DOE/IG-0423

AUDIT
REPORT

REVIEW OF THE
U.S. DEPARTMENT OF ENERGY'S
INFORMATION MANAGEMENT
SYSTEMS

AUGUST 1998

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

August 10, 1998

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
           Acting Inspector General

SUBJECT: INFORMATION: Audit Report on "Review of the U.S. Department of
           Energy's Information Management Systems"

BACKGROUND

The Federal emphasis on reinventing Government and the end of the Cold War have driven change at
the Department of Energy. In the midst of this change, the Department's Information Architecture
Program was initiated. Over the past several years, the Department realized that information
management and strategic planning efforts must focus on the utility and management of information,
rather than management of technology. The importance of an information architecture was also
recognized by Congress through the Clinger-Cohen Act of 1996. This law required the establishment of
a Chief Information Officer position in each Federal agency with the responsibility to develop and
implement an integrated information architecture. The objective of this audit was to determine whether
the Department had developed and implemented an Information Technology Architecture.

RESULTS OF AUDIT

The Department had not developed and implemented an Information Technology Architecture.
Although a key goal of the Department's 1997 Strategic Plan was implementing a Departmentwide
information architecture by January 1998, this goal was not achieved. Integral to architecture
implementation is the need for Headquarters program offices to develop and implement their own
information architectures. However, only one program office had initiated a development effort in
Fiscal Year (FY) 1997. Continued delays could adversely affect the successful attainment of a strategic
goal for $100 million in cost avoidances. Fully defined and implemented Departmentwide and program
office architectures are needed if the Department is to assure that the Headquarters information
management budget of $125 million for FY 1998 is not spent to develop and operate duplicative and
overlapping information systems.

MANAGEMENT REACTION

Your office and the Acting Chief Information Officer prepared a joint management response to our
report. The response indicated general concurrence with the points and recommendations made. You
stated that this audit will assist the Department to achieve a higher degree of attention for its
Information Architecture and persuade the programs and sites to properly design and align their business
and information systems. The joint response also took the position that because significant events
occurred after audit fieldwork was completed, the report's finding did not constitute a material internal
control weakness.

Attachment

cc: Deputy Secretary
     Under Secretary

REVIEW OF THE U.S. DEPARTMENT OF ENERGY'S INFORMATION MANAGEMENT SYSTEMS

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Overview

INTRODUCTION AND OBJECTIVE

Historically, the Department of Energy (Department) and its predecessor agencies planned, acquired, and implemented information technologies in a decentralized manner. This was done without a comprehensive method to address the overall information requirements of Departmental management, the integration of equipment and business processes, duplication of efforts, and corporate information resources. In 1997, the Department identified the development and implementation of Departmental and programmatic information architectures as a key goal. The Department sought to meet management information needs and avoid duplicative and redundant information systems through development and implementation of an integrated information management planning process.

An information technology architecture is a blueprint used to guide and constrain the development and evolution of information management systems. The architecture provides a high-level description of an organizational mission, the business functions being performed to accomplish that mission, the relationships among these functions, and the information needed to perform the functions. The architecture also provides the rules and standards needed to ensure that interrelated systems are built so they can exchange information, use various software designs, and reduce maintenance requirements.

The development and implementation of an information technology architecture is especially important to the Department because of its large investment in information systems. The Department's Fiscal Year (FY) 1998 budget request for information management was $1.5 billion. Of this amount, the budget for Headquarters elements was $125 million with over 95 percent of the funding spent on administrative systems. Information management budgets for field sites, including management and operating contractors, comprised the remaining amount. In a December 1996 report to the Office of Management and Budget (OMB), the Department identified that it had 29 major information systems. OMB policy requires that Departmental investments in major information systems must, among other things, be consistent with the agency's information architectures.

The Department documented its commitment to an integrated information architecture in its Strategic Plan, issued September 1997. A key goal of the plan was the implementation of a Departmentwide information architecture by January 1998. Through accomplishment of this goal, the Department was committed to avoiding $100 million in information technology expenditures over the subsequent 5-year period.

