

Chapter 3

**Policy Issues in Management,
Planning, and Innovation**

Contents

	<i>Page</i>
Summary	43
Introduction	44
Major Findings	47
Finding 1	47
Finding 2	50
Finding 3	51
Finding 4	52

Tables

<i>Table A-o.</i>	<i>Page</i>
3-1. Dimensions Along Which Agency Planning Styles Differ	46
3-2. Opportunities for Use of Information Technology at Five Key Agencies.	49
3-3. Agencies Reporting Current or Planned Use of Certain Information Technology Tools	49

Policy Issues in Management, Planning, and Innovation

SUMMARY

This chapter examines a set of issues related to information technology management and innovation in Federal agencies. Specific topics that are of interest include the strengths and weaknesses of current agency and governmentwide planning efforts; the adequacy of policies for planning, procurement, and management; the extent to which agencies are using information technology in strategic and innovative ways; the extent to which planning efforts consider the civil liberties impacts of information technology use; and the adequacy of information available to Congress in the areas of planning and management. In this analysis, it is important to note that planning for information technology cannot be divorced from agency planning as a whole, and in fact there should be substantial interaction between the two processes.

Almost since the first uses of computers in the government, there has been a building consensus that the Federal Government's planning in this area is often weak, resulting in serious problems implementing the government's large-scale systems, and in failures to capitalize on opportunities to use information technology. The reasons for this chronic weakness in Federal information technology planning include rapid change in technology, frequent top-level management turnover, changes in political goals, bureaucratic defensiveness, scarce personnel and time, and short-range budget and procurement processes.

OTA's major findings in this area are:

- Effective planning is an essential component of effective use of information technology. Many Federal agencies have begun to develop thoughtful plans. However, many of these efforts appear to have major flaws, including a focus on operational

as opposed to strategic plans, a failure to identify innovative opportunities for use of information technology, and a failure to connect planning effectively to implementation.

- The annual "5-year plans" currently published by the Office of Management and Budget (OMB) lack an analysis of agency or governmentwide strategies for using information technology to further government missions. They also do not discuss the security, privacy, and civil liberties implications of information system plans. Without such information, congressional oversight of information technology management and security/privacy issues is much more difficult.
- There are serious deficiencies in the information available to Congress, and to the agencies themselves, on the scope and nature of information technology in use in government. These deficiencies could present difficulties for effective congressional oversight and agency decisionmaking regarding information technology use.

For the Federal Government to improve its effectiveness in using information technology, the quality of information *about* information technology needs to be improved, innovation needs to be encouraged and pursued more vigorously, and strategic planning needs to be significantly strengthened. Though much of this can be done by the executive branch acting alone, Congress can facilitate and encourage some of these actions. OTA analysis indicates that the following actions warrant congressional as well as executive branch consideration:

- Holding hearings or conducting studies on the accuracy and usefulness of infor-

mation being collected by the General Services Administration (GSA) and OMB; the extent of innovative uses of information technology in Federal agencies; comparisons between government and private sector information technology planning strategies; the extent to which agencies are using information technology to further government goals; and the effectiveness of the procurement process.

- Encouraging effective use of information technology by giving stronger mandates to central agencies to collect and distribute documentation of innovative applications; designating a formal resource center for information technology planning and innovation; strengthening the role of the National Bureau of Standards (NBS) in providing technology trend information to agencies; enhancing training for information technology planners, procurement

officers, and managers; experimentally exempting certain agencies from procurement regulations; and assembling an interdisciplinary team to assist agencies in developing and salvaging major information technology projects.

- Amending the Paperwork Reduction Act to give agencies a clear mandate for strategic planning; to clarify the mandate for the "5-year plan" from the Office of Management and Budget to include information useful to Congress; to specify that agency and governmentwide planning efforts must consider security, privacy, and civil liberties impacts; to strengthen the definition of information resources management (IRM) in the act; and to designate an additional assistant secretary, for some agencies, who would be responsible for IRM.

INTRODUCTION

This chapter examines a set of issues related to information technology management and innovation in Federal agencies. Specific topics that are of interest include the strengths and weaknesses of current agency and governmentwide planning efforts; the adequacy of policies for planning, procurement, and management; the extent to which agencies are using information technology in strategic and innovative ways; the extent to which planning efforts consider the civil liberties impacts of information technology use; and the adequacy of planning and management information available to Congress. In this analysis, it is important to note that planning for information technology cannot be divorced from agency planning as a whole; in fact, there must be substantial interaction between the two processes.

Although different theorists and organizations use different terms, planning efforts generally differ along two dimensions:

1. The length of time considered by the planning process. Generally, plans for more than 1 to 2 years hence are generally con-

sidered long term, while others are considered short term.

2. The extent to which plans seek to define new goals and programs. Those that do so are generally termed strategic plans, whereas plans that extrapolate from the current situation and describe the implementation of existing goals and programs are called tactical or operational plans.

There are many permutations of these terms for different planning applications. For example, OMB's guidance for planning strategies defines the different types of planning as follows:¹

- *Long-term or strategic planning* is a process for defining agency missions and identifying agency goals and objectives as projected over a specified period of time. In the context of automatic data processing (ADP) and telecommunications, long-

¹Office of Management and Budget, General Services Administration, and Department of Commerce/National Bureau of Standards, *A Five-Year Plan for Meeting the Automatic Data Processing and Telecommunications Needs of the Federal Government*, Volume 1: Planning Strategies, April 1984, p. 12.

range planning develops and documents the agency's direction and specifies the activities and resource requirements necessary to support stated missions and objectives.

