SIX YEARS AFTER ITS PASSAGE, WHAT HAS BEEN THE IMPACT OF THE CLINGER-COHEN ACT ON THE U.S. AIR FORCE?

THESIS

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Abstract

Over the past decade, a considerable amount of attention has been given to federal legislation in making the federal government operate more efficiently and effectively by concentrating on Information Resource Management and Information Technology. In 1996, the Clinger-Cohen Act was passed, creating the role of Chief Information Officer (CIO) in each agency of the Federal Government.

This study assesses the impacts of the Clinger-Cohen Act (CCA) on the USAF, with an emphasis on the Federal CIO Council Core Competencies. Given that this law and supporting policies have been in place for nearly six years, it would be valuable to assess USAF compliance with CCA as well as its impact on the USAF.

It is intended that the information gathered may help the USAF to be a better steward of the nations critical information and financial resources, and to better provide critical information capabilities to the warfighter, thus ensuring information superiority over our nations adversaries.

Findings of this survey provide evidence that the USAF is in compliance with the CCA, and identifies impacts of the CCA on the USAF. Among these impacts are: IRM responsiveness has contributed to mission accomplishment, Strategic planning includes information as well as IT, technology has improved efficiency, baseline performance measures are more realistic, alignment of organizational structure improves critical services, and standardization of policy and processes optimizes IT resources.

SIX YEARS AFTER ITS PASSAGE, WHAT HAS BEEN THE IMPACT OF THE CLINGER-COHEN ACT ON THE U.S. AIR FORCE?

I. Introduction

Overview

The Clinger-Cohen Act (P.L. 104-106) was signed into federal law on 10 February 1996 and became effective on 8 August 1996. Federal Chief Information Officers (CIO) were mandated in every (23) executive branch agency as a result. Not long after, President Clinton signed Executive Order 13011 (1996), "Federal Information Technology," creating the Federal CIO Council (CIOC) and outlining additional details concerning the responsibilities and duties of these same CIOs. Generally speaking, the creation of the CIO position was a strategy for federal government leadership to manage out-of-control federal spending on Information Technology (IT). Likewise, the establishment of the CIOC represented the president's effort to improve federal IT management by building an inter-agency forum that was chartered to improve agency practices on such matters as the design, modernization, use, sharing, and performance of agency information resources (EO 13011, 1996).

Five years later, what has been the impact of this legislation? This study will assess the effects of the office of the AF-CIO on the USAF as an organization, based on the requirements of the CCA and direction from the Federal CIOC. Given that these federal policies have been in place for over five years, it would be valuable to assess the outcomes of the CCA and the office of the AF-CIO. It will describe the association of the office of the AF-CIO to the CIO provisions of the CCA and CIOC guidance. The

study will examine and relate relevant CIO issues from the private sector and public sector. Finally, this research will assess the effects of the CCA on the USAF and USAF operations.

Background

The CCA is the law that created federal CIO positions and is quoted by the Administration, Congress, and government agencies as the authoritative source on how this Executive Level position should manage and perform in its roles and responsibilities (GAO 2000a, 2000b). Further, the CCA led to the creation of the Federal CIOC, which has raised the visibility of agency CIOs, as the Council has become the preeminent inter-agency IT coordination body (EO 13011, 1996; GAO, 2001). The CCA also changed the way that agency IT systems are acquired by shifting control from the General Services Administration (GSA) to the individual agencies.

While it is possible to identify a large body of prescriptive Information Resource Management (IRM) literature (Deardon, 1987; Boynton, Jacobs, and Zmud, 1992; Markus and Keil, 1994; Rockart, Earl, and Ross, 1996; Markus and Benjamin, 1997; Broadbent and Weill, 1997; Feeny and Willcocks, 1998), relatively few studies specifically judge whether assessments of IRM prescriptions consistently correlates with technical or substantive policy compliance, improved IT performance, or consequential affects (Boynton, et al., 1994; Sambamurthy and Zmud, 1992; Van Shaik, 1985).

Additionally, several government studies have been undertaken on the CCA and CIOs, including two GAO reports on federal CIO organizations and practices (GAO, 2000a, 2000b). They suggest assessments of the AF-CIO office would be effective in

determining CCA compliance, as well as suggest performance evaluation criteria that would assist in that determination. Numerous studies and reports have prescribed CIO roles and responsibilities, accountability, and performance effectiveness as well as predicted CIO challenges regarding performance and technology. While prescriptive IT management literature might assess technical compliance with the CCA, this study is interested in surveying substantive compliance, effects, and outcomes of the CCA and the AF-CIO office on the USAF. No study was found that assesses the CCA in terms if its impact on the USAF.

Problem Statement

It has been over five years since Congress passed the Clinger-Cohen Act, the agency CIO position was created, and the Federal CIO Council was established. Five major questions could be asked regarding the outcomes of this legislation and it's impact on the USAF:

1) Are the USAF implementation efforts consistent with the intent of the CCA?

2) To what extent can a model of the AF-CIO position illustrate the level of the AF-CIO office implementation efforts?

3) What outcomes can be found as a result of the CCA and the AF-CIO office requisite to;

A) The Federal CIO Core Competencies,

B) The performance based aspects of the CCA, Section 5123,

C) Key IRM achievement areas from the public and the private sector,

D) The roles and responsibilities of the AF-CIO

4) Have changes in USAF operations occurred as a result of instituting an AF-CIO office?

5) How have these changes impacted the USAF?

This exploratory study will propose an assessment using criteria defined in the CCA, prescriptive literature of public and private organizations, and the results of qualitative research measures. The resultant assessment collected data designed to explicate the effect of the CCA and the AF-CIO office on USAF operations and the USAF. This study suggests the results may be generalizable to other branches of military service in the DoD, and possibly to other federal agencies.

To change and to improve are two different things. -- German proverb

Research Focus

The intent of this research is to identify the impacts the CCA has made on the USAF. The research will cover multiple aspects of the agency CIOs, as well as study how the office of the CIO has been implemented in the USAF, and how leadership has helped influence the outcome of the AF-CIO office on USAF operations. Finally, the research will discuss the impacts of office of the AF-CIO on the USAF.

An assumption in doing this research is that USAF compliance with the CIO-related mandates of the CCA is in the best interest of the USAF. By this I mean that if the USAF creates its CIO position, roles, and responsibilities in accordance with the CCA, some benefit to mission accomplishment will result.

To provide an interpretation of the CCA legislative intent with respect to the federal CIO position, the research will examine the CCA, other federal IRM legislation, and research related to the CIO position. Chapter two will explore the research that has addressed the issue of the CCA and explores CIO roles and responsibilities. Based on the

results of the literature review, an assessment of AF-CIO impacts on the USAF as a result of the CCA will be addressed. Chapter three will address the methodology for conducting the research. Chapter four will provide the results of the data collection. Chapter five will discuss the results obtained in Chapter four along with implications, limitations of the study, and suggestions for future research.

Advantage to the U.S. Air Force

The USAF has invested much time, money, and energy implementing the mandates of the Clinger-Cohen Act. The value of implementing these mandates range considerably from technical compliance with federal legislation, to the substantive optimization of finite information resources such as money, time, personnel, and equipment. Other substantial impacts include the capitalization affects of strategic planning, standard systems, standardized IT acquisition and technical and fiscal processes, and standard performance-based measures. Meeting the requirements of the CCA could support the leveraging of information resources toward effective operations and eventually the USAF Core Competency of Information Superiority. Given that the CCA mandates have been in existence for nearly six years, it may be beneficial to better understand both the impact that this legislation has had on the USAF and its implications for future operations.

II. Literature Review

Overview

In qualitative research, literature is often used sparingly and inductively to frame the research problem (Creswell, 1994). However, others believe that a broader theoretical framework is required to focus data-collection efforts and reduce the chances of the researcher being inundated with large amounts of data (Miles, et al, 1994; Yin, 1994). The researcher adopted the latter view to employ a broad observation of the literature in order to develop the research focus introduced in Chapter 1, and to guide the data collection and analysis.

In order to conduct an assessment of the impacts of the Clinger –Cohen Act of 1996 (CCA) on the Air Force, it is necessary to define and review the Information Resource management (IRM) field of research, federal IT policy leading up to the passage of the CCA, the goals of the CCA, and how CIO roles and responsibilities have developed to implement the CCA. It is also necessary to place into context the theoretical model in which to base the assessment, and to explain the results in terms of outcomes (or impacts) on the USAF and USAF operations. A previous study regarding the impacts of the CCA and the office of the AF-CIO on the USAF could not be found by the researcher.

This chapter reports a review of the literature to learn what has been published about CIOs and the management of information. The chapter begins with a review of the field of interest and the historical background creating the agency CIOs in the federal government. To provide an understanding of the CCA's legislative intent with respect to

the federal CIO position, the CCA was reviewed along with other federal IRM policy and other related guidance. Information relating the CCA and Executive Order 13011 is also presented. The federal policies are connected to the AF-CIO focus areas and are examined along with experiences of federal and state government agencies, and private sector organizations. This section summarizes a high-level view of CIO Core Competencies, or focus areas, of government CIOs private sector CIOs, and finally the AF-CIO. Further, the relationship between the roles and responsibilities of CIOs are associated with an organizational context and policy framework that makes the relationship more understandable.

Field of Interest

Information Resource Management (IRM) is the field of interest for this study. The result of effective IRM by the office of the AF-CIO, in the context of federally mandated policy and other managerial and organizational factors, is the subject of interest. Although the terms "information systems" (IS) management, "information management" (IM), and "information technology" (IT) management, have been used interchangeably in literature, (Boaden and Locket, 1991) the IRM term is appropriate for this study as it, "entails a broader conceptual definition of management as well as the human resources and technical components more typically associated with IT management (Lewin and Sprehe, 1996). The literature also expresses concern that existing policies emphasize managing technologies at the expense of managing information even though, "to some extent, IM issues become defined as IT management issues (Lewin, et al., 1996).

The study uses the term IT management, in its general sense. It is consistent with the definition of IRM used in section 3502 (7) of title 44, United States Code as "the process of managing information resources to accomplish agency missions and improve agency performance, including through reduction if information collection burdens on the public" (United States Congress, Title 44, 1997; Section 3502).

The scope of this research effort will be limited to identifying and reviewing federal government and USAF IT policy and existing IRM theory and practice, as captured in the CCA, and its impact on USAF operations. The intent of the research is to provide an assessment of progress of the AF-CIO office and USAF operations in accomplishing the objectives of the CCA.

Federal IRM Problems

In 1994, Senator William Cohen of Maine, released a critical report on federal IT management entitled, "*Computer Chaos: Billions Wasted Buying Federal Computer Systems*." In the report, Senator Cohen identified major IT projects wasting billions of dollars because of poor management. To improve the success of IT projects in the public sector, Senator Cohen stated the government needs to do better planning of IT projects particularly when they define objectives, analyze alternatives and establish performance measures that link to agency accomplishments (Cohen, 1994). Additionally, Senator Cohen declared, "The federal government is the largest information manager in the world…The ability of the government to manage this information has a profound effect on the daily lives of all of us…Government information systems are headed for catastrophic failure if we fail to address the challenge of modernization" (Cohen, 1994).

Prior to Senator Cohen's report, the General Accounting Office (GAO) summarized the problems identified in audits (see Table 1) associated with federal IT management over a period of nearly three years (General Accounting Office, 1992).

Table 1: Number of Reports Citing IT Management Problems

Instances	Problem
66	Inadequate management of information systems development lifecycle
29	Ineffective oversight and control of information resources management (IRM)
16	Inability to ensure security and integrity or reliability of information systems
14	Inabilityof systems to work together
9	Inadequate resources to accomplish IRM goals
22	Cost overruns
20	Schedule delays
7	Systems not performing as intended
18	Inaccurate, unreliable or incomplete data
8	Systems that make data access time consuming or cumbersome

Source: GAO Report GAO/IMTEC-92-13FS (General Accounting Office, 1992)

Cohen's report emphasized these failures and declared that government efforts to replace its antiquated computer systems met with little success because of poor management, inadequate planning, and an acquisition process that is too cumbersome to competitively purchase computer technology before it is obsolete (Cohen, 1994). Because the process of acquiring federal computer systems takes longer than developing new technology, the likelihood is increased that technology will be obsolete once delivered (Ibid.). The report cited several modernization efforts that have failed, and faults the protest process as a major factor in the long delays in acquiring computers, as well as higher costs due to court and personnel costs. Cohen's suggestions to improve the situation included early oversight and planning, encouraging innovation through pilot programs using new procurement ideas, and creating incentives for both the government and contractors to perform, such as using past performance as an evaluation criteria.