The objective of the audit was to determine whether the Department had developed and implemented an Information Technology Architecture.

CONCLUSIONS AND OBSERVATIONS

The Department's Strategic Plan called for the implementation of a Departmentwide Information Technology Architecture by January 1998. However, the Department did not attain this goal, and only one program office initiated an architecture development effort during FY 1997. There was little apparent support for the development and implementation of the Departmentwide and program office architectures. Continued delays could adversely affect the successful attainment of the Department's strategic goal for $100 million in cost avoidances. Also, without program office support, the Department has little assurance that the Headquarters FY 1998 information management budget of $125 million will not be spent on duplicative and overlapping information systems.

Effective October 1, 1998, the Government Performance and Results Act of 1993 requires the Department to prepare performance plans that complement the Strategic Plan. These plans will set annual goals with measurable target levels of performance and require an annual program performance report to Congress that compares actual performance to the annual goals. Accordingly, the implementation of an Information Technology Architecture and achievement of associated cost savings will be a key performance measure reported to the Congress.

The audit identified a material internal control weakness that management should consider when preparing its yearend assurance memorandum on internal controls.

_____/s/_____

Office of Inspector General

CONTROL OF INFORMATION MANAGEMENT SYSTEMS

Information Architecture Development and Implementation

The Department had not developed and implemented an Information Technology Architecture (ITA) although its Strategic Plan called for the implementation of a Departmentwide information architecture with supporting standards by January 1998. An ITA is necessary to properly manage and control future systems development efforts. As of March 1998, the Department had not approved a fully defined Departmentwide architecture and was not planning to complete implementation until FY 2000 at the earliest. We found that the Department's success in implementing a Departmentwide ITA depends on the timeliness and effectiveness of Departmental programs developing and implementing their own ITAs. As of January 1998, only one program office had initiated action to develop an ITA.

Information Systems Management and Control

The Department operates numerous, independent systems for meeting program office needs in the same functional area. For example, in the administrative area, the Department operates systems for accounting, budgeting, human resources, procurement, property management, and performance measures. These systems are maintained by separate organizational entities responsible for the respective functions these systems support. The Departmental Integrated Standardized Core Accounting System is operated by the Office of Chief Financial Officer, the Assistant Secretary for Human Resources and Administration operates the Procurement and Assistance Data System, and the Facility Information Management System is operated by the Office of Field Management. Replacement systems were under development or planned for these systems with little consideration on how they would integrate with other major business systems. A Departmental Financial Information Management report, issued May 1995, recommended that to properly manage and control future business systems development efforts which assure full integration, it was imperative that an Information Architecture Plan be developed for the Department.

In December 1995, the Department described its then current defacto architecture, acknowledging that there was functional duplication and redundancy of Departmentwide information systems. Specifically, the Department stated that unnecessary duplication of systems and processes existed at the local, intermediate processing and corporate system levels and that systems required data architecture coordination. For example, in its internal report, the Department concluded that 21 desktop applications used for personnel activities seemed excessive.

Further, the Department found that there were redundancies in several administrative applications such as eight applications for tracking Headquarters procurement actions and requisitions, and six mail/label applications.

<u>ITA Implementation Efforts</u>

The Department started work on the definition phase of an ITA in October 1994, which resulted in the adoption of an approach and guiding principles for developing an architecture. In April 1997, the Department issued guidance for implementing information architectures. The guidance indicated that programs are required to develop information architectures for all systems that support Departmental information needs. Further, in February 1998, the Department issued a draft vision for a Departmentwide architecture. The vision presents a target ITA towards which all Departmental organizations and activities can aim. This document describes how technology may be implemented within the Department over the next 7 years to dramatically improve the ways business is conducted. Approval of the ITA vision will complete the definition phase of the Departmentwide architecture. At the time our audit field work was completed, the draft vision had not been approved and issued by the Department.

According to guidance issued by the Chief Information Officer (CIO), programs are required to develop information architectures for their systems that support Departmental information needs. The Secretary of Energy had reported to OMB in December 1996 that assessing and integrating program office and site ITAs into the Departmental Information Architecture was a critical follow-on issue for the ITA program. However, by the end of FY 1997, only one Headquarters program office had initiated an information architecture.