- *Tactical planning* involves identifying and scheduling the appropriate means for attaining the stated objectives of individual ADP and telecommunication activities that support the strategic plan.
- *Operational planning* integrates individual tactical plans and drives the day-to-day activities of line operations.

Private sector planning experts generally place considerably more emphasis on the strategic, goal-seeking aspect of planning. For example, one business administration text defines strategic planning as:

... the continuous process of making present entrepreneurial (*risk-taking*) decisions systematically and with the greatest knowledge of their futurity; organizing systematically the efforts needed to carry out these decisions; and measuring the results of these decisions against the expectations through organized, *systematic feedback*.²

While there are few, if any, disagreements on the importance of planning to effective use of information technology, on a practical level there are differing notions of what constitutes an effective and realistic plan. Federal information technology managers contacted by OTA often cited the following factors as affecting what is realistically possible from their planning efforts, and what level of effort planning deserves:³

- Since information technology is changing so rapidly, it is difficult to anticipate what technology will be available for agency use more than a few years from now.

²Peter Drucker, *Management* (New York: Harper & Row, 1974), p. 125 (emphasis original).

³While these perceptions are not necessarily correct or desirable indicators of the current situation, it is OTA's assessment that they are reasonably widely held in the Federal information technology management community. There are, of course, some exceptions, and as will be discussed below, many agencies have proceeded in developing long-range plans despite these factors.

- The frequent top-level management turnover in the executive branch means frequent shifting of priorities, and thus planning beyond 1 or 2 years often results in (seemingly) wasted effort.
- Agencies' long-range goals, both general and specific to information technology, are determined by a political process that includes, in particular, the White House and Congress. These goals also seem to be frequently shifting.
- Goals that are set forth visibly in long-range plans often become targets for attack by central management agencies or Congress. Thus, it often seems easier to develop information technology capabilities incrementally.
- When personnel and time are scarce, and when the ability of information systems to meet demands reaches a state of crisis, planning seems to be a diversion from survival. This was the case, for example, in the Social Security Administration in the late 1970s; although many believe that it was only by developing a coherent plan for the early 1980s that SSA came out of its tailspin.
- It is difficult to develop goal-oriented, long-range plans when the budget and procurement processes are relatively rigid and short range. This factor has intensified after enactment of the Gramm-Rudman-Hollings deficit reduction act, since uncertainty about future budgets has been increased considerably.

The combination of these factors tends to push agencies toward incremental, operational plans, as opposed to strategic plans. Nevertheless, there has been progress in the quality and foresight of government information technology planning. As noted in chapter 2, both GSA and OMB have given high visibility to the need for planning and have issued a variety of guidance documents to assist agencies in the process. GSA, for example, defines a generic planning process to include seven steps:⁴

⁴General Services Administration, *IRM Review Handbook*, 1985, p. 39.

1. update agencywide inventories of information resources;
2. define the missions, broad objectives, and policies of the IRM organization;
3. develop approaches for achieving agency missions and broad IRM objectives within the context of existing policies;
4. prepare specific top-down planning directions (call for plans);
5. develop, consolidate, and approve detailed plans and budgets;
6. prepare supplemental analyses; and
7. prepare progress reports based on performance against the plans.

GSA has also recently established a small group to provide planning assistance to agencies on a reimbursable basis.⁵

Clearly, different planning styles are appropriate for agencies differing in mission, structure, and size. Table 3-1 shows some of the dimensions along which agency planning styles differ. Nevertheless, the standards by which most experts would judge a planning process to be effective are reasonably consistent. OTA found that the following criteria are useful in judging planning effectiveness, both at the agency and governmentwide levels:

- Do information technology plans support overall agency plans? Clearly, the overriding function of a plan is to help the agency pursue its mission. This requires linking information technology plans to the agency's overall plans. To the extent that overall agency planning efforts are weak, information technology plans may be flawed as well.
- Does the **plan identify opportunities for coordination of information technology projects**? Another role of a plan is to allow coordination of the agency's resources in

⁵GSA began the Federal IRM Planning Support Program in 1983; in fiscal year 1985 it had 13 planning specialists working on 18 active programs, providing roughly \$1 million in reimbursable services to the agencies. OMB's Bulletin 85-12 said that OMB asked GSA to construct a database of current agency information resources and major proposals. In GSA's review comments to OTA, GSA said that this database was in fact stymied because OMB was not supporting its development.

Table 3.1.—Dimensions Along Which Agency Planning Styles Differ

Goal driven Incremental Long term Short term
Some agencies take a long-term, strategic approach to information technology planning looking for ways to integrate information technology into the agency strategic plans. Other agencies look primarily to modest improvements they can make in existing systems that will enable them to do their job better.
Centralized Distributed
Agency planning can vary from highly centralized, headquarters based approaches to highly decentralized, localized planning by individual agencies, regional offices, or field offices.
Top down Bottom up Hierarchical Participatory
Some agencies encourage participation from line offices and interested individuals. Other agencies prefer to have top managers create the framework within which other managers operate. Most agencies use some mix of the two.
Structured Informal, ad hoc
While the requirements of the Paperwork Reduction Act of 1980 and the resulting OMB and GSA guidance have increased the formalism of all agency plans, styles continue to range from highly structured, rigidly scheduled, formal processes to informal assessments of future information technology needs and potential.
Integrated Fragmented
Several agencies look at their information technology resources in an integrated, system wide manner. Others take a less coherent, more fragmented approach by planning the future of individual technologies, databases, or pieces of hardware.
Security/privacy.. . . . Efficiency/access
Agencies differ in the degree to which they pay attention to security and privacy issues. Some are concerned primarily with increasing efficiency of operations and providing access to internal and external authorized users. Others take great pains to protect the security of the system and the integrity of data.
Forefront technology. Established technology
Some Federal agencies are dependent on leading edge or state-of-the-art technologies such as supercomputers. Others only need established routine technologies such as personal computers or office automation equipment.
SOURCE J F.Coates, Inc., <i>Scenarios of Five Federal Agencies as Shaped By Information Technology</i> , OTA, contractor report, June 1985.

pursuing various projects, and to ensure that systems developed will be compatible.