To meet the challenge, numerous changes to the IRM policy framework occurred during the 1980's and 1990's through legislation, Office of Management and Budget (OMB) directives, and IT related initiatives. At the heart of these federal policies are directives to control IT costs, meet IT requirements, and create a strategy to measure IT performance and effectiveness. It is also through these laws and policies that the position of Chief Information Officer (CIO) came into existence in federal government agencies, as well as the creation of a Federal CIO Council.

Federal Legislation

This section will review major IT legislation and policy framework related to IT management, that are the precursors to the Clinger-Cohen Act of 1996.

Brooks Act (P.L. 89-306)

Under the Brooks Act, the Secretary of Commerce had responsibility for federal computer standards through the National Institute of Standards and Technology (NIST). However, OMB retained management oversight authority (40 U.S.C. Section 759 (d)(5)(e)). Additionally, the General Services Administration (GSA) was charged with the authority and the responsibility to acquire and operate information technology as well as to oversee the IT acquisition process and operation.

In comparing the Paperwork Reduction Act of 1995 (PRA '95) IT acquisition philosophy to that of the 1966 Brooks Act, John Bertot et al. stated:

> A fundamental objective of the PRA was to have agencies manage their own information resources, and to include IT as part of this, while the Brooks Act's primary objective was for agencies to acquire IT through the most cost-effective and efficient means (Bertot, et al, 1996).

Congressional and agency criticism of the Brooks Act was that its emphasis on cost-effectiveness in IT acquisition did not necessarily produce systems that allowed agencies to produce efficient information-based services. In spite of this criticism of the Brooks Act, PRA '95 did not replace or modify the Brooks Act (Bertot, et al, 1996). The CCA repealed the 1965 Brooks Act, which was characterized as "strict regulatory control over IRM, an excessive documentation approval process, and a lengthy acquisition cycle in which systems were often obsolete when finally fielded" (Johnson, 1997; 3).

The Paperwork Reduction Act (PRA)

In 1976, President Ford established the Commission on Federal Paperwork to assess the impact of Government reporting requirements on businesses and individuals. In 1977, the Commission launched an investigation of information management practices. The Commission observed;

> The absence of a body of doctrine covering the effective and efficient management of information resources has fostered overlap and duplication in both the administrative controls over, and organizational structures which manage information gathering, processing, and dissemination (Holden,et al, 1996).

In 1980, Congress passed the Paperwork Reduction Act incorporating the Commission's findings to recognize information as a valuable and manageable resource, reduce federal agency paperwork burdens on the public and industry by 15 percent by 1982, and to centralize federal information policy functions into the Office of Information and Regulatory Affairs (OIRA) within OMB (Holden, et al, 1996).

The Paperwork Reduction Act of 1980 (PRA '80) also connected industry and government best practices in IRM, including mandates for each agency to:

1) Carry out information management activities in an efficient, economical manner,

2) Designate a senior official or officials to carry out agency responsibilities under the Act,

3) Inventory major information systems and review, periodically, its management activities,

4) Ensure that its systems do not overlap each other or duplicate systems of other agencies,

5) Develop procedures for assessing the paperwork burden of its collection activities,

6) Ensure that each information collection request submitted to nine or fewer persons that it is not subject of the provisions of PRA '80. (P.L. 96-511).

The PRA was amended again in 1995 (PRA '95) (P.L. 104-13). Congress intended PRA '95 to strengthen federal IRM and concluded that the IRM concept under the PRA was not flawed but, "rather the need is to develop an improved strategy by which to apply IRM" (U.S. Senate, 1994). The PRA established a broad mandate for agencies to perform IRM activities in an efficient, effective, and economical manner.

> To assist agencies in an integrated approach to information resources management, the PRA requires that the Director of OMB develop and implement uniform and consistent information resources management policies; oversee the development and promote the use of information management principles, standards, and guidelines; evaluate agency information resources management practices in order to determine their adequacy and efficiency; and determine compliance of such practices with the policies, principles, standards, and guidelines promulgated by the Director (P.L. 104-13).

Perhaps congress had intended to align agencies' strategic missions and strengthen OMB oversight processes. However, these objectives were not really new, and no new mechanisms or resources were provided to assist the agencies in achieving them (Beachboard, 1996).

Reconciling PRA and the Brooks Act

"Congress never reconciled the differences between the PRA and the Brooks Act" (Holden, 1996). The main objective of the PRA was centered around agency

management of their own information resources to provide efficient and effective information services with regard to stewardship of federal government resources. The Brooks Act objective was for agencies to acquire IT through the most cost effective and efficient means. Holden points out that "cost effective and efficient acquisitions do not necessarily generate information technologies that allow agencies to produce efficient and effective information-based services" (Ibid). While the intent of these policies shared the interest of federal IRM, it appears that differing interpretations caused consternation, leading to the development of the Clinger-Cohen Act of 1996, ultimately repealing the Brooks Act.

Government Performance and Results Act (GPRA) (P.L. 103.62)

In 1993 Congress passed, and the President signed into law, the GPRA. The broad intent of the legislation was to enhance the effectiveness, efficiency, and accountability of government programs by directing federal agencies to more singularly focus their management efforts on the results that are achieved, and away from such traditional concerns such as staffing and activity levels. Under GPRA, agencies must set goals, measure performance, and report on their accomplishments.

Under the GPRA, agencies develop five-year plans that include mission statements, agency goals and associated program performance plans, "to establish objective, quantifiable, and measurable…performance objectives...unless authorized to be in an alternative form…" (P.L. 103-62, Section 115(a)(3)). This comprehensive initiative "impacts IRM and IT management in that they establish the strategic planning processes with which to align IT planning, and the objective agency-performance measures to evaluate IT contributions" (Bertot, et al, 1996).

Recently President George W. Bush cited the GPRA in "The Presidents Management Agenda", August 2001, which provides the President's strategy for improving the management and performance of the federal government;

> In 1993, Congress enacted the Government Performance and Results Act (GPRA) to get the federal government to focus federal programs on performance. After eight years of experience, progress toward the use of performance information for program management has been discouraging. According to a General Accounting Office (GAO) survey of federal managers, agencies may, in fact, be losing ground in their efforts to building organizational cultures that support a focus on results (The President's Management Agenda, 2001).

The assumption is that new information technologies should be a great advantage in bringing about successful program performance, however, President Bush alludes to the possibility that results are not being properly associated to performance in federal IT management.

OMB Circular A-130

In 1985, OMB issued the first extensive policy for federal IRM in Circular A-130: *The Management of Federal Information Resources*, incorporated PRA '80, other federal guidance and government/industry best practices (Office of Management and Budget, 1996). For more than a decade PRA '80 and OMB A-130 remained the federal government's primary IRM guidance. Together they created the government's version of the term and scope for IRM, the position of an agency Senior Official for IRM, and evolved these concepts through two major revisions of the PRA (in 1986 and in 1995) and two revisions of OMB A-130 (1996 and 2000) (Holden, et al, 1996). The 1995 reauthorization of the PRA introduced a dramatic new approach to federal IT oversight by creating a Senior IRM Official in each federal agency, reinforcing the IRM/TQM principles of OMB A-130 (Holden, et al, 1996).

OMB Circular A-130 was revised in mid-1996 to align with PRA'95, but was issued before the mandates of the newly-passed CCA could be incorporated. Recently, OMB Circular A-130 was revised with Transmittal Memorandum No. 4, on November 30, 2000. The mandates of the CCA were incorporated. Memorandum No. 4 establishes a comprehensive approach for executive agencies to improve the acquisition and management of their information resources by,

> 1) focusing information resource planning to support federal agency strategic missions;
>
> 2) implementing a capital planning and investment control process that links to budget formulation and execution; and
>
> 3) rethinking and restructuring the way the federal government does their work before investing in information systems. The PRA establishes a broad mandate for agencies to perform their information resources management activities in an efficient, effective, and economical manner (OMB Circular A-130 (5), 2000).

To assist agencies in an integrated approach to information resources management, the PRA requires that the Director of OMB develop and implement uniform and consistent information resources management policies.

Clinger-Cohen Act of 1996

Congress was not convinced that GPRA and PRA '95 would result in a correction of identified federal IT problems (Holden, et al, 1996). They therefore passed the CCA less than a year after PRA'95 in order to create a synergy of IT acquisition reform and program performance reviews, and to consolidate IT oversight under CIOs (Bertot, et al, 1996). The CCA also modified the Computer Security Act of 1987 and the National Institute of Standards and Technology Act, and eliminated the Federal IRM Regulations(FIRMR), which were absorbed into the Federal Acquisition Regulations

(FAR) (Bertot, et al, 1996). In so doing, the CCA in early 1996 replaced PRA'95 as the predominant piece of legislation dealing with federal IRM policy (Ibid.).

The Clinger-Cohen Act created the statutory position of Chief Information Officer in major federal government agencies. It requires the Office of Management and Budget (OMB), the agencies, and the Chief Information Officers to improve information technology practices. It requires mission and program driven strategic planning for information technology. It requires senior user management guidance to ensure information technology activities align with agency plans and operations. It requires regular assessments of information technology skills inventory, skills requirements, and skills development programs. In short, the Clinger-Cohen Act requires the development of an effective and efficient, mission-oriented, user-oriented, results-oriented information technology practice in each and every federal agency.

The purpose of the Clinger-Cohen Act is to ensure that the federal investment in information technology is made and used wisely. The law was designed to increase competition, eliminate burdensome regulations, and help the Government benefit from efficient private sector techniques (Johnson, 1997).

Section 5125 of the CCA obligates each executive agency to appoint a CIO and establish a process to acquire and manage IT investments. This section also had the effect of amending the Paperwork Reduction Act (codified as Chapter 35 of Title 44 of the US Code) by specifically designating the agency CIO as the officer responsible for information resources management.

The CCA applies to all federal executive agencies and all IT system domains. It applies to and combines automated information systems (AIS), command, control (C2),

communications (C3), computer (C4), and intelligence (C4I) systems and embedded systems. The Office of the Secretary of Defense (OSD) explains that, "Recent guidance from OMB places added emphasis on managing investments, to include weapons systems" (OMB Memorandum, 1997).

Executive Order 13011

To implement PRA '95 and the CCA, President Clinton issued Executive Order (EO) 13011, Federal Information Technology (July 16,1996). This order established a government-wide, Federal CIO council to serve as a forum to share ideas and make government-wide recommendations. The order also established the Government Information Technology Services Board to confirm that National Performance Review (NPR) recommendations are carried out. Concerns over National Information Infrastructure security issues resulted in a revision of OMB Circular A-130. FAR Section 39.001, Acquisition of Information Resources, has been rewritten to reflect the CCA procurement policies.

Section 3 of Executive Order 13011 created the Federal Chief Information Officers Council (CIOC). Essentially, the Federal CIOC is responsible to act as the "principal interagency forum to improve agency practices on such matters as the design, modernization, use, sharing, and performance of agency information resources" (EO 13011, 1996). Essentially, the Federal CIOC has been entrusted to;

1) Develop recommendations for federal information technology management policy, procedures, and standards;

2) Share experiences, ideas, and promising practices, including work process redesign and the development of performance measures, to improve the management of information resources;

3) Identify opportunities and recommendations for sponsoring cooperation in using information resources;

4) Review and address the hiring, training, classification, and professional development needs of the federal government personnel with respect to IRM;

5) Make recommendations and provide advice to appropriate executive agencies.