Information Technology Architecture Requirements

The Clinger-Cohen Act of 1996 required each agency to establish the position of CIO reporting directly to the agency head. The CIO is responsible for developing, maintaining, and facilitating the implementation of a sound and integrated ITA. The CIO is expected to work with the agency head and senior program managers to implement effective information management that achieves the agency's strategic goals. The Act envisions the CIO with a critical leadership role in this relationship. The Department reinforced the CIO's information architecture management responsibilities in DOE Order 200.1, "Information Management Program," issued September 30, 1996.

OMB has issued several policies to Federal agencies concerning implementation of the Act. In October 1996, OMB issued Policy Memorandum M-97-02, "Funding Information System Investments," that set forth criteria for making investments in major information systems. One such criterion specifically requires agency information systems proposed for funding to be consistent with Federal, agency, and bureau information architectures. This criterion establishes the critical link between systems planning and implementation of an information architecture that is designed to align technology requirements with Departmental missions and goals.

Another OMB Policy Memorandum, M-97-16, "Information Technology Architectures," issued in June 1997, provided guidance on the development and implementation of an ITA. This policy directed agencies to be prepared to indicate the status of the development, implementation, and maintenance of the agency ITA during the formulation of the FY 1999 budget. OMB concluded that *successful implementation* of an ITA was essential if Departments were to meet the goals of the Clinger-Cohen Act.

Departmental Support Of The ITA Initiative

Information architecture initiatives have not received the kind of Departmental support needed to ensure timely and successful implementation.

ITA Needs Organizational Support

Organizational support was not present at various levels. The CIO lacked the authority and resources necessary to ensure development of information architectures at the program office level which form the building blocks of a Departmental architecture. Additionally, information architecture development and implementation efforts did not receive the kind of support from the program offices and the Executive Committee for Information Management (Executive Committee) that is needed to complete such a task in an agency as complex and system dependent as the Department of Energy.

Office of Chief Information Officer

The CIO reports to the Assistant Secretary for Human Resources and Administration and is a non-voting member of the Executive Committee. However, in July 1997, the Deputy Director for OMB

expressed concerns about the placement and authority of the CIO within the Department's organizational structure. One concern was that the CIO did not report directly to the Chief Operating Officer, which significantly reduced the CIO's ability to impact the management of the information technology function at the Department, including the implementation of an ITA. The Deputy Director also concluded that the CIO, as a non-voting member of the Executive Committee for Information Management, had very little clout in decisions affecting the effective management of the agency information technology resources. OMB believed that until the CIO had a seat at the budget table with Executive Committee members, "... the CIO (position) will not have any teeth." The Department has proposed to have the CIO report to the Deputy Secretary and be a voting member of the Executive Committee, but had not approved the changes as of April 3, 1998.

Program Offices

Program offices also did not provide the support necessary for a Departmental information architecture. To illustrate, the Department's Information Architecture Program Manager within the Architecture, Standards, and Information Security Group of the CIO's office told us that some major program offices have not been proactive, and there was a high risk of failure for program ITAs, unless the major program offices recognized the need to align their efforts with the Department's ITA. In contrast, the one program level ITA that was initiated in FY 1997 had the requisite senior management commitment. This effort began with the full support and approval of the Program Office Director. The program office Information Management (IM) manager stated that a successful ITA depends on support from the Office of the CIO and senior program management, appropriate levels of funding, and the willingness to sacrifice other projects. According to this manager, his office was able to initiate a successful architecture effort because it had a management that recognized the benefits of an information architecture. He added that many other program offices had not assigned the necessary funding or staffing resources to implement a successful ITA.