- Does the plan identify opportunities for innovative uses of information technology to pursue agency missions? This is the strategic aspect of an information technology plan, where a planning effort should catalyze creative thinking by agency staff on ways to deliver services in new ways or to improve efficiency.

- Does the plan incorporate concerns for security, privacy, and fair information practices at an early stage in the planning process? While there is little dispute that the best way to design a secure information system is to consider security throughout the planning, implementation, and use of a system (see ch. 4), this point is often not explicitly recognized by planners. Similarly, concerns for privacy and fair information practices are most easily accommodated when they are introduced at an early stage of system planning.
- Does the planning process provide a mechanism for interested publics to provide input into major projects for public services or information dissemination? Obtaining the views of those who will be significantly affected by a major project can help avoid unanticipated pitfalls and make the system more useful. Several examples can be found in major projects for electronic dissemination of information (see ch. 7).
- Does the process involve both management and operating levels of the organization so that they (on the whole) are committed to implementation of the plan? The experiences of government and private sector planners indicate that those who are to execute the plan must be part of the planning process, and must largely support the plan. Otherwise, a well-crafted plan can become simply irrelevant to the organization's activities.

MAJOR FINDINGS

Finding 1

Effective planning is an essential component of effective use of information technology. Many Federal agencies have begun to develop thoughtful plans. However, many of these efforts appear to have flaws, including a focus on operational as opposed to strategic plans, a failure to identify innovative opportunities for use of information technology, and a failure to connect planning effectively to implementation.

There is almost no disagreement on the importance of planning for information technology use, both in government and in business. While there may be differences among Federal officials about the feasibility of long-term planning in the Federal Government bureaucratic environment, it is well understood that planning for information technology is essential to enhance the ability of an agency to use the technology well, especially when complex systems are involved.

The results of OTA's Federal Agency Data Request indicate that despite the problems and criticisms there are substantial planning efforts under way. Many agencies' plans appear to set appropriate goals, and are carefully

prepared, detailed, and useful. Despite these efforts, however, many of the plans seem to suffer from a similar set of problems.

Focus on the short-range. Although most agencies have developed 5-year plans as a result of OMB guidelines and requirements, only a few of the plans devote much effort to years 3 to 5, or develop the plan in a truly "strategic" fashion—that is, seeking out new aspects of their mission and opportunities for information technology to improve the agency.⁶ In some cases, this may be because staff assigned to prepare the plan do not have the authority to develop strategic goals, or do not have the attention of the agency's top management. Moreover, in most cases, the later years of a 5-year plan are not considered credible because they involve acquisitions not yet approved by GSA and Congress, and from prior experience most bureaucrats expect that the approval process will alter the future sig-

⁶An interesting exception seems to be the Department of Agriculture, which has published a small monograph, "The Future of Information Resources Management in the Department of Agriculture (A Strategic Framework)," April 1985. The monograph, used in concert with USDA's 5-year plan, sets forth broader goals and opportunities for use of information technology.

nificantly, for good or ill. This factor provides further incentive for agencies to spend less effort on long-range planning. Ironically, the central management agencies would argue that a carefully prepared long-range plan should help budget requests survive the approval process without major upheaval,⁷ and that such a plan is the only way to make substantial progress in the agency's use of information technology.

OMB has recognized the scarcity of long-term planning. As its deputy director noted,

So far, few agencies have taken advantage of the opportunities that have really been offered by modern information technology we have not had enough attention paid to long-term planning for ADP processing and telecommunications.⁸

As a response, OMB devoted the bulk of volume 1 of the 1984 5-year plan to a tutorial on effective planning, and to examples of agencies that do have a significant planning process. Also, in OMB's latest guidance on planning, Bulletin 85-12 (Mar. 29, 1985), OMB tried to adapt these incentives so that good planning would more clearly lead to easier acquisitions. The bulletin, which requests a variety of planning information from agencies, states that acquisitions that are approved as part of planning and management reviews in the spring will have a "shortened and simplified" budget approval process in the fall.⁹

⁷There are at least a few examples where this has occurred. A Department of Justice manager, for instance, reported that because they take the planning process seriously (and use some bureaucratic resourcefulness) they have a considerably easier time with oversight and approval of their plans, and actually follow the plans for the most part. (Frank Guglielmo, Acting Director, Computer Technology and Telecommunications Staff, Office of Information Technology, Department of Justice, "Streamlining Acquisition," address to Government Computer Expo, Washington, DC, June 13, 1985.)

⁸Joseph Wright, testimony to House Science and Technology Subcommittee on Transportation, Aviation, and Materials, hearings on "Computer and Communications Security and Privacy," Sept. 24, 1984, p. 4.