6) Seek the views of the Chief Financial Officers Council, Government Information Technology Services Board, Information Technology Resources Board, Federal Procurement Council, industry, academia, and State and local governments on matters of concern to the Council as appropriate. (EO 13011, Section 3)

Currently, the council membership is comprised of the Chair of the CIO Council, the Deputy Director for Management for the OMB, the Vice Chair, elected by the membership of the CIO Council, and represented by at least 28 federal executive agency CIO offices. Membership also includes associates of other federal, state, and private sector IM professionals. Recently, the CIO Council included participation from state government and private sector representatives. The Council recognized that by including the experience of other organization CIOs they could capitalize on synergistic and cooperative teaming effects that make CIO initiatives successful (Feeny, D, 1997).

The Federal CIO Council was established to more effectively contend with federal government IT management issues (Feeny, 1997). This E.O. 13011 directs a coordinated approach to IT management that builds on existing IRM structures of successful practices observed in the private sector as well as in federal and state government agencies. Since its creation, the council has drafted guidance on several issues of great concern for federal IT management including topics such as IT capital planning, identifying critical skills required by CIOs, enterprise interoperability, and standarding measures of costs and benefits (Federal CIO Council, 1998a, 1998b, 1999a, 1999b).

Significance of the CCA

As stated earlier, the CCA is the predominant piece of legislation dealing with federal IRM policy (Bertot, et al, 1996). The CCA defines the role of the CIO, designates the CIO as the senior (IT) official in each agency, and asserts the general responsibilities for the position. The CCA also specifies duties and qualifications for CIOs. Creation of the CIO positions for organizations gives an executive-level focus and accountability for IT and management issues within agencies that are meant to guide a greater level of accountability for delivering effective technology systems and services (GAO, 2000c).

PRA '95 created chief IRM executives in federal government agencies and was enacted for the purpose of improving the management of information resources within the executive branch of government (PRA, 1995). The changes in the CCA reflect the experiences of PRA legislation and events both internal and external to the government.

The legislative history of the CCA implies there were at least three major areas of concern; 1) serious deficiencies in major federal information technology acquisitions, and 2) the need to reengineer capital planning and performance measurement, and 3) notable successes of the private sector CIOs position. This section addresses these areas, as well as others that are of interest to the researcher.

IT Acquisition Changes

By focusing on IT acquisition and management of large development projects, the CCA implies that large system development problems in the federal government could be avoided (Beachboard, 1996). Similar situations may occur in the private sector, but differences in the public/private sector acquisition goals and processes may reduce the severity and occurrence. Better alignment of authority and responsibility is a classic

management approach for large, complex challenges, both within and outside of the IT community (Cohen, 1994).

Aligning the authority and responsibility for large system development projects is clearly one of the tenets of the private sector's movement to CIO designations (Cohen, 1994). The clear goal is to make the CIO part of the agency head's governing body. By accomplishing this, the federal government might be able to take advantage of the benefits and successes learned by the private sector and other organizations.

Business Processes, Capital Planning, and Performance Measurement

The CCA recognizes the need for agencies to reassess business processes and focus on capital planning and performance-based measurement. This legislation explicitly requires an analysis of organizational missions, benchmarking, and a performance assessment of business processes. Based on this observation, mission-related and administrative processes are redesigned prior to investing significantly in information technology (IT) to support those missions. Simply stated, the CCA mandates that agencies must maximize the potential of technology to improve performance rather than simply automating inefficient processes.

The CCA requires federal agencies to integrate IT investment plans and performance measures into the budget process. CCA Section 5123, *Performance and Results Based Management*, can be found in Appendix A. Highlights of the requirements include; 1) establishing a process to select, manage and evaluate the results of IT investments, 2) submitting annual reports on progress in achieving goals with budget submission, 3) linking IT performance measures to agency programs, and 4) revising mission-related processes before making significant IT investments.

Basis for Federal Agency CIOs

The new IT management provisions in the CCA offer the potential to improve how government agencies decide to spend money on IT initiatives (Beachboard, 1996). Built on practices which are common to leading public and private organizations, the CCA assists in focusing senior management attention on selecting well designed projects with sound business justifications while mitigating risks as IT investments proceed through development, and evaluating actual performance improvement results attributable to the investments (Beachboard, 1996). A common understanding of the legislation's objectives, the means by which agencies can achieve these objectives, and effective execution by senior agency managers are critical to future success of the CCA (Cohen, 1994). Today's CIOs are seen as business executives with responsibilities for harnessing the potential of IT in the interest of their organizations' business (Schafer, 2001; Scalet, 2000; Periasamy and Seow, 1998; Korn/Ferry, 1998). CIOs have found it necessary to address key management factors such as maintaining a holistic business perspective when managing IT, being knowledgeable in relevant non-IT disciplines, managing people effectively, building relationships within and without the organization and facilitating communication at all levels (Periasamy and Seow, 1998).

The typical CIO in the private sector is thought of as providing significant competitive advantage in business performance, clearly traceable to the IT strategy created, sold internally, and then delivered (Ulrich, 2001). The CIO is best suited to lead the enterprise into this new era; more than other top-level executives, he understands IT and how it enables business strategy (Ibid.). With appropriate and applicable performance measures in the federal government, such CIO achievements are possible,

but will depend on the skills and abilities of the CIO and the organization to assess risk, accept it, and then to achieve the desired results.

Private and Public Sector Differences

Differences between private and public organizations are at the core of public administration theory and have been the topic of an ongoing stream of research. Some public administration researchers have argued that a dichotomy such as public and private is a harmful oversimplification (Boseman, 1987, Emmert & Crow, 1988). However, the sector differences presented have been substantiated empirically. Differences have been found, for example, in personnel management, decision-making, and information systems (Bretschneider, 1990).

Sector differences have been linked to environmental factors, organization-environment transactions, and internal structures and processes (Rainey, Backoff, and Levine, 1976). The public sector has less interaction with economic markets, and this leads to behaviors that do not conform to the incentives and punishments associated with market controls. There are more constraints on procedures, a greater tendency toward formal specifications and controls, more external sources of formal influence, and a greater need for support from constituencies. Many of the activities are mandatory, have a broad impact, are closely scrutinized, and must satisfy unique public expectations. Public sector organizations may have multiple, and oftentimes conflicting objectives; less autonomy and control over decision-making and personnel; greater cautiousness; more turnover of top leaders; more difficulty in devising incentives; and personnel with greater

variations in personality traits and needs (Bozeman & Bretschneider, 1986; Rainy, 1983; Rainey et al., 1976).

The position of the CIO has been explored from many perspectives. The decision to establish a CIO in each agency is an attempt to better link IT to agency programs, while providing a foundation for cross-agency initiatives (Hernon, 1996). While determining if a CIO position was right for any organization, Hernon observed that research and analysis should be integral to information policy formulation and review. Policy makers, "risk confusion, misunderstanding, error, and redoing work if they do not better unite the study of government information policy with practice (Hernon, 1996). Linking private sector CIO activity and public sector adoption of those ideas is revealed in a March 2000 GAO report:

> The Clinger-Cohen Act required major departments and agencies to appoint CIOs and implement IT management reforms largely grounded in successful commercial IT management practices. This mirrors the evolution of the CIO position in industry where it has largely moved from solely a technical support focus to a much more executive and strategic level position (GAO, 2000d).

CIOs are common in many private and public sector organizations, although the position itself is not the solution to IT problems (Beachboard, 1996). The important thing is the influence that CIOs might bring to bear on strategic management issues by ensuring that IT helps resolve existing performance problems, and identifying opportunities in which IT and improved information management can enable redesigned work processes and service delivery methods (Beachboard, 1996, Korn/Ferry, 1998). As time progresses and organizations, both public and private, put into practice the managing methods of a CIO, they have the potential to benefit from the experience.

CIO Roles and Responsibilities

Over the past decade, a considerable amount of attention has been given to defining the priorities, roles, and responsibilities of the CIO. The CCA and EO 13011 imply the performance of private sector CIOs could prove beneficial to the federal government. The range of CIO roles and responsibilities extend to technical and managerial realms (Periasamy and Seow, 1998).

According to the CCA, PRA '95, and OMB Circular A-130, a CIO must focus on the following IRM policy issues;

1) Identifying the role of technology in strategic plans,

2) Documenting an integrated business and technology architecture,

3) Determining approaches to IT security,

4) Creating measures to balance release of information with demands for privacy,

5) Setting IT project cost, schedule, and performance goals,

6) Establishing and overseeing a capital investment portfolio,

7) Setting recruitment/training goals in new technology areas.

As this list shows, the CIO must address many major policy areas. The timing, interrelationships, and execution of this body of agency IRM policy should be understood in order to better view the requirements placed upon the CIO and their functions (Beachboard, 1996). Specifics of Federal CIO roles and responsibilities are included as Appendix B. Additionally, the AF-CIO office recently updated their roles and responsibilities list. For reference, the roles are listed below in Table 2. The descriptions of these roles can be found at Appendix C.

Table 2: MAJCOM CIOs and HAF Functional CIO Representatives Roles and Responsibilities, 2 Jan 2002

1	Capital Planning and Investment Control
2	Information Technology Acquisition
3	Performance Measures:
4	Information Assurance
5	Standards & Architecture
6	Strategic Planning
7	Training and Education
8	Information and Knowledge Management
9	Process Improvement
10	Technology Assessment
11	E-Government/E-Business

The role of the CIO is to be accountable for planning and managing all of an agency's information management resources to support the responsibilities of business managers. In this context, the role of the CIO is to provide executive-level support for the agency's strategic business planning, financial planning and business process reform. From the literature, it appears there is a common thread of CIO skills and qualities in private sector organizations where the CIO role has made a positive impact (Applegate, 1992; Yang. 1996; Feeny, 1997; GAO, 2000d; GAO, 2001). The list is fairly extensive so, as mentioned in the intro to this section, the list is limited to the top 15, in no particular order;

1) As relationship developer, both up and down the chain of authority.
2) As role model.
3) As personnel developer and staff evaluator.
4) As global thinker, big picture orientation, long-range strategic visionary.
5) As principled organizational leader.
6) As technologist and standards enforcer / initiator.
7) As program manager.
8) As goal setter and expectations articulator.
9) As financial expert.

10) As demand chain expert.
11) As change agent.
12) As reengineer.
13) As researcher.
14) As culture-carrier, culture-champion, culture-maker.
15) As e-business initiator / controller a "technology-opportunist".

The specific roles, responsibilities, and authorities assigned to CIOs positions vary reflecting the needs and priorities of the organization (Swanson, 2000). This is consistent with reports presented in several articles reporting their experiences with IT management and the CIO roles (Swanson, 2000; Trimble 2000; Rockhart, 1996; Grover,1993). The evidence suggests there is no one right way to establish a CIO position and that leading organizations are careful to ensure that information management leadership positions are appropriately scoped, defined, filled, and implemented to meet their unique business needs.

Federal Government CIO Certification

Since 1997, the AF-CIO office has been experiencing the growing pains of creating and integrating a new Executive Level position into the hierarchy (Trimble, 1999, 2000). This is a possible paradigm shift as an AF-CIO is now responsible to treat the utilizing and teaching of information and information technology as a resource and mission enhancer/enabler. The federal government has taken steps to certify its CIOs.

The Information Resource Management College (IRMC), located at Fort McNair in Washington, D.C., supports a CIO Certificate Program, sponsored by the DoD CIO (ASD 3I). The IRMC has been designated as the Department's flagship for information technology management training for senior managers. In addition to the two primary programs offered, the Advanced Management Program and the DoD CIO Certificate

Program, the IRMC has established the Information Security/Assurance Certificate Program. This new program has been certified by the National Security Telecommunications and Information Systems Security (NSTISS) Committee as being compliant with the Information Systems Security Professionals standard (NSTISSI No. 4011). The IRM College is one of only four schools nationally that has been certified as meeting the specified NSTISSI training criteria (Annual Defense Report, 2001).

The program responds to the requirements set forth in the CCA and supports an official certification to recognize individuals receiving advanced education in the Federal CIO Core Competencies. The CIO Certificate Program is organized around twelve subject areas directly related to Federal CIO Core Competencies identified by the Federal CIOC. Table 3 below contains the competencies from the Federal CIO Council Core Competencies (2000). Appendix E contains the complete list and explanations of each of the Federal CIO Council Core Competencies (2000).