Executive Committee

The Executive Committee also had not provided the emphasis or support to ensure the development and implementation of a Departmentwide and supporting program office architectures. The Committee, which functions as the Corporate Information Technology

(IT) Investment Board, makes the investment decisions for funding major IT projects. The Board reviews management proposals, authorizes funding, and monitors development and implementation of corporate information systems. Although the Executive Committee Chairman had stated that an architecture was the key to successful management of information technology and recognized the potential for real cost savings was the force behind development of the Act, the Committee did not formally support an ITA implementation schedule or promote the development of architectures at the program office level. Specifically, the development of an ITA plan that includes a schedule, budget, and tracking system is essential to the successful implementation of an ITA. To date, the Committee has not approved an ITA implementation schedule, budget, or system to track implementation.

Implementation of An Effective Information Architecture Needs Resource Investment

Progress toward developing and implementing a Departmentwide information architecture has been impeded by funding priority decisions. In the FY 1998 budget, the CIO's office requested $8 million for the Corporate Information Management Program and received $6 million in approved funding. Of the $6 million received, only $460,000 or 8 percent of the total amount was applied to the ITA program. This amount was significantly less than the $1.4 million requested for FY 1998 by the ITA program manager to support the architecture and standards program and hindered the CIO's 1997 Information Management Strategic Plan for successful implementation of an architecture. In response to our draft report, management stated that it had increased the total funding of the architecture and standards program to $1.03 million for FY 1998. This amount was about 27 percent less than the amount requested by the program manager.

Architecture Benefits Not Achieved

Information architecture is an essential part of the Department's Strategic Plan. The Plan's corporate management strategy requires the CIO to integrate a Departmentwide framework for planning, budgeting, evaluating, and implementing information management requirements to reduce costs and improve operations. Specifically, the strategy called for the CIO to implement, by January 1998, a Departmentwide information architecture with supporting standards to foster $100 million in cost avoidance over the next 5 years. However, the Department did not realize this Strategic Plan objective with its projected benefits.

Continued delayed implementation of an Information Technology Architecture will prevent the Department and its programs from achieving the following qualitative benefits:

- Reduction in the number of redundant software applications and program systems,

- Savings in data processing time,

- Reduction of duplicate data entries,

- Reduction in the time required to reconcile data between disparate systems,

- Increased data flexibility,

- Improved control over new system development,

- Reduction in maintenance costs associated with different systems, and

- Reduction in security risk related to reducing the number of systems.

RECOMMENDATIONS

To provide necessary Departmental support for development and implementation of an ITA, we recommend that the Chairperson for the Executive Committee for Information Management:

1. Reassess the roles, responsibilities, and authority of the Chief Information Officer to assure conformance with the Clinger-Cohen Act of 1996.

2. Require Executive Committee members to formally approve the Departmentwide Information Technology Architecture and an implementation schedule to ensure timely completion of the program.

3. Provide the funding necessary to support the successful development and implementation of Departmentwide and program office architectures within the approved program schedule.

4. Consider delaying corporate system development projects until Departmentwide ITA implementation is completed.

5. Ensure that future major systems investment decisions are consistent with the approved ITA as required by OMB.

To provide the leadership necessary to achieve ITA development and implementation, we recommend that the Chief Information Officer:

1. Increase the allocation of resources within the CIO organization to assist and support the development and implementation of the Departmentwide and supporting program office information architectures.

2. Report the status on the implementation of the Departmentwide and program office Information Technology Architectures on a periodic basis to the Executive Committee for Information Management.

MANAGEMENT REACTION

The Acting Secretary of Energy and the Acting Chief Information Officer prepared a joint management response to our report. They generally concurred with the points and recommendations that were made in the report. They believe that this audit will assist the Department to achieve a higher degree of attention for its Information Architecture and persuade the programs and sites to properly design and align their business and information systems. They also felt that because significant events have occurred after fieldwork for the audit was performed, the weaknesses identified in the report did not constitute a material internal control weakness. The Acting Secretary's response and specific comments on each of our recommendations are included in Appendix 4.

AUDITOR COMMENTS

Management's comments are generally responsive to the recommendations. Specifically, management's proposed actions, if properly implemented, will improve the management of information systems in the Department of Energy.

In implementing its proposed actions, we suggest that management consider the following three points.

- Management's action plan should include milestones for implementing information architectures at the program office level.

- Management needs to not only identify the sources of funding for the Departmentwide and program office architectures, but also to identify the required and planned level of resources to be committed to the architecture effort.

