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AUGUST 16, 1979

The Honorable Jack Brooks
Chairman, Committee on
  Government Operations
House of Representatives

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Dear Mr. Chairman:

As you requested, we are reporting on our review of the [problems associated with developing large, complex data processing systems] Our objective was to identify Government-wide actions that would help resolve those problems. As you requested, we also assessed the need and appropriate organizational framework of a management assistance center for computer software and system development.

Previous reports issued by us and others have widely documented the failures of Federal agencies in developing data processing systems. These failures have resulted in millions of dollars being spent for systems that were not cost effective, did not meet user needs, experienced prolonged development and cost overruns, or simply did not work. Since 1970, we have identified almost $300 million of waste in such efforts. We did not further assess the extent of such failures but, rather, attempted to identify ways to improve management control over such development efforts.

(Our review centered on three agencies--the Department of the Army, the Veterans Administration, and the Bonneville Power Administration.) We also considered the results of recent audits we made at the Department of Labor, the Bureau of Census and National Bureau of Standards in the Department of Commerce, and the Social Security Administration in the Department of Health, Education, and Welfare. Additionally, we reviewed 57 GAO reports issued since 1970 which included discussions of data processing systems and software development. Our findings are summarized below.

NEED FOR MANAGEMENT CONTROL

The objective in investing in data processing, as with other major investments, is to develop data processing

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Letter Report

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systems and applications that are cost effective and meet user needs, and to do so within cost and time limitations. Since requirements change over time, if development is not completed on schedule, the system may not meet user needs. Cost and schedule overruns can diminish, and even eliminate, the cost effectiveness of an application.

Good management principles must be followed to insure the successful development of data processing systems. Those principles include:

--Continual planning, which involves analyzing requirements and related benefits and gaining appropriate approval for new systems and changes to existing systems.

--A structured approach to managing development work, which involves close supervision (by a project manager) during construction and implementation, and management review of progress and performance.

--Effective top management involvement throughout the development process.

The last point--top management involvement--is essential for a number of reasons. Data processing systems today are an integral part of agency operations and affect the entire organization. They provide information that management relies on as well as products and services that go directly to the public. Also, development frequently requires the coordination of needs among agency components and the cooperation of different department managers; only top management can assure both. Development may also be expensive and time consuming, which means that top management should have an interest in the development process as well as an inherent obligation to provide direction and leadership. Accordingly, top management needs to establish policies that will not only provide procedures for planning and controlling system development but policies that will also ensure top management's effective involvement in making key decisions and reviewing ongoing work.

MANAGEMENT CONTROL IS INADEQUATE

The three agencies we reviewed have serious weaknesses in management control over system development. They do not have policies or procedures addressing the management principles discussed above, their procedures were incomplete, or their procedures were not being followed.

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The Army's directive governing data processing addresses many important points of good management, but the directive has procedural weaknesses and is not regularly followed or enforced. As a result, (the Army continues to have weaknesses in top management control of its largest data processing projects. The Veterans Administration (VA) has weaknesses in all areas of system development, with its management authority so fragmented that it has no assurance that its system development resources will be used efficiently and effectively. Bonneville Power has many planning and management weaknesses, including an overall lack of uniform policies, standards, and procedures governing system development.)

Department of the Army

The Army is a major consumer of computer resources, using over 1,200 large computer systems with more than 4,400 application systems. While the Army's detailed directives (Regulation 18-1) governing automatic data processing (ADP) management include many essential controls, weaknesses continue to exist in the Army's management of automated system development. Those weaknesses include the following:

--Overall system plans are frequently not developed, and those that have been developed do not address major aspects of the system or tie into other plans.

--Top management frequently has not been sufficiently or effectively involved in large, complex system development efforts.

--Users of systems have not always actively participated in system development.

--Overall direction, coordination, and control of system development has been weak because a project manager has not been assigned as the central point of authority for most major ADP system development projects.

--Cost estimates and economic analyses have not consistently been prepared.

--Effective procedures have not been established to compare a system's progress with the approved cost, schedule, and performance estimates.

--Procedures have not been adequately enforced for approving either new design efforts or major enhancements and modifications to existing systems.

These management weaknesses had seriously reduced the
effectiveness of the Army's top management control over
ADP resources.

Veterans Administration

The Veterans Administration uses computers for both gen-
eral and special management purposes--primarily in support of
veterans' medical, insurance, and benefits programs; engineer-
ing and clinical research applications; and administrative
functions. The agency currently has approximately 137 major
system applications. Major new systems are under way and
others are being proposed.

Although VA has recently tried to improve management con-
trol, it still has no assurance that ADP resources are being
used effectively and efficiently because:

--VA lacks an effective agencywide planning process
   for system development.

--Top management has not provided sufficient overall
   coordination and central direction.

--No formal concept or structured management approach
   has been established to control system development.

--Project control has been hampered by inadequate cost
   accounting and reporting and by an inefficient organi-
   zational structure.

These management inadequacies have seriously weakened
VA's control over ADP resources and could easily lead to the
inefficient use of these resources. As you know, we are con-
ducting a separate review of the Veterans Administration's
problems, at your request.

Bonneville Power Administration

The Bonneville Power Administration of the Department of
Energy has a significant investment in computer resources--
equipment, technical staff, and application systems--and re-
lies heavily on computer system support to achieve its assigned
mission. In fiscal 1977, Bonneville spent about $4 million to
operate, maintain, and develop ADP systems and annually allo-
cates over 60 percent of its ADP staff effort to system devel-
opment.