Table 3: Federal CIO Core Competencies (2000)

1	Policy and Organizational
2	Leadership/Managerial
3	Process/Change Management
4	Information Resources Strategy and Planning
5	IT Performance Assessment: Models and Methods
6	Project/Program Management
7	Capital Planning and Investment Assessment
8	Acquisition
9	E-Government/Electronic Business/Electronic Commerce
10	IT security/information assurance
11	Technical
12	Desk Top Technology Tools

CIO Challenges

For the past six years, the Association for Federal Information Resources Management (AFFIRM) Emerging Issues Forum has conducted annual surveys of the senior federal information technology community to determine the most critical challenges facing CIOs. The following tables (4 and 5) represent the results taken from the "The Federal CIO - Sixth Annual CIO Challenges Survey (December 2001)". These AFFIRM surveys explore how the top challenges facing Federal CIOs today, as viewed by senior federal government IRM officials and staff, might have changed from year-to-year as well as changes in the priority of the top ten critical technologies. Approximately 300 electronic surveys were distributed to senior information technology officials and managers at federal departments and agencies. Each of these two tables show a comparison between 2001 responses and the prior five years. In a few cases, specific challenge statements and technologies have been added or altered to reflect current realities (AFFIRM 2001).

Table 4: CIO Challenges - 2001 Survey Responses and Prior Year Comparisons

2001 Votes	2001 Ranking	DESCRIPTION	2000 Ranking	1999 Ranking	1998 Ranking	1997 Ranking	1996 Ranking
29	1	Using IT to improve service to customers/stakeholders/citizens	8	5	6	7	11
28	2	Making the business and cultural changes necessary for full e-Government transformation	--	--	--	--	--
27	3	Hiring and retaining skilled professionals	1	1	13	--	--
26	4	Obtaining adequate funding for IT programs and projects	4	5	--	--	--
25	5	Preventing unauthorized system intrusions (hackers, terrorists, etc.)	3	2	--	--	--
24	6	Formulating or implementing an agency IT architecture	6	7	3	1	3
23	7	Building effective relationships in support of IT initiatives with agency senior executives (agency head, CFO, etc.)	7	15	9	12	6
19	8	Capturing, organizing and making accessible Agency knowledge and expertise (knowledge management)	8	10	10	--	--
18	9	Simplifying business processes to maximize the benefit of technology (see note)	10	13	10	9	5
17	10	Unifying "islands of automation" within lines of business	--	--	--	--	--
16	11	Aligning IT and organizational mission goals	12	11	5	5	4
15	12	Implementing e-business/e-government solutions	2	3	--	--	--
15	13	Providing effective IT infrastructure and related services (not including the desktop)	11	9	10	6	9
14	14	Implementing IT capital planning and investment management across the agency	5	5	4	2	1
12	15	Assessing and developing agency IT competence (training and education)	9	8	9	11	12
12	16	Implementing solutions in support of Government Elimination Act (GPEA)	--	--	--	--	--
10	17	Measuring and reporting past performance	15	12	--	--	--
9	18	Ensuring public access to information vs. the need for system security	13	9	8	--	--
9	19	Controlling IT budgets	17	11	7	13	13
8	20	Managing or replacing legacy systems	11	12	9	12	15
8	21	Developing agency-wide IT accountability	18	12	13	8	14
3	22	Identifying and reporting specific CIO/IRM measures/outcomes under the Government Performance and Results Act	16	6	6	--	--
3	23	Implementing COTS solutions (ERP, CRM, etc.)	19	15	--	--	--
3	24	Planning and implementing IT disability access solutions into existing and new IT systems	20	--	--	--	--
3	25	Responding to outsourcing (A76) requirements	--	--	--	--	--
		Note: replaced "championing BPR as a precursor to IT decisions" from prior surveys					

Table 5: CIO Critical Technologies – 2001 Survey Responses and Prior Year Comparisons

2001 Votes	2001 Ranking	DESCRIPTION	2000 Ranking	1999 Ranking	1998 Ranking	1997 Ranking	1996 Ranking
55	1	Security Infrastructure	1	14	1	2	2
34	2	Internet / Intranet / Web infrastructure	2	1	2	1	1
24	3	Knowledge management	3	5	3	--	--
23	4	E-Mail	14	11	13	8	10
21	5	Internet/ Intranet/ Web applications	2	1	2	1	1
20	6	Remote and mobile computing including personal digital assistants	5	4	9	*	*
19	7	Data warehousing/data mining	6	2	4	3	4
15	8	Security Applications	1	14	1	2	2
14	9	Virtual Private Networks	--	--	--	--	--
12	10	Wireless technology	--	--	--	--	--
11	11	Records management	--	--	--	--	--
11	12	Executive information and decision support systems	10	6	15	10	7
10	13	Data, voice and video convergence (was voice and data integration)	4	10	12	12	12
10	14	Storage and storage networks	--	--	--	--	--
9	15	Video solutions (distance learning, virtual office, desktop)	13	7	--	--	--
8	16	Workflow	7	5	10	6	6
8	17	Portal technologies	--	--	--	--	--
7	18	Training technology and applications					
7	19	COTS applications including ERP, CRM and SCM (was COTS development S/W)	14	11	11	8	1
6	20	Middleware	16	9	14	11	13
5	21	Online analytical processing (OLAP)	19	13	14	10	14
4	22	EC/EDI	8	3	5	5	3
4	23	IT accommodation – disability access solutions	11	12	--	--	--
3	24	Relational databases	16	11	14	9	8
2	25	Next generation Internet	9	11	8	--	--
2	26	Voice integration	21	--	--	--	--
2	27	Groupware	21	11	8	9	8
1	28	Application Service Provider (ASP)	12	--	--	--	--
1	29	Imaging	18	10	12	7	9
0	30	LINUX	19	14	--	--	--

Private Sector CIOs

The purpose of this section is to highlight the many challenges, roles, and responsibilities of the position of CIO. As stated earlier, one of the main reasons cited in

the Clinger-Cohen Act for creating the CIO position was the notable successes of the private sector CIOs position.

A review of the literature regarding private sector CIO roles and responsibilities suggest that CIO roles are extensive and continue to evolve; this implies CIO roles are not cookie-cutter positions where a "one size fits all" philosophy works, and is supported by research (Raghunathan, et al 1989; Applegate et al, 1992; Feeny et al, 1992; Grover et al, 1993;; Earl et al, 1994; Periasamy, 1998; Swanson, 2000) . Four years ago, CIOs said the most pressing concern they faced was completing information technology application projects on time and within budget. Priorities have shifted and CIOs in 2000 say their biggest concern is improving security. John J. Davis & Associates in New York surveyed 288 CIOs to determine the most important challenges for IT departments (Computerworld, 2000). The results of their study are summarized in Table 6 below.

Table 6: Summary of Challenges

Legend for Chart:
A - Role
B - 2000
C - 1997

A	B	C
Improve security and integrity of systems/databases	92%	59%
Complete IT application projects on time and on budget	88%	82%
Expand communication bandwidth	71%	66%
Set systems standards throughout the organization	71%	74%
Increase and justify IT investments	50%	65%
Replace aging or incompatible platforms	42%	68%

(Computerworld, 2000)

In early 2000, Infoworld magazine conducted a survey of 77 CIOs in the US, Europe, and Australia to find out how CIOs view their jobs. The results are in Table 7.

Table 7: CIO Duties

Percent of CIOs who said their jobs include these duties:

A	B
Technology policy-maker	94.8%
Functional leader	81.4%
Systems strategist	68.5%
Service deliverer	67.6%
Change leader	64.5%

(Infoworld, 2000)

The survey results from practitioner-oriented periodicals appear to support academic research findings that CIO duties in the private sector continue to evolve and change as the IRM areas of focus change. Federal government leadership has recognized the research findings of the challenges and successes experienced by private sector CIOs.

IT Investment, Performance, and Productivity

Extensive research has been conducted in the effort to reach a globally accepted method in which to assess IT investment costs to organizational productivity payoffs and performance increases (Cline and Guynes, 2001; Keung, et al, 2001; Bharadwaj, 2000; Brynjolfsson and Hitt, 2000; Tallon, et al, 2000; Sircar, et al, 2000; Brynjolfsson and Yang, 1999; GAO, 1997b). However, in public practice, performance measures are required by law to be an integral part of any federal IT program.

> Use Capital Planning to Improve Performance: Agencies invest more than $40 billion in IT to support some 26,000 information systems. Technology now affects virtually every aspect of the way the Government operates, and IT investments are extremely important to the success of e-gov transforming the delivery of information and services. Agencies will use capital planning and investment control to promote security and privacy in the use of technology and guide the results of this investment, and ultimately for ensuring results from other capital assets as well. The Government can thus achieve outcomes from IT investments that match agency strategic priorities and provide real benefits for the American people (OMB, 2000).

"The need to achieve high returns on information technology (IT) investments and reduce systems development risks has never been greater, given the public's demand for a government that works better and costs less" (GAO, 1995: 2). Effectively managing information and information resources in today's dynamic high-tech environment has been a formidable challenge for the federal government. As the rapid advancement of information technology has progressed through time it has revolutionized the way

businesses and governments accomplish goals and objectives. The fact that technology has undergone rapid cycles of innovation, causing constant change in the federal IT management, compounds the difficulty even more. Yet, explosive growth and use of information technology has quickly outpaced the processes and federal policies that serve to guide and direct its utility, "technology and its applications evolve faster than policy-makers can develop or refine policy to deal with ever-changing and ever-unfolding issues" (Hernon, 1996: 2).

Unreliable Investment Data

IT financial data are unreliable because the government does not know how much, or on what, it spends for IT (Cohen, 1994; Johnson, 1997). The IT-related obligations OMB requires agencies to report systems and services (OMB Circular A-11, 1993), totaled approximately $24.8 billion in fiscal 1998 (General Accounting Office, 1999). According to Bruce McConnell, director of OMB's information policy branch, the fiscal 1998 defense IT budget was $10.2 billion, of which OMB was "unable to capture the spending on embedded systems" (McConnell, 1997). Fiscal 1998 IT budgets for DoD, the Defense agencies, and the services are summarized in the Table 8 below (McConnell, 1997).

Table 8: 1998 Federal IT Budget

Fiscal 1998 IT Budget	
DoD	$10.2 billion
DoD Agencies	$3.4 billion
Air Force	$2.3 billion
Navy	$2.2 billion
Army	$2.3 billion

Obligations also are difficult to quantify because IT programs are funded from two sources: procurement accounts and operations and maintenance accounts. This information is neither comprehensive nor collected uniformly government-wide or agencywide (Johnson, 1997). In addition, Johnson observed that agencies often do not separate IT obligations from total program dollars, or IT obligations are lost when lumped into administrative accounts (Johnson, 1997).

For instance, the legislative and judicial branches do not have to report their IT spending. The reporting of IT obligations under $50 million was not required for embedded weapons systems or in federally funded research centers. DoD alone estimates it spends between $24 billion and $32 billion annually on embedded weapons system software that is also not reported (GAO, 1997a). If they were known, these unaccounted-for dollars could greatly alter the government's IT investment portfolio (Johnson, 1997).

Unknown Return on Investment

Return on investment (ROI) is troublesome as well. Agencies did not usually quantify accrued IT investment benefits. ROI is often calculated as system outputs or activities rather than in improved mission performance or program results (for example, 33 percent more taxpayers were served better, faster, more conveniently, or situational awareness and accuracy increased 50 percent)(Johnson, 1997).

This lack of quantitative and qualitative understanding about IT investment led to unsound management decisions (Cohen 1994). Poorly managed IT investments with inadequately assessed risks, cost, and benefits can have costly consequences (Cohen, 1994)—and even impede performance. Conversely, as mentioned above, well-managed,

carefully selected IT resources that focus on mission needs can substantially improve organizational performance while reducing cost.

Performance Measures

The CCA requires agencies to develop and employ decision criteria for evaluating, comparing, and prioritizing IT investments. While this may not be new for some government processes outside of IT, Congress has mandated it specifically for this purpose. This perspective is approached much the same way a competitive, profit-making organization would; or, as Periasamy believed, "…the role of the CIO is moving away from the more conventional technical and managerial position to a business and leadership one" (Periasamy and Seow, 1998). The new business-like perspectives have included concepts such as return on investment, economic analyses, alignment with mission or business goals, program specific measurements, business plan, business case analysis and justification, technical risks, and degree of process redesign and improvement support.