⁹As might be expected, efforts by central management agencies to "collect information" are viewed with some suspicion by line agencies. One cabinet agency told OTA in review comments that it felt the general perception among agency staff was that Bulletin 85-12 was a way for OMB to find places to cut budgets and reduce personnel, not necessarily improve agency strategic planning. The same agency said that it felt OMB's promise for a "shortened and simplified" fall budget approval process was falsified by the fact that, as of October 1985, no one at OMB had indicated they had read their plan submitted in April 1985.

Failure to identify innovative opportunities. In addition to meeting current operational needs, long-term planning is necessary for agencies to take advantage of opportunities to use new information technology tools in effective and innovative ways. OTA found that there are many such opportunities, but that only in a few cases are agencies using innovative tools now, or planning their use. Table 3-2 shows some examples of information technology opportunities for five selected agencies. Thus, for the Social Security Administration, some of the opportunities for change that could be facilitated by information technology include the use of electronic bulletin boards and automated telephone information services in field offices to communicate with clients, expanded use of direct deposit, and possibly the use of "smart cards" (credit-card-sized electronic memories) to record the earnings of each worker. While the specific changes postulated in table 3-2 are speculative, similar opportunities for productive change with concerted attention to information technology were evident in virtually every agency examined by OTA.¹⁰

One imperfect index of an agency's ability to identify innovative opportunities is the extent to which it is planning uses for information technology beyond the conventional data processing and office automation tasks. OTA asked agencies to indicate whether they had used, were currently using, or were planning to use a variety of new information technology tools ranging from videoconferencing to artificial intelligence. Table 3-3 summarizes the responses. The only techniques currently used by most agencies are electronic mail and audio-conferencing (conference calls), although roughly 30 percent of the agencies said they plan to use teleconferencing (one-way video, two-way audio), optical disk storage, and expert systems.

¹⁰See, for example, J.F. Coates, Inc., *Scenarios of Five Federal Agencies As Shaped by Information Technology*, OTA contractor report, June 21, 1985. This report examined and developed scenarios for the National Oceanic and Atmospheric Administration, Bureau of the Census, Internal Revenue Service, Environmental Protection Agency, and Social Security Administration.

Table 3-2.—Opportunities for Use of Information Technology at Five Key Agencies

Agency/possible use of information technology
Social Security Administration:
• Use of electronic bulletin boards and automated telephone inquiry systems to communicate with clients.
• Expanded use of direct electronic deposit of social security payments.
• Use of smart cards (credit-card-sized electronic memories) for each individual to store his/her earnings records.
Internal Revenue Service:
• Electronic submission of tax returns.
• Increased use of optical character readers to scan returns submitted
• IRS development or certification of software used to prepare tax returns.
• Use of optical disks to store returns.
• Use of expert systems to assist in auditing.
• Use of computer auditing to closely monitor access to taxpayer information in order to protect privacy.
Bureau of the Census:
• Use of portable data terminals and computer-assisted telephone interviewing for census workers to gather and transmit information.
• Use of expert systems to probe data for errors and trends.
• Overall shift from paper to electronic systems and products, allowing census reports in months instead of four years, and facilitating possible shift to rolling census instead of decennial census.
• More and better data available to public on diskettes.
Environmental Protection Agency:
• Integration of databases storing information on air, water, land quality, supported by sophisticated database management systems, allowing more complex and integrated analyses of health risks.
• Use of robots to implant, repair, and retrieve microprocessor-based environmental monitoring devices.
• Use of smart cards for individuals to record their exposure to environmental hazards.
• Use of expert systems to review environmental impact statements, and examine data for errors and trends.
• Public access to computer models used in environmental decisionmaking.
National Oceanic and Atmospheric Administration:
• Use of supercomputers and expert systems to develop 20-day weather forecasting capability.
• Use of microprocessor-based weather data collection stations to decrease costs and improve forecast accuracy.

NOTE: The specific activities and changes outlined above are intended only as suggestive of possible opportunities related to use of information technology, and not as judgments about their desirability or likelihood.

SOURCE: J.F. Coates, Inc., "Scenarios of Five Federal Agencies (1991-1995) as Shaped by Information Technology," OTA contractor report, June 1985.

Even though a significant minority of agencies are pursuing the use of advanced information technology tools, most agencies do not seem to be pursuing these (or other) kinds of innovations. While it is likely that some agencies are not pursuing information technology innovations because they do not expect them

Table 3-3.—Agencies Reporting Current or Planned Use of Certain Information Technology Tools

Technology	Currently using		Planning to use	
	#	%	#	%
Audio-conferencing	84	62.7	86	64.2
Teleconferencing	23	17.2	42	31.3
Videoconferencing	10	7.5	30	22.4
Computer-				
conferencing	16	11.9	29	21.6
Teletext	21	15.7	26	19.4
Videotext	9	6.7	14	10.4
Cable television	14	10.4	20	14.9
Interactive cable	3	2.2	15	11.2
Expert systems/AI	14	10.4	43	32.1
Electronic mail	97	72.4	115	85.8
Voice mail	9	6.7	35	26.1
Optical disks	6	4.5	39	29.1

NOTE: 134 components reporting

SOURCE: OTA Federal Agency Data Request

to be useful, many others are either unaware of potential useful applications or feel that innovation is too risky and likely to come under fire by top agency management, OMB, or Congress. There is no formal support mechanism for agencies considering innovative uses of information technology to obtain information or technical expertise, or to share experiences.