- The Department should carefully monitor the effectiveness of the Acting Chief Information Officer's organizational dual reporting responsibilities.

Although management pointed out that it could not delay corporate system development projects until implementation of the Departmentwide architecture is completed, they stated that corporate systems are currently being evaluated against the published architecture. This evaluation and appropriate follow-up actions based on the results of those evaluations satisfy the intent of our recommendation.

Regarding management's position as to when the Department had implemented the information architecture, we acknowledge that with the May 1998 issuance of the Vision document the Department had completed publication of the architecture. However, as described in the Vision, that document completed the definition phase of the architecture and the next phase, expansion and implementation, was not planned to begin until mid-Fiscal Year 1998. Furthermore, expansion and implementation cannot be achieved without supporting program office architectures. As of the date of our draft report, no program office had implemented its own information architecture.

Appendix 1

SCOPE

The audit was performed at the Headquarters Forrestal and Germantown locations from June 1997 to April 1998.

METHODOLOGY

To accomplish the audit objective, we:

- Reviewed Departmental implementation requirements of the Clinger-Cohen Act and Office of Management and Budget Policy Memorandums;

- Reviewed published Department information architecture documents and strategic plans;

- Held discussions with personnel from the Office of the Chief Information Officer, various Headquarters program office information management managers, and personnel from the Office of Management and Budget;

- Examined program office documentation used to support initiating an information architecture;

- Evaluated the efforts by the Chief Information Officer to develop, maintain, and facilitate implementation of a Departmentwide Information Technology Architecture; and

- Evaluated benefits from implementation of information architectures by the Headquarters program offices.

The audit was performed in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. We did not conduct a reliability assessment of computer-processed data because no such data was used during the audit.

Appendix 2

PAST AUDITS RELATING TO INFORMATION MANAGEMENT SYSTEMS

- *Audit of Management Information Systems for Environmental Compliance Activities,* Office of Inspector General Report Number DOE/IG-0284, dated April 1990. This report concluded that DOE's many information-gathering systems, developed by various offices and contractors, did not meet the Department's needs for tracking and reporting on environmental compliance.

- *Status of Efforts to Improve Management Information Systems for Environmental Compliance Activities,* Office of Inspector General Report Number CR-L-95-21, dated June 1995. This report determined that the Department had allowed the development and operation of duplicate and overlapping information systems to continue in the Environmental Management Program. Because of on-going Departmental initiatives supporting the 1994 Information Management Strategic Plan and Strategic Alignment Initiative # 39, recommendations were not presented. Instead, Department management was informed that this issue would be revisited at a later date to assess the effectiveness of these initiatives. However, requirements from these initiatives were subsequently replaced with passage of the Act.

- *Energy Lacks Data to Support Its Information System Streamlining Effort,* GAO Report Number AIMD-96-70, dated July 1996. This report addressed the baseline inventory of data on specific systems used by the Department and its management and operating contractors. GAO found that the inventory was substantially incomplete and lacked sufficient information describing systems' functional capabilities. As a result, the inventory would not be adequate to help eliminate duplicate information systems as part of the Department's streamlining effort.

FY 1998 PROGRAM OFFICE INFORMATION
MANAGEMENT BUDGETS

PROGRAM OFFICES	FY 98 DOLLARS
	(in thousands)
Energy Information Administration	$60,800
Chief Information Officer	14,551
Environmental Management	11,939
Environment, Safety & Health	9,349
Energy Research	7,899
Energy Efficiency & Renewable Energy	6,486
Chief Financial Officer	5,442
Defense Programs	4,159
Fossil Energy	1,810
Procurement	1,240
Inspector General	970
Nuclear Energy	825
TOTAL	$125,470

Appendix 4

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The Secretary of Energy
Washington, DC 20585
July 2, 1998

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MEMORANDUM FOR GREGORY H. FRIEDMAN
                 ACTING INSPECTOR GENERAL

FROM: ELIZABETH A. MOLER
                     ACTING SECRETARY

SUBJECT: Draft *Report on* "Review of the U.S. Department of Energy's Information
                     Management System"

Thank you for the opportunity to review and comment on the subject draft report.