State Government CIOs

The researcher recognizes the significance of state government CIO roles being relevant to this research as they contribute to the establishment of the CIO position and to and IRM. While state government CIOs were not researched to lend specific support to the federal CIO role, the duties they perform and the responsibilities they bear are similar to that of federal government CIOs. State CIOs have established a single organization that focuses on and represents the 50 states' IT primary interests and supports CIOs endeavors to achieve success at the state level.

The National Association of State Chief Information Officers (NASCIO) represents state CIOs and information resource executives and managers from the 50 states, six U. S. territories, and the District of Columbia. State members are senior officials from any of the three branches of state government who have executive-level and statewide responsibility for information resource management (NASCIO, 2001). The mission of the association is to shape national IT policy through collaborative partnerships, information sharing and knowledge transfer across jurisdictional and functional boundaries. NASCIO is also represented at the Federal CIO Council. The following table is a representative list of overarching focus areas that NASIRE is currently promoting for the 50 states (NASCIO, 2001):

Table 9 NASCIO Focus Areas (2001)

NASCIO Focus Areas (2001)
Accessibility
Communications Infrastructure
Digital Government
Information Architecture
Innovative Use of Technology
IT Professional Retention & Recruitment
Public/Private Partnership
Service Application
State Planning & Management Initiatives

As governors and legislatures seek centralized management of technology projects, budget, and strategic planning, the role of the chief information officer (CIO) has become an increasingly common position in state governments. While seeking to build a consensus among elected officials and heads of programmatic agencies, CIOs here are outlining a vision of improved customer service through IT management so that state governments can operate more efficiently, thereby benefiting the citizens of their

respective states. In a NASCIO report entitled "The Chief Information Officer" published in October 1998, NASCIO examined the scope of CIOs responsibilities, strategies, functions, and techniques related to information resource management. Of interest for this section, Table 10 below provides evidence of interest to this study.

Table 10: State Government CIO Roles and Responsibilities

1	Developing economic policy using IT
2	Managing public access to data
3	Statewide process re-engineering
4	Exercise project management responsibilities
5	Authority over contracting and purchasing functions for IT
6	General legislative advocacy for IT

On a separate but related report involving state government CIOs, the GAO prepared an Executive Guide to assist government agencies in maximizing success of CIOs (GAO, 2000). This Executive Guide centers on six key principles from the study of several leading organizations (public and private) that have been successful at implementing IM enterprises processes. The principles are listed in the following figure.

SIX KEY PRINCIPLES FOR SUCCESS

1. The ability to understand and recognize information management's role in creating value. In other words, taking steps in building business plans that incorporate information management and appreciating the overall influence that it has on strategic direction.
2. Moving to visibly define the role of the CIO. In other words, clearly spelling out the overall duties and responsibilities of the CIO and how, exactly, he or she fits into the senior management team.
3. Finding a way to guarantee CIO credibility. All directives from the CIO should be viewed as essential to the organization. CIOs must look outside of their inner circles for partnerships and peer exchanges.
4. CIOs must balance business and technical needs while demonstrating results - and successes. They must build a mechanism for regular feedback.
5. Information management must be able to adapt quickly to the ever changing environment. Structures must be flexible yet still designed to meet necessary business needs.
6. Building information management talent. Finding ways to identify, attract, train and keep IT talent.

Figure 1: GAO Six Principles for Success

In summary, the GAO has taken notice of leading organizations that have taken a proactive role in establishing information as a resource and enabler. They continue to create the technical and managerial infrastructure, strategic outlook, and leadership and business culture to make IT initiatives successful.

The Office of the AF-CIO

On March 14, 1996, the DoD Deputy Secretary designated the Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASD(C3I)) as DoD's Chief Information Officer. The Chief Information Officer of the Department of Defense (CIO, DoD) is responsible for carrying out certain provisions of the ITMRA on behalf of the Secretary of Defense (Office of the Secretary of Defense, 1997). Each

military service has been designated as an executive agency by the ITMRA and under Presidential Executive Order 13011 is required to designate its own CIO (CCA, Section 5123). By Order, the Secretary of the Air Force appointed the Assistant Secretary for Acquisition (ASAF(A)) as the Air Force CIO (Secretary of the Air Force Order 560.1, 2001). As instructed by SAF Order 560.1, The Principal Deputy Assistant Secretary for Business and Information Management (PDAS(BIM)) performed the AF-CIO responsibilities on a full time basis while the Deputy Chief of Staff for Communications and Information (AF/SC) acted as deputy AF-CIO, reporting to the AF-CIO. However, on November 26, 2001, The Secretary of the Air Force, Dr. James G. Roche, restructured the AF-CIO organization, establishing direct reporting between the Under Secretary of the Air Force and the AF-CIO. The AF-CIO is the principal adviser on information management, business processes and information technology standards. The AF-CIO and the Deputy CIO are responsible for overall implementation of information technology management policy for the USAF. The AF-CIO organizational structure is included below in Figure 2.

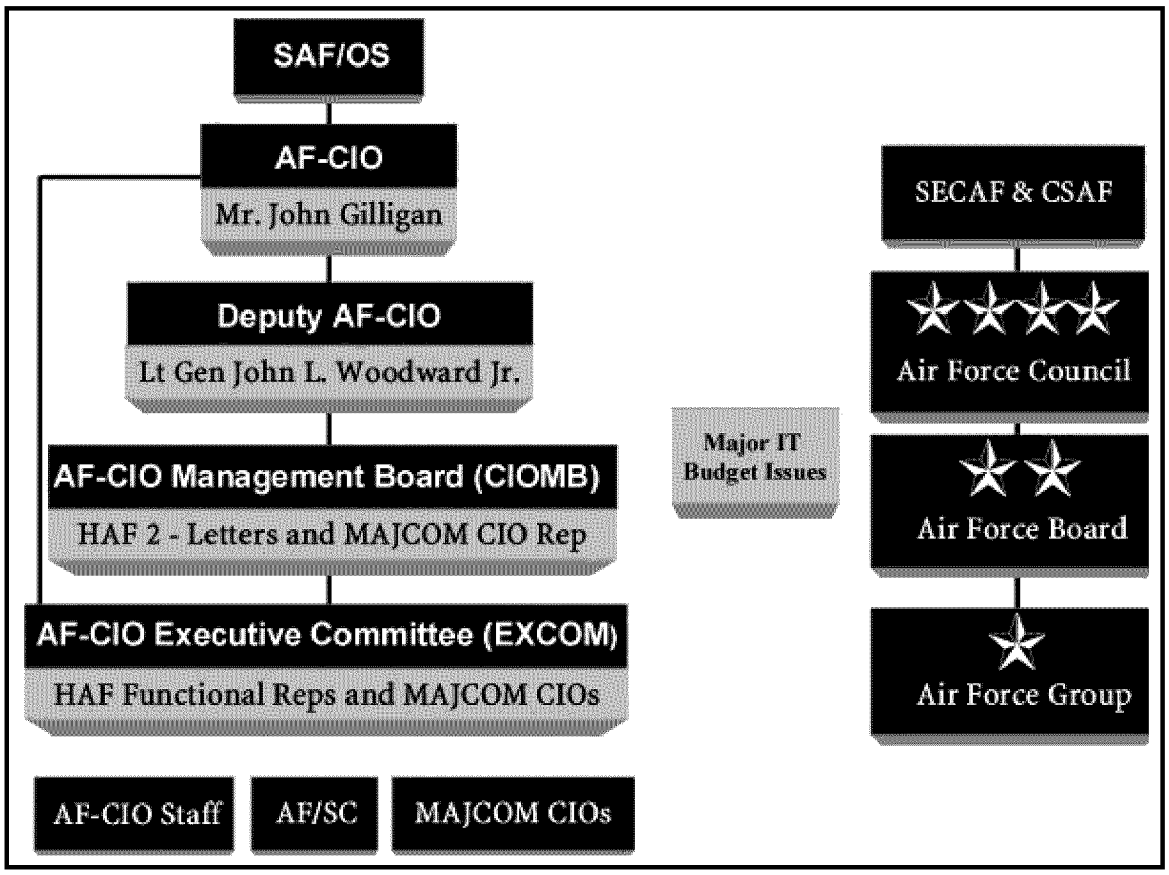


Figure 2: AF-CIO Organizational Structure (AF-CIO Webpage, 28 Nov 01)

The AF-CIO Management Board (CIOMB) is an executive forum established to improve the Air Force modernization, use, sharing, and performance of information resources and management practices through re-engineering and capital investment planning. The forum oversees matters related to development of innovative technologies, standards, and practices. The board seeks opportunities for improvement in multi-functional cooperation, common infrastructures, affinity groups for technology areas, coordination of information needs and methodologies, standards and guidelines for information management and technology. The Board advises the AF-CIO on information

technology investment issues; reviews and prioritizes CIO focus areas; and provides a forum for the CIO to carry out his role, under the CCA.

AF-CIO Mission, Vision, and Goals

A view of the AF-CIO Visions and Goals, as seen from the AF-CIO website, is provided in Figure 3 below, from the AF-CIO website, accessed 10 Nov 2001.

Air Force CIO Vision and Goals
Mission - Promote the most effective and efficient application, acquisition and management of information technology resources. **Vision** - Enhanced mission performance through seamless integrated access to the right information anywhere, anytime -- One Air Force…One Network. **Goals** - Gain the greatest benefits of information technology by facilitating business process improvement and reengineering efforts. - Base Air Force Information Technology (IT) investment decisions on sound business cases, as well as approved Air Force standards, and architectures. - Ensure the availability of accurate, trusted, and protected information to the right person anytime, anywhere. - Integrate CIO IT investment reviews and recommendations into the Air Force Planning, Programming, and Budgeting processes. - Ensure Air Force personnel possess the information technology skills to accomplish their Air Force missions.

Figure 3: AF-CIO Visions and Goals

Air Force Information Technology Management Plan

"A Government that works better and costs less requires efficient and effective information systems." (Executive Order 13011, 1996). This line not only begins EO 13011, but also begins the USAF Information Technology Management Strategic Plan (ITMSP) by previous AF CIO, Art Money. The Plan begins a process of reengineering how the Air Force delivers information to warfighters and those who support them. The Plan is also intended to guide the development of detailed plans and while not addressing

specific programs, initiatives, or budgets. This plan meets the strategic planning requirements of the Clinger-Cohen Act (CCA), Office of Management and Budget (OMB) mandates, and Office of the Secretary of Defense directives. Sections I and II give an overview and outline the national and joint influences on this planning effort. Section III describes the Air Force Chief Information Officer (CIO) organization and processes.

One highlight of the strategic plan directs USAF leadership at all levels to focus on four effectiveness characteristics that make up the core of USAF operations:

1) Make Air Force missions and business operations better,

2) Build communications and information architectures,

3) Reengineer our processes so they are models of performance and efficiency,

4) Develop and nurture strategic partnerships to achieve our vision, goals, and objectives.

These broad attributes are then mapped to CIO processes and strategies that are essential to successfully accomplishing the USAF core competency of Information Superiority. Measuring effectiveness is outlined in Objective 1.4 of the ITMSP and included in Figure 4 below.

Objective 1.4 - Measure information technology performance in mission terms:
Strategy 1.4.1 - Implement a process that measures information technology effectiveness in mission outcome terms (e.g. sorties, tonnage moved).
- Measure information technology effectiveness on a continuous, recurring basis.
- Benchmark performance against similar activities in government and business.
Strategy 1.4.2 - Develop models and analytical tools that enable the prediction of mission improvements from information technology investment.

Figure 4: AF ITMSP: Objective 1.4

The goal of these strategies clearly places effectiveness performance on the shoulders of USAF leadership. Defining and developing results-based measurements will inherently be required by personnel at the "doer" levels. In fulfilling the responsibilities of the CCA, Paper Reduction Act (PRA), and the Government Performance Results Act (GPRA), the Secretary of the Air Force established goals for improving the efficiency and effectiveness of Air Force operations. The AF-CIO advises the Secretary on improving the effectiveness of Air Force operations through the effective use of information technology.