Failure to connect planning effectively to implementation. Perhaps the most serious flaw in the planning process, which often cannot be anticipated in advance, occurs at the implementation stage. Some of these problems are the result of circumstances difficult to foresee, even though agencies tried to implement their plan. "In other cases, the agency is simply not organized to carry out the plan, the planning staff is isolated from the operational staff, or staff pay little attention to the plan."¹²

¹²For example, a top GAO official said that even though the Federal Aviation Administration (FAA) had done a careful planning job, their huge system upgrade was having serious unforeseen problems in the "benchmarking" process, where the ability of different systems to meet FAA needs was being tested. (Warren Reed, GAO, "Coping With Policies and Procedures," address to Government Computer Expo, Washington, DC, June 12, 1985).

"J.F. Coates, Inc., "Planning for Federal Information Technology: Continuity and Conflict," ch. 7 in J.F. Coates, Inc., op. cit., May 24, 1985, based on interviews with agency officials and literature analysis.

Finding 2

The annual 5-year plans currently published by the Office of Management and Budget lack an analysis of agency or governmentwide strategies for using information technology to further government missions. They also do not discuss the security, privacy, and civil liberties implications of information system plans. Without such information, congressional oversight of information technology management and security/privacy issues is much more difficult.

While the Paperwork Reduction Act of 1980 required OMB to develop a "5-year plan for meeting the automatic data processing and telecommunications needs of the Federal Government," (Section 3505, paragraph 3(E)), the resulting documents do not constitute such a plan, although they do provide some useful information.¹³ The 1985 report, for example, contains:

- summary data on Federal expenditures for information technology;
- brief advice to agencies on planning;
- a brief description (one to two pages each) of eight of the largest Federal information systems and their relation to agency mission;
- some information on technical trends in computers and telecommunications, developed with the assistance of NBS; and
- an appendix volume that simply lists the major tentative acquisition plans of Federal agencies, primarily for interested vendors.

OMB acknowledges that the 5-year plans are not really plans. The 1984 plan, for example, notes that the 1983 plan:

was less a comprehensive plan than a compilation of planning information designed: 1) to assist agencies in preparing their plans; and 2) to inform equipment and services vendors

¹³ "A Five-Year Plan for Meeting the Automatic Data Processing and Telecommunications Needs of the Federal Government, April 1983 (1st cd.), April 1984 (2d cd.), and June 1985 (3d cd.). While the publication of the plans is coordinated by OMB, they are a joint effort between OMB, GSA, and the NBS Institute for Computer Sciences and Technology.

about potential Federal marketing opportunities.¹⁴

Further, the 1985 report argues that a governmentwide planning document would be unworkable:

Governmentwide planning is made difficult by the size and diversity of the Federal Government. This leads us to focus on planning efforts at the agency level, since agency goals can be specified more clearly than can goals for the government as a whole. The task of governmentwide planning then becomes one of: (1) specifying the rules for agency planners who develop plans to achieve agency goals, (2) reviewing their success in complying with those rules, and (3) intervening in cases where individual agency planning efforts would produce sub-optimal results.¹⁵

Despite OMB's skepticism about governmentwide planning, there are "macro-level" goals for the government that are useful and productive to establish—an example is OMB goal to refocus more attention on software and software maintenance, and to reduce software maintenance expenses by 25 percent and full-time equivalent employees by 5,000, by 1988.¹⁶

Although clearly there are certain aspects of a detailed governmentwide plan that could become unwieldy, there are several kinds of information not included in these reports that could be useful—for congressional oversight needs. In particular, the reports do not shed much light on the different strategies used by agencies to meet their ADP and telecommunication needs, or on the ways in which the agencies are using information technology to further their missions. Information of this kind could help congressional committees compare the strategies of various agencies, assess how information technology shapes new opportunities in Federal agencies' missions, oversee the effectiveness of the Brooks Act and the Paperwork Reduction Act, and possibly devel-

¹⁴ "A Five-Year Plan, 1984, op. cit., p. v. OMB's staff also acknowledged this point at OTA'S work session on information technology management, planning, and procurement, June 26, 1985.

¹⁵ "A Five-Year Plan, 1985, op. cit., p. 17.

¹⁶ "OMB, *Management of the United States Government Fiscal Year 1986*.

op useful measures to amend these acts. It could also help agencies communicate with one another and pursue joint ventures.

Gradually, the 5-year plans have become more comprehensive. The 1985 plan, for example, does include descriptions of eight major information systems and their connection to the agency mission. However, the description is too short to provide much insight, and no analysis of agency strategy is included. Further, OMB included in the 1985 plan a list of the titles of major Federal information systems, which were gleaned from agencies' submissions in response to Bulletin 85-12 (see previous finding). Although merely providing the titles of information systems is not very helpful for oversight purposes, the responses to Bulletin 85-12 may be a promising source of information for more substantive analysis of agency strategies in future 5-year plans.

There is one area of congressional interest that neither the OMB plan nor the agency plans are designed to address—the implications of information technology use for privacy and civil liberties, as discussed in OTA's reports on *Electronic Record Systems and Individual Privacy* (forthcoming) and *Electronic Surveillance and Civil Liberties* (October 1985). Congress could ask for an analysis of agency strategies for use of ADP and telecommunications that includes identifying major potential implications for privacy and civil liberties, and describing agency plans for responding to these implications.

Finding 3

There are serious deficiencies in the information available to Congress, and to the agencies themselves, about the scope and nature of information technology in use in the Federal Government. These restrictions could present difficulties for effective congressional oversight and agency decision-making regarding information technology use.