The Acting Chief Information Officer and I have drafted a joint response to clarify and elaborate on certain facts and conclusions. In most instances, we concur with the points and recommendations that have been made. However, based on the attached clarifications, and significant events that have occurred since the conclusion of the audit, we believe that the weaknesses identified in the draft report do not constitute a material internal control weakness as stated therein.

We appreciate the effort of the Office of the Inspector General in drawing attention to these important initiatives. We believe that this audit will assist the Department in achieving a higher degree of attention to its Information Architecture and in persuading the programs and sites to properly design and align their businesses and information systems.

If you have any questions regarding this response, please contact Mr. Howard E. Lewis, Jr., Acting Chief Information Officer, at (202) 586-0166.

Attachment

ATTACHMENT

RECOMMENDATIONS

To provide necessary Departmental support for development and implementation of an Information Technology Architecture (ITA), we recommend that the Chairperson for the Executive Committee for Information Management (ECIM):

1.   Reassess the roles, responsibilities, and authority of the Chief Information Officer to assure conformance with the Clinger-Cohen Act of 1996.

Secretary Pena signed Delegation Order No. 0204-165 to the Chief Information Officer (CIO), effective April 21, 1998. The Order specifies various delegated and assigned responsibilities of the CIO, based on the Clinger-Cohen Act of 1996. The Order also stipulates that the CIO reports directly to the Deputy Secretary, which is consistent with the Act.

2.   Require Executive Committee members to formally approve the Departmentwide Information Technology Architecture and an implementation schedule to ensure timely completion of the program.

The Executive Committee approved the Departmentwide Information Technology Architecture as a top priority at its January 27, 1997, meeting. An implementation schedule is being developed for presentation at the July ECIM meeting.

3.   Provide the funding necessary to support the successful development and implementation of Departmentwide and program office architectures within the approved program schedule.

We concur that Departmentwide architecture be funded from the Corporate Information Management budget and that program office architectures should be funded by the appropriate program. We need to share information on architectures from a corporate and program perspective to obtain maximum benefit from projects funded.

4.   Consider delaying corporate system development projects until Departmentwide ITA implementation is completed.

We disagree with this recommendation. As is elaborated on page 3 of this document, there is clear evidence that the architecture is being implemented. We are currently evaluating all corporate systems against the published architecture. This reinforces the issue of architectural alignment and strengthens the ongoing efforts within the CIO Architecture program. In addition, delaying corporate system development projects might jeopardize potential enhancements needed to ensure readiness for the Year 2000.

5.   Ensure that future major systems investment decisions are consistent with the approved ITA as required by OMB.

We concur that all future major systems investment decisions are consistent with the approved ITA.

To provide the leadership necessary to achieve ITA development and implementation, we recommend that the Chief Information Officer:

1.   Increase the allocation of resources within the CIO organization to assist and support the development and implementation of the Departmentwide and supporting program office information architectures.

With the limited funding for corporate initiatives and infrastructure support, we are supporting the architecture as one of our highest priorities. We will strive to find additional funding options for supporting architectural initiatives in the future.

2. Report the status on the implementation of the Departmentwide and program office Information Technology Architectures on a periodic basis to the Executive Committee for Information Management.

The CIO is prepared to report on the status of implementation of the Departmentwide and program office architectures on a periodic basis to the Executive Committee for Information Management.

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1. What additional background information about the selection, scheduling, scope, or procedures of the audit would have been helpful to the reader in understanding this report?

2. What additional information related to findings and recommendations could have been included in this report to assist management in implementing corrective actions?

3. What format, stylistic, or organizational changes might have made this report's overall message more clear to the reader?

4. What additional actions could the Office of Inspector General have taken on the issues discussed in this report which would have been helpful?

Please include your name and telephone number so that we may contact you should we have any questions about your comments.

Name _____   Date _____

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If you wish to discuss this report or your comments with a staff member of the Office of Inspector General, please contact Wilma Slaughter at (202) 586-1924.