The AF-CIO is also developing a guide for using information technology performance measures for selecting and controlling IT investments. The goal is to link IT performance measurement to the requirements and budget processes. Essentially, a five percent decrease in cost coupled with a five percent increase in efficiency is the expectation of Congress (CCA, 1996). In addition, a rewrite of the ITMSP is scheduled to be out soon, but has not been published as of the writing of this thesis study.

AF-CIO Focus Areas

The AF-CIO office has identified nine focus areas (see Table 11 below). The AF-CIO website describes the USAF Focus Areas that are listed below, with detailed descriptions found in Appendix: D.

Table 11: AF-CIO Focus Areas

1	Architecture
2	Business Process Reengineering
3	Capital Planning and Investment Control
4	Information Resource Management
5	Information Technology Acquisition
6	Performance Measures
7	Standards
8	Strategic Plan
9	Training and Education

These focus areas account for progressive action regarding the accomplishments of the AF-CIO office in implementing successful IT processes. It appears the USAF is creating a logical leadership and management infrastructure to define and delegate duties.

Assessing the AF-CIO

The Federal CIO Position Evaluation Method (FCPEM)

The FCPEM is an evaluation method developed by Scott Bernard for determining the degree to which a federal agency has complied with the intent of the CCA in creating their CIO position (Bernard, 2001a). The assumption is that if agencies are in technical compliance with the CCA, the assessment would manifest these results. It is further assumed that being in technical compliance, an agency can therefore aspire to substantial compliance and IT success (Beachboard, 1996). To support the development of this method, the CIO-related mandates in Section 5125 of the CCA were identified and interpreted as shown in Table 12 below .

The FCPEM operates by asking evaluation questions that determine whether thirteen CCA/CIO mandated roles have been established for that agency's CIO position.

Determining the degree of compliance in each area gives both a functionally specific, and in summary, an overall indication of support for the CIO provisions of the CCA. Both compliance with and variance from CCA-CIO mandates are potentially valuable information for policy studies on what the effect of this portion of the law has been. Additionally, the identification of patterns of compliance or variance within the twenty-three agencies listed in the CCA may inform discussions regarding future federal IRM law and guidance.

Table 12: The Federal CIO Position Evaluation Method

	CIO Roles, Per the CCA (Section 5125)	The Evaluation Standard for Each CIO Role	Goal for/of Agency	Complexity of the CIO Role Area	Related CIO Competency	Additional Federal Reference(s)
1	Agency establishes a CIO position/title. 5125(a)(1)(A)&(B)	Was A CIO position formally designated and established?		N/A	N/A	OMB 96-02, EO-13011, PRA'95
2	CIO designated at Executive Level-IV 5125 (e)	Is the CIO a member of the Senior Executive Service, Level IV?		N/A	N/A	Title 44 U.S. Code Section 5315
3	CIO reports directly to the agency head 5125 (a)(1)(A)&(B)	Is direct CIO-agency head reporting established in writing?		N/A	N/A	PRA'95, OMB Memo96-02
4	IRM is the CIOs principle duty. 5125(c)(1)	Does the designation document make IRM the CIO's principle duty?		N/A	N/A	OMB Memo96-02
5	CIO ensures efficient IRM processes, including reducing information collection burdens on the public 5125 a(1)(c)	Does the CIO facilitate reviews to improve IRM-related processes, including reducing the public information collection burden?				PRA '95, OMB A-130, GPEA, GAO Reports
6	CIO supports defining the agency's program information needs, strategies, systems, and capabilities. 5125 (a)(1)(c)	Is there a CIO & CFO facilitated process for identifying all agency program IT needs, strategies, systems, capabilities?				PRA '95, OMB A-130, GAO Reports
7	CIO heads a process to evaluate proposed agency collections of information. 5125 (a)(2)	Does the CIO facilitate the evaluation of information collections independent of CIO program roles?				PRA '95,
8	CIO provides advice to agency head/management to ensure IT is acquired & IRM done IAW PRA '95 and agency head priorities. 5125 (b)(1)/5122(a)	Does the CIO facilitate an IT Capital Planning process, advise agency head/mgmt, & ensure IT is acquired & IRM/ITA are done IAW PRA'95 & agency head priorities?				PRA '95, OMB A-130, OMBMemo96-02, FAR
9	CIO develops, maintains, facilitates an integrated agency IT Architecture (ITA) 5125 (b)(2)	Does the CIO facilitate an ITA that ties to Capital Planning and follows OMB A-130/OMB 97-16 format/guidance?				CIO Council's FEAF, OMB Memo97-02, OMB Memo97-16, OMB A-130
10	CIO monitors/evaluates IT program performance & advises continuation 5125 (c)(2)	Does the CIO review IT programs for <10% variance in cost, schedule, performance?				OMB A-11, OMB A-130, GPRA, PRA'95
11	CIO participates in FY agency strategic planning & performance evaluation processes. 5125 (c)(3)	Is there an agency IT Strategic Plan and is it reflected in the FY Strategic Plan and the Performance Report?				GPRA, OMB A-11
12	CIO assesses IRM skill requirements, develops strategies to rectify deficiencies, w/ plans for hiring, training, professional development 5125 (c)(3)(A),(B)&(C)	Does the agency have a CIO-facilitated IT Workforce Plan that addresses needed IRM skills, training, hiring, & professional development?				OMB A-11, OMB A-130, CIO Council
13	CIO reports annual progress in improving IRM capability to agency head. 5125 (c)(3)(D)	Does the CIO report in writing to the agency head each year on how IRM capability is improving?				OMB A-11, PRA'95

As Bernard describes, the FCPEM is not meant to be a pass/fail evaluation method. It is meant to be used to identify whether an agency is complying with the intent of the CCA relative to how the agency established its CIO position. Bernard goes on to explain that with the assortment of organizational forms, cultures, and mission orientations of the twenty-three agencies listed in the CCA, a "cookie-cutter" approach to using the FCPEM is not useful or appropriate. Bernard recommends that the researcher using the FCPEM as an analytic tool do so with the intention of documenting an agency's CIO/CCA compliance in each of the thirteen areas using techniques and information appropriate to that area. "While a 'comply/not comply' overall rating for each area may be appropriate, amplifying comments in areas of noncompliance are an intended part of using the FCPEM" (Bernard, 2001a).

The Federal CIO Position Model and The Parsons/Thompson Model of Organizations

Bernard also developed the Federal CIO Position Model, which serves to provide the conceptual relationship of the CIO position when illustrated against the Parsons/Thompson Model of Organizations (Bernard, 2001a). The Parsons/Thompson general model of organizations provides an aspect of structure by identifying the three distinct levels of responsibility and control: technical, managerial, and institutional. The CIO Position Model builds on this concept by relating the CIO's general roles and responsibilities (competencies) to the organizational level(s) at which they operate. For this research, a CIO competency area was defined as being an area of knowledge that is needed to successfully perform as a CIO (Bernard, 2001a). Together they provide a theoretical representation of the organizational context and the policy framework that

makes the relationship more understandable. The model further involves the Federal CIO Core Competencies.

The Federal CIO Council (CIOC) updated the CIO Core Competencies in September 2000. This comprehensive list is included as Appendix E of this study. The Federal CIOC has included in its CIOC Fiscal Year 2001-2002 Strategic Plan, section 4.2, to update the Federal CIO Core Competencies every two years, with the next review to take place by September 30, 2002 (CIOC Strategic Plan, 2000).

While the Federal CIO Core Competencies list is extensive, the researcher did not consider this list to be fully descriptive of the Federal CIO position because it lacked an organizational context. Without this perspective, the roles of the Federal CIO are not seen in the highly dynamic, multilevel, complex organizational environment that is described in GAO reports (GAO, 2000b; GAO 2000d) and as identified by previous researchers (Sweeny, 2000; Periasamy and Seow, 1998; Grover, 1993; Korn/Ferry, 1998) In selecting a model of organizations to be used, Bernard considered five criteria:

1. The model had to be generic enough to fit the variety of federal departments, agencies, and commissions that comprise the executive branch.

2. The model had to support interaction of an organization with its environment, consistent with the open-systems orientation of this study.

3. The model had to support the mapping (cross-linking) of CIO Core Competencies to organizational levels.

4. The model had to recognize that business processes are a part of CIO competency areas, and be able to support that concept.

5. The model had to be grounded in organizational theory to support use in scholarly research (Bernard 2001a).

Bernard's perspective of the organizational model of organizations that were developed by Parsons and later adapted by Thompson was selected because it fit these

criteria. Case study validation of the CIO Position Model by Bernard further supported this choice.

Bernard fashioned the Parsons/Thompson organizational structure dimension to his CIO Position Model in order to provide a conceptual model of how the two are related and to reveal that a basic relationship exists. This is a unique approach in CIO modeling, representing organizational theory and CIO duties or competency areas. The chief reason for placing the CIO competency areas in the context of an organizational structure is to reveal more about how and where these competency areas function in the complex federal agency organization (Bernard, 2001a).

Bernard validated that at the Technical Level of the CIO Position Model, CIO functions are related to core business processes, information protection, and maintaining/enhancing the IT infrastructure. Also rational decision-making is a key CIO activity of the Technical Level. At the Managerial Level, CIO roles involve facilitation, resource management, and the maintenance of interpersonal relationships; they are the focal point. Developing and maintaining social relationships are key activities of the CIO (Schafer, 2001). Bernard continues, the highest of the CIO Position Model's three organizational levels, the institutional level, is where environmental factors predominate. Here CIOs are engaged in both rational decision-making, as they interpret the influence of the environment on core business processes, and socially-constructed relationships with external actors.

Bernard's CIO Competencies, in Figure 5 below, was updated to reflect the changes made to the Federal CIO Core Competencies list in October of 2000 by the

Federal CIOC. When CIO competency areas are related to the organizational model's levels, relationships can be depicted as in the following figure as example relationships.

Technical Level. "*A sub-organization whose problems are focused around effective performance of the technical function... the primary exigencies are those imposed by the nature of the technical task.*"

CIO Competency: Technical/Data Management/Security/Architecture
IT Security/Information Assurance

Managerial Level. "*Services the technical sub-organization by mediating with those who use its products, and procuring the resources necessary to carry out its functions.*"

CIO Competency: Leadership/Managerial
Project/Program Management
IT Performance Assessment: Models & Methods
Capital Planning and Investment Assessment
Acquisition

Institutional Level. "*A wider social system which is the source of the meaning, legitimization, or higher-level support which makes the implementation of the organization's goals possible.*" *(Thompson , 1967)*

CIO Competency: Policy
Process Change Management
Information Resources Strategy & Planning
E-Government

Figure 5: (Revised) Relating CIO Competencies to Organizational Levels (Bernard, 2001)

This relationship model might be sufficient to reflect the CIO position except that it must be considered that CIO competency areas may extend to and operate in more than one organizational level. Figure 6 below provides a theoretical updated version from Bernard's CIO Position Model that incorporates the current version CIO Competency List (September 2000) and the Parsons/Thompson tri-level organizational view, informed by key actor feedback from Bernard's research. The model has been updated with the competencies of E-Government and IT Security, which will be included in this study. It is intended to be descriptive and to produce a visually intuitive depiction of the CIO

position that indicates that the 12 roles of a Federal CIO operate across different levels of a generic agency organization.