Despite its growing investment and reliance on ADP sys-
tems, Bonneville has consistently failed over the past decade

to effectively control its ADP resources. Our review disclosed serious weaknesses in Bonneville's systems management.

--Its ADP management plan lacks meaningful and accurate information about individual systems. The plan is neither authoritative nor considered mandatory, and it has not been used as a tool to manage ADP systems.

--Top managers and users are not actively involved in system development activities, and project leadership is lacking.

--It does not estimate the costs or benefits of future systems and does not accumulate costs incurred to develop systems.

A certified public accounting firm, during a recent review of Bonneville's ADP operations, also expressed concern about these ADP management weaknesses. In the past, three other management consultants have reported similar weaknesses.

MANAGEMENT WEAKNESSES EXIST
AT OTHER AGENCIES TOO

According to numerous reports we have issued and reports by others, inadequate planning and management control have been primary causes of many significant failures in the design and development of large data processing systems at other Federal agencies as well. The following table summarizes the management inadequacies that were identified most often in 57 reports we have issued since 1970.

Management problem identified	Number of times cited
Inadequate planning	49
Insufficient or ineffective management and user involvement	32
Inadequate management approach for controlling system development	39
Inadequate control over changes to application programs	15
Inadequate budgeting and financial control	20

We believe that these weaknesses in management controls are indicative of a Government-wide problem. Moreover, we believe the problems will continue until a Government-wide policy guide is established and agency management (1) takes an active and effective role in the development of its data processing systems and (2) adopts a formal planning process and a structured framework for controlling system development.

To help correct these problems in management control, we have prepared guidelines setting forth the basic concepts and general procedures for planning and controlling system development. We have also prepared a guide for agency auditors to use in evaluating the adequacy of their agency's procedures for managing data processing system development.

NEED FOR SYSTEM DEVELOPMENT
TECHNICAL ASSISTANCE CENTER

We believe that agency managers recognize the need to exercise greater control over data processing. However, some may be intimidated or handicapped by the jargon and their unfamiliarity with the technical aspects and related problems of data processing. Further, those who try to exercise greater control are often hampered by a lack of information in a format needed for effective review at critical points. Top management and the central agencies are very often also hampered by the lack of independent assessments and opinions. (One approach that we believe would help managers, particularly top management, be more effective is to establish a service center that would provide agencies with managerial and technical system development expertise.) The center would, on a reimbursable basis:

--Assist agencies in planning, designing, and managing the acquisition of ADP systems (equipment and software).

--Independently review and evaluate agency ADP plans and system development plans, designs, and projects.

--Assist OMB and GSA by providing independent assessments, suggesting alternatives, and validating requirements and economic analyses for major information system budget and acquisition proposals.

--Assist OMB and GSA in developing standards, guidelines, and policy options, as well as in developing

new and innovative applications of ADP and data
communication technology.

In addition, such a center could also develop designs and
specifications for common functional systems software, mathe-
matical/statistical analysis software, and system support
software (e.g., data base and data communication management).

A management assistance center for software and systems
development could be established in a number of ways. Some
alternatives are:

(1) Establish the center within GSA or Commerce, fully
staff it with Federal personnel or supplement the
staff with experts on a contract basis.

(2) Establish an office within GSA or Commerce, staff
it with some Federal personnel, and create or re-
designate a Federal contract research center to
provide additional staff.

In making the decision there are two factors to be con-
sidered. One, consideration should be given to consolidating
the center with the three other limited-scope service activi-
ties (the Federal Computer Simulation and Evaluation Center,
the Federal COBOL Compiler Testing Service, and the Federal
Software Conversion Center) whose activities would inevitably
overlap. Two, it is important to assure

--separation of the assistance function from any regula-
tory function,

--the flexibility of the overall staffing level and the
ability to select and release scarce technical per-
sonnel,

--coordination with other assistance centers,

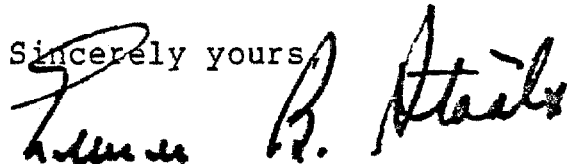--cost-effectiveness, and

--responsiveness to user needs.

Establishing such a center within GSA or Commerce raises
the question of how is it to be distinguished and insulated
from other services and regulatory functions. A Federal Con-
tract Research Center would provide a source of assistance
that could be made independent of any hardware or software
vendor as well as flexible in acquiring and releasing expert
personnel. However, such a center would require strong
management controls.

What we see as most desirable is to create a new autonomous Federal ADP service center combining the operating concepts of the Federal Computer Simulation and Evaluation Center and the Federal contract research centers. It would be desirable to include in this center the three existing service activities to preclude overlap of functions. We also believe it would be a good idea to establish a management steering committee of representatives from selected small, medium, and large Federal agencies to guide the assistance center activities, and the three other service activities if not consolidated. This committee would give the agencies who would use the center a means of voicing their needs and would minimize duplication of effort.

We are preparing a report to the Congress which will provide more details on our findings and conclusions as well as our recommendations to the Director of the Office of Management and Budget, the Administrator of General Services, and the Secretary of Commerce. An appendix to that report will include our guidelines for managing system development.

As you requested, we have not obtained agency comments on this report. We have, however, written letters to the Bonneville Power Administration and to the Veterans Administration on the results of our review at these agencies. As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the date of the report. At that time we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

Comptroller General
of the United States

Enclosures