OTA found that two kinds of information, currently unavailable, would be useful to Congress in oversight of both information tech-

nology policies generally, and of the management of specific agencies:

1. Broad overview data about trends in information technology use in the Federal Government. These would include, for example, both a governmentwide analysis and an agency-by-agency breakdown of:
 - the number of mainframes, minicomputers, and microcomputers in use;
 - investment in software, both custom and off-the-shelf;
 - investment in telecommunications;
 - number and cost of information technology personnel by function (e.g., operations, management, planning, budgeting); and
 - historical and projected trends in these data.

This information would enable Congress to gain an overall sense of the pervasiveness of information technology in government as a whole and in the various agencies; to judge the urgency of congressional attention in computer-related policy areas, such as computer crime; and to assess the rate of change in use and cost of technology in government. With this information, both Congress and executive agencies could evaluate possible changing missions and opportunities for new services and efficiency increases.

2. An evaluation of the extent to which each agency is exploiting innovative information technology tools to accomplish its missions. Gathering this data could take the form of a survey similar to OTA's Federal Agency Data Request, which asked agencies to indicate whether they were using a particular technique and to describe that use briefly. This information could provide Congress with an "early warning" about coming trends in technology use and the ability to assess the level of innovation in different agencies. Such information could also be disseminated to allow other agencies to identify similar opportunities to further their missions.

This description of information useful to Congress is only a starting point, and clearly

Congress itself should determine its information needs. However, using the above as a basis, it is clear that existing information sources only begin to meet these needs.

The apparatus for collecting information about Federal use of information technology is in flux. Several mechanisms have been discontinued or restricted. In particular, after fiscal year 1983, GSA stopped systematically collecting information regarding the number and cost of computers costing less than \$50,000. On the other hand, GSA's revised inventory system is intended to be more accurate than the previous one, and on the basis of their first reports, the new system is promising as a source of data on trends in mainframes and more expensive peripherals. (See discussion in Finding 1.¹⁷) Further, OMB's 5-year plans and OMB's Bulletin 85-12 are improving as sources of information, as noted above.

However, these improvements still leave major gaps in information about software, telecommunications, personnel, and use of emerging technologies. For example, as noted in the previous finding, GSA's annual surveys on microcomputer purchase in the government provide some information, but do not indicate the total number of machines in use. GSA has also discontinued its management information system for keeping track of communications use and expenses.¹⁸

Perhaps a more troubling issue is that agencies themselves may not have complete information about the technology they use to fulfill their missions. Each agency is mandated by the Paperwork Reduction Act to "systematically inventory" its major information

systems (Section 3506, part (c)(1) of Public Law 96-511). Thus, at least in theory, agencies should have reliable data on their information technology use even if centralized data are inadequate. However, there is a clear consensus among government ADP experts that most agencies do not have such systematic and reliable records.¹⁹

Although OTA acknowledges that gathering data has significant costs and the need for information should be carefully evaluated, overall there appear to be significant gaps in available data that could hamper both effective policymaking and understanding of the information technology transition under way in government, as well as decisionmaking by the agencies themselves. Further, in the absence of reliable information, much effort can be wasted arguing about estimates.²⁰

Finding 4

Possible actions to improve information technology management, planning, and innovation include: hearings and studies to improve the accuracy and usefulness of available information, new or strengthened mechanisms for exchanging learning and encouraging innovation, and amendments to the Paperwork Reduction Act.

Since the technology and the administrative environment for Federal information technology are in rapid flux, information technology management is a moving target for congressional policy. Yet, it is widely agreed that government is becoming increasingly dependent on information and information technology. This situation calls for policies and oversight procedures that are flexible and anticipatory to the greatest extent possible, at each level

¹⁷The data in the previous system were suspect. For example, a 1985 GAO report noted:

GSA's data base of the government's inventory of computer equipment has been inaccurate for some time. In attempting to use the data base to select review sites, GAO initially contacted eight computer installations and found errors in the data base for six, which prevented GAO from including them in this review. For example, at two sites, equipment listed on the inventory was not installed, and officials did not know whether it had ever been installed.

General Accounting Office, *Effective Management of Computer Leasing Needed To Reduce Government Costs*, IMTEC-85-3, Mar. 21, 1985, p. iii.

¹⁸Federal Property Management Regulations, Temporary Regulation F-502, *Federal Register*, Oct. 25, 1983.

¹⁹Reed, *op. cit.*

²⁰See, for example, Frank Carr, "Government IRM Fact and Fiction," *Government Computer News*, Sept. 17, 1984. The development of reliable data about use of information technology need not involve a complete census of the government in every case. Authoritative statistical estimates may be quite useful for policymaking purposes.

of policymaking for information technology management. More specifically, the goal of being flexible and anticipatory implies that both policymakers and the agencies themselves:

- have reliable information on the use of information technology, and on the trends in that use;
- assess on an ongoing basis the ways in which agencies can use information technology to further their missions; and
- facilitate and reward innovation, as well as expect occasional failure as a cost of attempts to use technology effectively and innovatively.

Though many improvements can be made by the executive branch acting alone, Congress can facilitate and encourage such actions. OTA's analysis indicates that the following actions warrant consideration:

Hearings or studies to improve the information available for oversight and policymaking on information technology management.

OTA found that, as noted in Findings 2 and 3, considerable gaps exist in the information available that hamper policymaking and oversight. Apparently, agencies themselves often do not have good inventories of information technology use, and the governmentwide inventories are limited in scope and reliability. Beyond simply counting and describing the systems in use, there is also no clear mechanism to obtain information about the effects of information technology use on the mission of the agency, and about future plans for information technology use. See the discussion in Finding 3, above, for an elaboration of the kinds of information that could be useful.