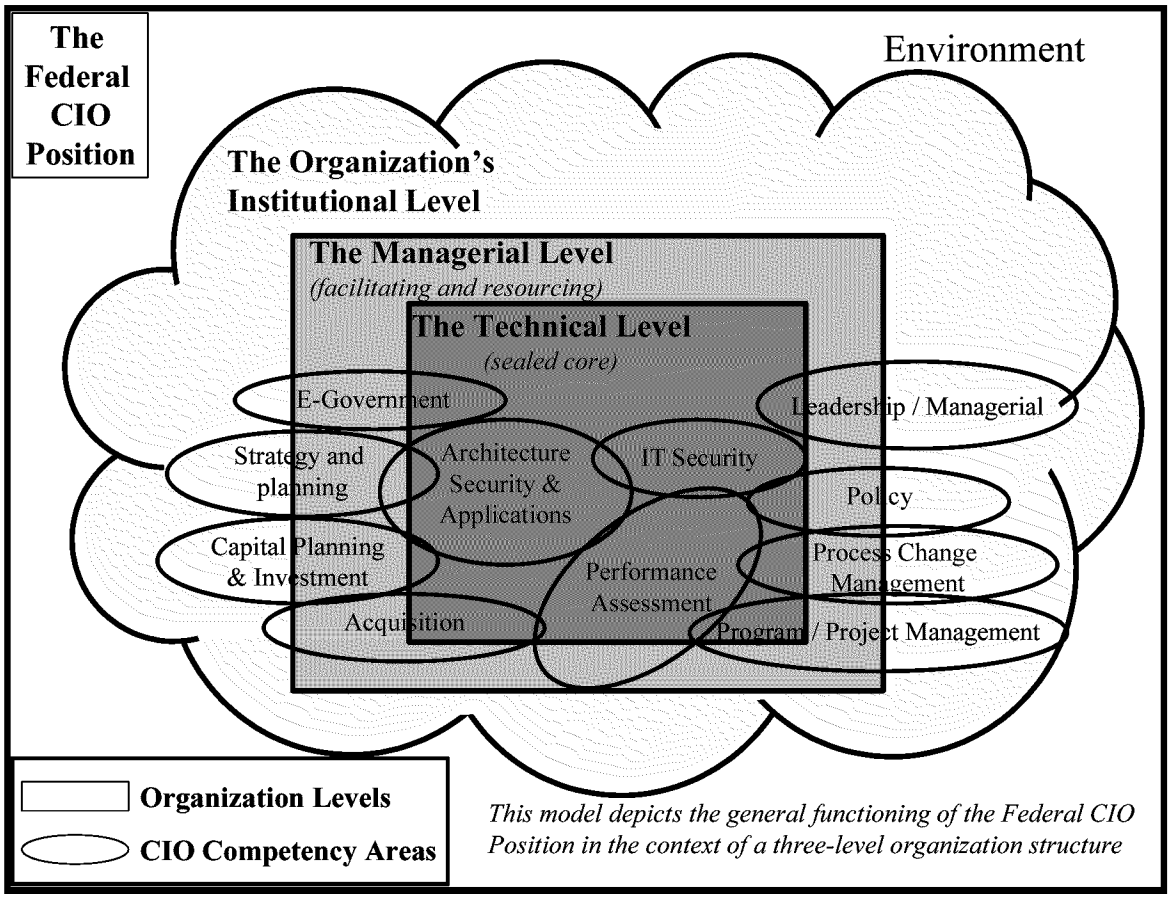


Figure 6: Federal CIO Position Model (Bernard, 2001)

Some of the CIO's roles relate primarily to key business processes that are protected in the core, others range out across all three levels, penetrating the core and also extending out into the institutional environment where they may interact with external entities (Bernard, 2001a). Bernard explains some CIO roles are mostly facilitation-oriented and therefore exist mainly in the middle management layer. The implications of the role/level relationships and interactions between CIO roles shown in the CIO Position

Model are not explored further in this research, but are discussed further with respect to areas for future research, in Chapter 5. With this CIO Position Model, one can now visualize the multitude of IT-related activities that a CIO must attend to. An understanding of how CIO competency areas work across multiple levels of the organization also creates a more realistic functional context for viewing the specific mandates of the CCA for Federal CIO oversight and process facilitation roles. With these tools, the researcher can now proceed to use the FCPEM method to evaluate CIO positions on a more informed basis.

Process, Outputs, and Outcomes

This research is also concerned with exploring and elucidating the outcomes of the CCA of 1996 on the AF-CIO office, and ultimately on the USAF. This section is provided in order to present the processes and structure for contemplating the issues describing the outcomes or impacts on the USAF.

Process

A business process is defined by Hammer and Champy as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer" (Hammer and Champy, 2001). In their research into Business Process Reengineering (BPR) Hammer and Champy describe that the concept of processes gives most managers the greatest difficulty because most people focus on tasks, jobs, people, and structures instead of the process (Hammer and Champy, 2001).

The Department of Defense (DoD)established guidance for CIO business processes as an integral part of a CIOs responsibilities. The DoD Model CIO Study

(2000), Section 6.0, CIO Processes, is described below, along with Table 13, the suggested CIO processes:

> CIO leadership, roles and responsibilities of enterprise IM and IT programs are directed through a number of key processes. Given that effective use of information and technology is an important enabler of organization success, these processes are the principal methods through which the organization implements its I/IT management programs. Assuring that the processes are properly conceived, supported and enforced is essential, along with clear links to CIO roles and responsibilities (Department of Defense, 2000).

Table 13: Model CIO Study 2000, Suggested CIO Processes

1	Strategic Planning for Enterprise Information Management & Technology
2	Enterprise Information Architecture Development & Implementation
3	Capital Planning & Investment Management
4	Enterprise Management
5	Strategic Sourcing
6	Training
7	Collaboration & Knowledge Management
8	Technology Strategy

The researcher noted these suggested processes are similar to previous Table 2 (MAJCOM and HAF CIO Roles), Table 3 (Federal CIO Core Competencies), and Table 13 (AF-CIO Focus Areas). The following Table is a combined version of those listed previously, in order to view their similarities. The benefit of listing the tables side-by-side is to view the relationship between goals, competencies, focus areas and roles of CIOs that assist in describing the issues in order to present the structure for contemplating the outcomes or impacts on the USAF. This analytical exercise helped to frame the survey instrument for this study.

Table 14: Comparison of Tables

	Model CIO Study Suggested Processes	MAJCOM / HAF CIO Roles	Federal CIO Core Competencies	AF-CIO Focus Areas
1	Strategic Planning for Enterprise Information Management & Technology	Strategic Planning	Information Resources Strategy and Planning	Strategic Plan
2	Enterprise Information Architecture Development & Implementation	Standards & Architecture	Policy and Organizational	Architecture
				Standards
3	Capital Planning & Investment Management	Capital Planning and Investment Control	Capital Planning and Investment Assessment	Capital Planning and Investment Control
4	Strategic Sourcing	Information Technology Acquisition	Acquisition	Information Technology Acquisition
5	Enterprise Management		Project/Program Management	Information Resource Management
6	Technology Strategy	Technology Assessment	Technical	
			Desk Top Technology Tools	
7	Training	Training and Education		Training and Education
8		Performance Measures	IT Performance Assessment: Models and Methods	Performance Measures
9		Process Improvement	Process/Change Management	Business Process Reengineering
10		Information Assurance	IT security/information assurance	
11	Collaboration & Knowledge Management	Information and Knowledge Management		
12		E-Government/E-Business	E-Government/Electronic Business/Electronic Commerce	
13			Leadership/Managerial	

Outputs

Outputs are the results of activities, processes, and services of a project. They can be measured numerically or in terms of volume. Typically, outputs are the number of visits, or number of attendees involved in a project, or the number of times a particular activity has been conducted. Outputs measure the actual work, services or programs; actual accomplishments in terms of delivery, such as number of programs offered, number of participants, or who was reached. While Hammer and Champy explain outputs as being the valuable item for the customer, this research endeavors beyond outputs, to explore the outcomes and their value to AF-CIO office.

Outcomes

Outcomes are the results or impacts of the activities, processes, and services. The outcomes are directly related to the research problem, where the researcher is usually most interested in the outcomes that are most reflective of the problem. Outcomes are the changes or results due to the execution of a program or policy. They are typically classified in three areas; 1) immediate or short outcomes are produced first, 2) intermediate or medium outcomes occur later as a result of immediate outcomes, and 3) long-term outcomes are the big changes the program ultimately accomplishes. This research is primarily interested in exploring USAF outcomes as a result of the CCA, at each possible level that may be described by the survey respondents.

AF-CIO Community Survey Results

In August of 2001, Dr, William B. Rouse reported on research conducted for the AF-CIO office. Dr. Rouse is the H. Milton and Carolyn J. Stewart Chair of the School of Industrial and Systems Engineering at the Georgia Institute of Technology. Rouse conducted interviews with members of the AF-CIO staff, the CIO Management Board (CIOMB) and the CIO Executive Committee (EXCOM).

The purpose of the study was two-fold: 1) to begin a dialogue to address the AF-CIO office greatest concerns, and 2) to measure and analyze interviewee answers regarding the role of the AF-CIO organization (Rouse, 2001). On an importance scale of 0 to 10, interviewees were asked to rate the AF-CIO Roles. The results of the interviews are included in Figure 7 below.

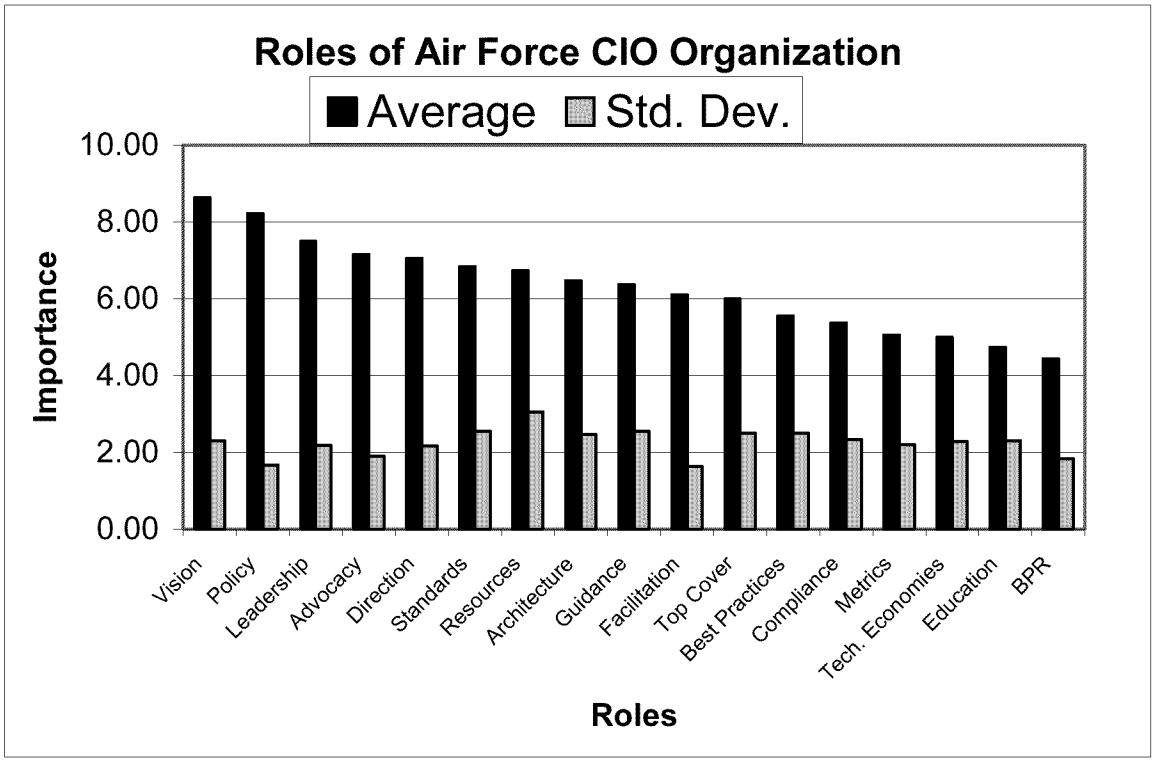


Figure 7: AF-CIO Office Survey Results (Dr Rouse, 2001).

In agencies in which staffs readily agree on a common vision, IRM discussions centered on how to apply information resources in the most effective and efficient manner to achieve agreed upon mission goals (Holden, 1996). Rouse's results support Holden's findings and both are relevant to the current study. They support AF-CIO office direction to frame CIO roles and responsibilities for MAJCOM and Functional representatives as outlined in the CIOMB and EXCOM Charter, Attachment 1. The researcher consulted with Rouse about these results and their relation to the current research. There was agreement that there is value added in conducting the current research to not only look at roles, but also research their impacts on the USAF from the perspective of the MAJCOM, Functional, and base-level leadership. Also, the current research adds the context of organizational management theory to assist in formulating

and explaining the results. Both research projects have the potential to contribute to and influence the behavior of USAF leaders and future decisions made by the AF-CIO office.

