in-house) I.S. staff to maintain older but critical custom software prevents wider application to new developments by that staff. GAO and NBS surveys have demonstrated that more than 70% of the software life cycle costs are expended on maintenance and under-managed enhancements.

For now and the foreseeable future, the predominant source of major new application development will be external to the government. The majority of the development will come from professional services and software development firms. A smaller but very significant part of the development will come from universities and not-for-profit organizations, especially in AI, supercomputers, and automation applications.

Statistics regarding assignment of internal IS personnel to applications development assignments are approximations based on random interviews shown in Exhibit II-3. Excluded from the 126,574 manyears

EXHIBIT II-3



budgeted for 1987 and the 127,560 manyears for 1988 are personnel involved in data center operations, supervision, scheduling and data entry/report production functions.

The National Bureau of Standards and General Services Administration software support studies indicated that 70-80 percent of the staff are involved in maintenance, but more recent investigations reveal that about a third of the effort is actually directed toward software enhancement. These reports noted an absence of appropriate management, including cost reporting and control procedures, that could have determined the cost benefit of replacement, rather than enhancement. Plans are being prepared whereby I.S. managers will be rewarded for making cost comparisons leading to increased software efficiencies, not currently recognized by the information resource managerial system.

The relatively small percentage of staff assigned to new applications development is crucial to the process of identifying the need for and acceptance criteria of new software and systems. Some applications are extremely sensitive to national security or protection of personal privacy, including the processing of general purpose data in secured enclaves. Internal staff are also needed for development of LTD (Live Test Demonstration) and benchmark test data that realistically reflect the most critical

requirements of new developments, without undue competitive risk to outside suppliers.

III

Budget Analysis

III

Budget Analysis

The 1987 budget of $16.9 billion represented an increase from 1.5% of the total federal budget in 1986 to 1.7%. The 1988 budget is expected to remain at 1.7%, at $17.4 billion. All of the federal I.S. budget categories have experienced strong growth in this decade, except personnel salaries and fringes. Beginning in 1986, however, with passage of the Gramm-Rudman-Hollings Act, that growth has slowed, while the personnel category has begun to grow. The budget distribution in 1987 and the projected 1988 changes are indicated in Exhibit III-1. Factors influencing growth include:

- Need to retain key I.S. personnel to operate new facilities and modernized current resources.
- Continued replacement of obsolete equipment to improve I.S. performance while reducing maintenance costs.
- Installation of higher-capacity, mass storage devices to increase availability of burgeoning data bases.
- Demand for standalone workstations and personal computers for support of military functions and civilian services.
- Emphasis on both custom and packaged software to meet interoperability, transportability and user-friendly requirements.
- Increasing demand for data communications for distributed processing, on-line data bases and service extension.

Despite the demand, some categories will decline in response to both expected and unplanned factors.

EXHIBIT III-1

1986 BUDGET DISTRIBUTION AND 1986/1987 CHANGES IN THE FEDERAL GOVERNMENT SECTOR

BUDGET CATEGORY	1987 PERCENT OF I.S. BUDGET	1987-1988 EXPECTED BUDGET GROWTH
Personnel Salaries and Fringes	22.5	3.6
Mainframe Processors	5.6	(3.1)
Minicomputers	3.7	(2.3)
Microcomputers	1.1	5.6
Mass Storage Devices	2.2	9.1
Other Hardware	9.3	(4.1)
Total Hardware	21.9	(2.9)
Data Communications	5.8	6.7
External Software	2.7	15.0
Professional Services	18.1	(1.6)
Turnkey Systems	3.9	(2.7)
Software Maintenance	2.7	(6.2)
Hardware Maintenance	6.9	(4.7)
Outside Processing Services	5.2	(1.8)
Other	10.3	2.5
Total	100.0	7.2

A number of replacement programs involving mainframe processors have been delayed, by:

- Re-evaluation of the overall replacement plans;
- Extension of the rate of implementation, to meet 1987-1988 Gramm-Rudman-Hollings cuts imposed in 1986;
- Changes or reductions in information processing needs of the agencies;

- Less demand for peripherals through increased I.S. center sharing of equipment.
- Reduction in hardware and software maintenance costs resulting from implementation of new systems.
- Less demand for outside processing services, as the result of:
  - Increasing availability of new in-house ADP resources;
  - Growing end-user computing employing personal computers and standalone workstations;
  - More competition from large federal data centers under revised OMB Circular A-76 policies.
- Response to agency budget restrictions includes some reduction of contractor operations support.
- Some reduction of investments in turnkey systems appears to be associated with indecisions about new federal language, protocol and network standards.

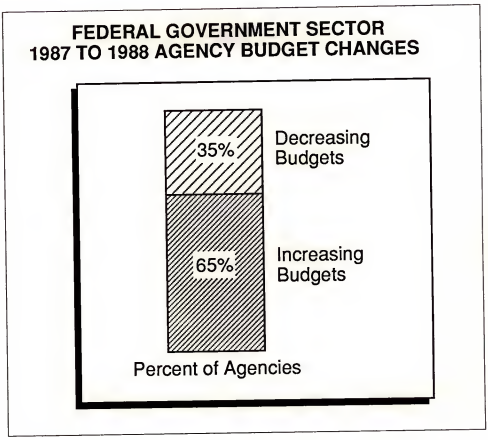
As of the writing of this report, the actual expenditure reductions to satisfy deficit control requirements had not been passed by Congress. I.S. is not expected to experience any severe cuts, but a number of approved programs may slip into another year. Present budget pressures have limited most non-operating obligations to replacement of high volume I.S. facilities that are becoming irreparable or increasingly expensive to operate.

The percent of agencies expecting their budgets to increase in 1988 versus those expecting a decrease from their 1987 budgets is shown in Exhibit III-2. None expected or requested unchanged budgets, for a variety of reasons.

Factors that cause agencies to increase their 1988 budgets include:

- Ongoing ADPE replacement programs that have Congressional approval to proceed.
- Replacement programs being initiated that were previously delayed by budget cuts.
- Implementation of new software to replace systems that have become too expensive to maintain.

EXHIBIT III-2



- Increasing information processing demands mandated by Congress and the Administration.
- Support for improvements that directly affect revenue (tax) collection and services to the public.

Downsizing of budgets was not large for most of the agencies. Cuts were influenced by:

- Rejection of requests or directions to revise current system designs or estimates to complete.
- Completion of upgrade implementations and shift from procurement to operation and maintenance.
- Results of earlier budget reductions directed by Gramm-Rudman-Hollings or administration orders in training, telecommunications, and the use of contractor personnel.
- Expected cuts in defense spending determined as part of the administration's budget priorities.

The number of agencies experiencing budget cuts will be more evident when the federal government fiscal year 1988 budget, incorporating the joint Congress-Administration Compromise deficit control measures, becomes law. The majority of reductions are expected to occur in the commercial services sector.

About INPUT

INPUT provides planning information, analysis and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs. Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning, This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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