Hearings or studies (or related activities, like conferences and workshops) could be conducted on:

- *The accuracy and usefulness of information being collected by GSA and OMB.* Hearings or studies on this topic could also help Congress to define the kinds of information that would be most helpful in its policymaking and oversight.

- *Information technology planning, focusing on planning for innovative applications of information technology in government, and on drawing private sector expertise into the Federal planning process.* Such hearings or studies could serve as forums for agencies and private sector organizations to exchange ideas on uses of information technology and on planning techniques, and could facilitate congressional oversight.
- *Information technology management generally, analyzing the extent to which agencies are using information technology to further government goals.* "Most of the oversight hearings on the Paperwork Reduction Act have concentrated on the paperwork reduction aspects, rather than information technology management issues. Congressional hearings could closely examine the new OMB circular on information resources management (see ch. 2). The House Government Operations Subcommittee on Government Information has already held hearings on the information dissemination portion of the circular.
- *The effectiveness of the procurement process for Federal information technology.* In particular, areas where current information is scarce or contradictory include the obsolescence of Federal information technology, the effect of the Competition in Contracting Act on ADP procurements, the extent to which current procurement processes present a barrier to effective and innovative use of information technology, and the staffing and training in procurement offices that handle ADP.

New or strengthened mechanisms to encourage innovation in information technology use.

"A set of hearings with a similar goal was held more than a decade ago. See *Federal Information Systems and Plans—Federal Use and Development of Advanced Information Technology*, hearings before a Subcommittee of the House Committee on Government Operations, April, June, and July 1973, and January and February 1974.

OTA found that there is a need for more mechanisms in the government whereby agencies can share information about effective uses of information technology. Clearly, this already happens in a variety of ways—at conferences, multi-agency meetings, and educational programs, through publications distributed by agencies, through NBS documents, and through personal contacts. However, NBS, OMB, and GSA could be given stronger mandates to collect and distribute documentation of innovative applications (the hearings described above could become a forum for sharing such ideas and plans).

Based on much of the evidence cited in the “background” and “findings” sections above, it is clear that many agencies need assistance in developing effective planning processes and identifying opportunities for information technology innovations. OMB, GSA, and the General Accounting Office (GAO) have recognized this need, in part, by providing handbooks and other guidance material on planning. These are promising initiatives, and Congress may wish to oversee the adequacy of these support efforts.

Another option would be to consider designating a formal resource center for information technology innovation and planning, either at GSA or NBS, and/or use personnel detailed from line agencies on a rotating basis. Such a center could provide training for agency staff in planning related to information technology, and could also establish a formal mechanism—such as an interagency committee or regular series of conferences—to allow agencies to coordinate their planning efforts and share expertise.

Another kind of support that agencies need in developing long-range plans is information on technology trends—e.g., the processing speeds and architectures one can expect from computers 3 or 5 years hence. Until recently, the Institute for Computer Sciences and Technology (ICST) at NBS provided such support for agencies.²² However, because of recent dis-

²²See, for example, two useful documents produced by the Institute for Computer Sciences and Technology: *Future Information Processing Technology 1983*, special publications No. 500-103, August 1983; and *Future Information Technology 1984: Telecommunications*, No. 500-119, December 1984.

agreements over the budget at NBS, the agency will no longer contract for any original research in technology trends, but will instead rely on published literature and subscriptions to consulting services. While many of these services provide excellent technology trend data, the Federal Government’s information technology use tends to be different from that of the private sector in several ways—including extremely large databases and a more diverse mix of vendors—that may make it useful to have customized trend information.

OMB itself argued for a strong centralized technology trend function in its 1984 5-year plan: “It therefore makes sense for agencies to band together to fund a cooperative forecast, which concentrates on areas of mutual interest.”²³ And indeed, it is well within the Brooks Act mandate for NBS to provide such technical resources to the agencies. If Congress agrees that such a resource is appropriate, it may wish to strengthen the function at NBS or designate a similar function in some other agency. In addition, the administration has repeatedly proposed to eliminate or drastically cut back ICST at NBS,²⁴ and Congress and the executive branch may want to examine the implications of this move for planning support, as well as for information security support and other areas (see ch. 4).

Another set of possibilities for encouraging innovation and effective use of information technology involves the procurement process. Enhanced training for ADP procurement officers, and for managers who are planning and implementing large-scale information technology projects, is one clear option to encourage sharing of expertise. GSA could enlarge its current small program to train procurement officers in ADP, or programs could be added through, for example, the Office of Personnel Management or the Department of Agriculture’s Graduate School. Some of the private training/seminar organizations in the Washington area do address ADP procurement issues to some extent, although these often focus on the process from the vendor’s per-

²³*A Five-Year Plan*, 1984, op. cit., p. 14.

²⁴Eric Fredell, “White House Again Targets ICST,” *Government Computer News*, Mar. 8, 1985.

spective. GSA suggests that this enhanced training does not need to make procurement officers into computer experts, or ADP managers into procurement specialists, but simply needs to provide each with a layman's understanding of the other field. In helping these officials to develop the resourcefulness necessary to get through the procurement process successfully, it could be useful as part of the training to present a workshop on experiences with actual acquisitions, both effective and problematic, in order to give students an understanding of the team approach to acquisition, pitfalls to avoid, and possible innovations.²⁵

One controversial option suggested by the Department of Commerce²⁶ is that Congress could experimentally exempt certain agencies (or parts of agencies) from the bulk of statutes and GSA rulings on procurement for a fixed period of time. Such an experiment could allow the agency to develop and try different techniques for acquiring information technology. Clearly, Congress would want to choose agencies whose track record in planning and procurement is already good, and both Congress and GSA should watch the experiment closely, while still allowing the agency flexibility. The outcome of such an experiment should be evaluated not just on the net cost to the government compared to more traditional procurement procedures, but on the effectiveness of the agency in using information technology to accomplish its mission.

Another interesting idea for sharing ADP expertise raised by Robert Head in his 1982 monograph is to establish the equivalent of a rapid-response troubleshooting team for information technology to help agencies plan for and implement major projects, either at the behest of the agency, OMB, or Congress. Head writes:²⁷

²⁵Francis McDonough, General Services Administration, letter to OTA, September 1985.

²⁶Jimmie D. Brown, Director for Management and Information Systems, Department of Commerce, letter to OTA, Oct. 2, 1985.

²⁷Robert Head, *Federal Information Systems Management*, op. cit., pp. 36-37; see also General Accounting Office, *Government-Wide Guidelines and Management Assistance Center Needed To Improve ADP Systems Development*, AFMD-81 - 20, Feb. 20, 1981.

The computer SWAT team would be available to aid agency managers in planning major new projects to avoid potential schedule pitfalls. Work here might include the installation of SDLC [systems development life cycle] procedures to strengthen management control of large projects, the application of software engineering principles, assistance in specification writing, and the selection and supervision of outside contractors. This would be one key function.²⁸

The second function would be to enter into systems projects that have deteriorated to the point where the agency has obviously become unable to salvage them. In such situations those responsible for managing the project are typically defensive. In this case, the computer SWAT team could provide not only technical assistance but also a "damage assessment" by advising Congress and other concerned parties about the true nature of the project's difficulties.

OMB or GSA could develop such an interdisciplinary team and establish guidelines for their activities. The team would not necessarily be free-standing; rather it could be composed of experienced officials from other agencies who serve on a rotating or ad hoc basis.

Amendments to the Paperwork Reduction Act to provide a stronger and more detailed mandate for information technology planning and management in the executive branch.

OTA found that information technology planning warrants more specific attention both in legislation and oversight. A first step might be to consider strengthening and refining the planning requirement included in the Paperwork Reduction Act of 1980, with specific legislative guidance for the content of 5-year plans. Aside from mandating that the plan be updated each year, as proposed in the Paperwork Reduction Act Amendments of 1984 (and as is now the case, due to OMB's initiative), the guidance could specify that the plan

²⁸"This kind of assistance is already available to agencies from GSA's Office of Software Development and Information Technology and the Federal Computer Performance Evaluation and Simulation Center (FEDSIM), which is under the auspices of the Air Force but performs contract services for other agencies.

include analysis of the impacts of information technology on the missions of the agencies, and on civil liberties and fair information practices.

Further, Congress may wish to examine in more detail current trends in the information available on information technology management, determine what kinds of information are vital to congressional oversight and agency decisionmaking, and request or direct the necessary information collection efforts. The Paperwork Reduction Act could, for example, require both a census of microcomputers and an inventory and description of major systems, and could require that GSA compile a more comprehensive report describing this information and the underlying trends. It would also be useful to establish some kind of inventory of software resources, since software has long since outstripped hardware in lifecycle cost and significance to programs.

OTA recognizes that, true to the IRM concept, there are costs associated with collecting such information. OMB and GSA officials, for example, have repeatedly expressed a hesitancy to collect further information because agencies already feel oppressed by the current information collection guidelines. In particular, agencies may resist providing information about microcomputers, since the unit cost is so low. Clearly, these arguments must be weighed against the potential value to Congress of having more complete and reliable information about trends in technology use.

Amendments to the Paperwork Reduction Act could also give individual agencies, in addition to OMB, a mandate for long-range planning. While agencies are currently required to plan, by OMB directives, a congressional mandate-and perhaps allocation of modest resources-may raise the visibility and effectiveness of the agency information technology planning process.

Other options would clarify the Paperwork Reduction Act mandate for general informa-

tion technology management. In the 98th Congress, several aspects of S. 2433 and H.R. 2718, proposed amendments to the Paperwork Reduction Act, would have clarified some of the definitions in the act, combined GSA's ADP and telecommunications funds, mandated that OMB's 5-year plan be updated annually, and specified further paperwork reductions. An effective congressional role in information technology management is difficult to construct, since there is a danger that Congress may be perceived as reaching too far into the management prerogatives of the executive branch. However, should Congress decide to take a more active role in this area, it could strengthen and expand the language of the Paperwork Reduction Act, setting forth goals for information technology management in order to define more specifically what is meant by IRM and what kinds of coordination and management structure the agencies should pursue. Such a congressional mandate may motivate quicker action by the agencies. While the act gives a very specific mandate for paperwork reduction, it gives only a bare minimum framework for information technology management.

Another possible option is to designate an additional assistant secretary for some agencies, whose primary responsibility would be information resources management. Since most agencies have designated their existing assistant secretary for administration as their senior official for IRM, many of these officials have been forced either to neglect IRM or to delegate the responsibilities. Establishing a new assistant secretary for IRM would ensure high-level visibility for the function, although it would also have clear costs in money and bureaucratic complexity. Such a new official also might have less authority than an assistant secretary for administration who also has jurisdiction over budgets, contracts, and facilities.