Organizational Culture and Change

The federal government experienced several IRM policies changes in the 1990's. Viewing how the CCA impacted the USAF is important to this study. Organizational culture has been found to play an important part in the outcome of federally mandated IRM policy in federal agencies (Beachboard, 1996; Holden, 1996). Beachboard discovered that agency culture is critical to achieving IT success and that culture largely determines the relationship between the IT organization and the program areas and policies they are to support (Ibid.). Holden found that organizational culture played a surprisingly strong role in enforcing agency IT management policy.

Dr. Edgar H. Schein defined modern organizational culture theory saying that, "culture should be reserved for the deeper level of basic assumptions and beliefs that are shared by members of an organization, that operate consciously, and that define an organizations views of itself" (Shafritz and Ott, 1996: 432). Organizational culture theory describes what occurs in organizations and provides possible applications for the leadership of the organization. In fact, this understanding of the theory is so important that Schein states that the only thing of real importance that leaders do is create and manage culture (Ibid). He feels that the process of culture creation and management are the essence of leadership. If leaders want to start evolutionary change processes, they must be adaptive.

Culture is also described by Gibson as " the property of an independently defined stable social unit, and is a learned product of group experience to be found only where there is a definable group with significant history" (Gibson, 1997: 30). Organizational culture differentiates the organization, provides a sense of identity to members, facilitates commitment, enhances social system stability, and promotes sense-making and control for attitudes and behaviors (Schafritz and Ott, 1996: 433).

The concept of organizational culture theory extends to measures of organizational effectiveness, determinants of structure and design, power and politics, intergroup conflicts and conflict resolution, and organizational development and change (Schafritz and Ott, 1996). The concept of culture is particularly important when attempting to manage organization-wide change. Practitioners have seen that despite the best-laid plans, organizational change must include not only changing structures and processes, but also changing the corporate culture as well (Hammer and Champy, 2001). The difficulty in creating a culture is made even more complex when attempting to bring about a significant cultural change (Gibson et al, 1997: 35). Organizational culture theory suggests an effective way of bringing about a change in people's values and beliefs is to focus on changing behavior; however, a change in behavior does not necessarily bring about a change in culture.

Research Questions

Having reviewed the literature relevant to the purposes of this thesis research, five major questions were formulated regarding the outcomes of the Clinger-Cohen Act and the AF-CIO office and their impact on the USAF:

1) Are the USAF implementation efforts consistent with the intent of the CCA?

2) To what extent can a model of the AF-CIO position illustrate the level of the AF-CIO office implementation efforts?

3) What outcomes can be found as a result of the CCA and the AF-CIO office requisite to;

A) The Federal CIO Core Competencies,

B) The performance based aspects of the CCA, Section 5123,

C) Key IRM achievement areas from the public and the private sector,

D) The roles and responsibilities of the AF-CIO

4) Have changes in USAF operations occurred as a result of instituting an AF-CIO office?

5) How have these changes impacted the USAF?

Summary

The goal of this literature review section is to describe what has been learned about this topic and to provide the framework for the research methodology. This chapter reports what has been published about the Clinger-Cohen Act (CCA), CIOs, and the management of information. This section summarizes a high-level view of CIO Core Competencies, or focus areas, of government CIOs, private sector CIOs, and the AF-CIO. Further, the relationship between the roles and responsibilities of CIOs are associated with an organizational context and policy framework that makes the relationship more understandable.

To correct the shortcomings associated with current management of IT investments, Congress, over the past decade, enacted several pieces of legislation requiring federal agencies to implement IT management and performance measures in their business processes to ensure the proper oversight and management of IT

investments. The Clinger-Cohen Act (CCA), which created the office of the Federal CIO, is the object of this study.

An examination of the field revealed a large body of prescriptive research regarding the roles and responsibilities of the CIO with very few research studies on the impacts of the CCA on federal agencies. However, IRM and Federal Policy researchers such as Bernard, Beachboard, Hernon, and Holden have reported impacts of federal IRM legislation and policy on the federal government. This study refers to their findings as a basis for exploring the impacts of the CCA on the USAF.

The IT management provisions in the CCA were intended to improve government financial management IT initiatives (Beachboard, 1996). Built on practices which are common to leading public and private organizations (GAO, 2000b; GAO, 2000d; United States Congress, 1996), the CCA is designed to assist in focusing senior management attention on selecting well designed projects with sound business justifications while mitigating risks as IT investments as they proceed through development, and evaluating actual performance improvement results attributable to the investments.

To provide an understanding of the CCA's legislative intent with respect to the federal CIO position, the CCA was reviewed along with other federal IRM policy and other related guidance. Information relating the CCA and Executive Order 13011, which created the CIO Council is also presented. The federal policies are linked to the AF-CIO focus areas and are examined along with experiences of federal and state government agencies, and private sector organizations.

Beyond technical adherence of the CCA, how can substantive compliance be assessed and the impacts on the USAF be explored? The researcher recognizes that

policy compliance alone does not provide a full assessment of the AF-CIO office and it's affects on USAF operations. However, it does provide a basis for further exploring the impact of the CCA on the USAF.

With the key policy directives identified, IT performance factors elucidated, CIO roles and responsibilities explained, and the conceptual model illustrated, the researcher can now establish a methodology in which to address and answer the research questions. The methodology can be used to gather data and explain the impact of the CCA on the USAF.

III. Methodology

Overview

The methodology chapter describes how the research for this thesis is structured and performed. This social research study is inductive and qualitative in nature; it seeks an ethnographic approach to developing an understanding of a topic rather than testing a theory. Qualitative research deals with opinion statements leading to generalizations. The nature of the data was largely qualitative due to this being a grounded theory study. However tests of proportions between populations are also conducted.

According to Babbie, social research serves many purposes. Three of the most common are exploration, description, and explanation (Babbie, 1998:90). This research is an exploration of the Clinger-Cohen Act (CCA) and its impact on the USAF. Exploratory studies are most typically done for three purposes: (1) to satisfy the researcher's curiosity and desire for better understanding, (2) to test the feasibility of undertaking a more extensive study, and (3) to develop the methods to be employed in any subsequent study (Babbie, 1998: 90). This study addresses all three.

This study is exploratory because the method of complying with many of CCA's mandates continues to be interpreted by Congress, the presidential administration, and other agencies. Examples of this are the December 2000 revision to OMB Circular A-130 that now incorporates CCA mandates, and congressional inquiry in 2000 into CCA/CIO compliance. In particular, an October 2000 investigative report by Senator Fred Thompson (R-Tennessee) found that "Roles, reporting relationships, and boundaries of authority among CIOs within large executive agencies and departments are not clearly

established" (U.S. Senate, 2000). Also, the January 2001 revision of SAF Letter Number 560.1, *The Chief Information Officer of the Air Force*, indicates further refining of the AF-CIO office continues to be necessary. As mentioned earlier, on November 26, 2001, The Secretary of the Air Force, Dr. James G. Roche, restructured the AF-CIO organization, establishing direct reporting between the Under Secretary of the Air Force and the AF-CIO. Finally, a recent amendment to the CCA, Section 331, "Additional Information Technology Responsibilities of Chief Information Officers", as well as published developments on the AF ITMSP (which have not yet been released) are representative of the field of study which continues to evolve.

Research Approach

To gain greater insight into a particular problem, it is often advantageous to question knowledgeable individuals about it. This exploratory study is conducted in-part using a narrative, web-based, open-ended questionnaire. A content analysis of the responses to this non-reactive, open-ended questionnaire approach is meant to help guide the exploration, clarify concepts, and build theory from the evidence. An advantage of a self-administered survey is the prospective anonymity of the respondent which could lead to greater validity overall (Babbie, 1998:257). Since the questionnaire is web-based, there is no interviewer; interviewer bias is eliminated at the time of recording.

This qualitative study also uses archival data in the form of federal government and USAF directives that both govern the AF-CIO office and management staff in their roles and responsibilities, as well as explore the issues related to the CCA and its impact on the USAF. Reports on the impacts of federal IRM policy on federal government

agencies were reviewed. Finally, interviews were conducted with notable researchers who have influenced the field of federal IRM policy and management.

Exploratory research is theory building rather than theory testing (Dooley, 2001; 253). As one researcher noted, "Model building is an ongoing process. Because a participant observer does not go into the field with a hypothesis, the end point of such a study is not always obvious. The construction of the model signals the end of the study, and the first attempts at model building usually are made long before the researcher leaves the field" (Browne, 1976, 81).

As Dooley mentions, "qualitative studies, with the least control, risk all of the internal validity threats" (Dooley, 2001: 269). This could make for rather difficult research design construction; however, relying on previous research, controlling for internal validity through instrument manipulation, choosing the correct sample frame and sample number, and selecting a qualitative, exploratory approach institutes what Dooley describes as "clever and persistent puzzle solving" (Dooley, 2001: 278).

Focusing on the impacts of the CCA on the USAF, the researcher selected an open-ended questionnaire; the respondent uses his/her own words to answer most of the questions. This research examines, through content analysis and statistical analysis, the respondent's answers and takes into account the environmental and organizational aspects of the impacts of the CCA on the USAF.

The researcher is interested in learning about the perceptions and experiences of Executive and Managerial Level information professionals in various echelons in the USAF, and having a direct relationship to the CCA and the AF-CIO office. The data collected from the respondents was interpreted by a number of IRM graduate students at

the Air Force Institute of Technology (AFIT) specializing in CIO concepts, to determine appropriate classifications in determining technical and substantive compliance with the CCA, building on the evolutionary model for the AF-CIO position, and exploring the resultant outcomes to the USAF.

This research also employs a web-based open-ended questionnaire survey method. There are many advantages of a survey in information systems research (Benbasat, 1987). One advantage is an appropriate way to research an area in which few previous studies have been carried out. As revealed in the literature review, this population has not been studied relative to the CCA. Little research has been conducted about the impact of the CCA on the office of the AF-CIO and it's influence on the USAF. For such unexplored subjects, the questionnaire method helps to discover new concepts and relationships between them for further research.

Population

The research methodology uses a web-based, self-administered survey. E-mail notifications for selection to participate in the survey were sent to senior information executives and members of top management within the USAF. The population of interest includes members of the AF-CIO staff, members of the AF/SC staff, members of the AF-CIO Executive Committee (EXCOM), and base-level individuals who are responsible for CIO related duties, such as USAF Communications Squadron Commanders and Group Commanders.

The population was separated into 2 groups – Executive Level and Managerial Level. The Executive Level group includes AF-CIO staff members, AF/SC staff

members, and EXCOM members, including all USAF Major Command (MAJCOM) CIOs and Headquarters Air Force (HAF) Functional CIO representatives. The Managerial Level group includes base-level individuals who are responsible for CIO related duties, such as USAF Communications Squadron Commanders and Group Commanders.

The research establishes that the population consists of 2 mutually exclusive and independent groups and that the independent group responses can be expressed as a single population. In other words, the groups are equal in agreement as to their roles and functions, and that they are united in purpose. This does not serve to specifically answer any of the research questions. However, it ascertains that in the organizational structure of the AF-CIO, the Executive Level establishes the managerial roles and the institutional goals and the Managerial Level is then expected to implement the Executive Level directions.

Executive Level contact was obtained through the AF-CIO website. A list of potential base-level respondents was produced by gathering organizational information of USAF members with the C33S4 Air Force Specialty Code (AFSC). USAF commissioned officers with the C33S4 AFSC are designated Commanders in the Communications and Information career field. The Managerial Level pool of potential base-level respondents was obtained from an Air Force personnel system database administered by staff from the Air Force Institute Technology Registrars office. (AFIT/RR). The list was provided to the researcher once the Air Force Personnel Center (AFPC/DPSAS) at Randolph AFB, TX, approved the survey request.

For this research, I polled the entire population. Surveying the entire population facilitates exploration across a wide variety of organizations and reduces the effects of deviant or disconfirming cases from different respondents (Babbie, 1998; 462). The population size is estimated to be approximately 250 individuals. Respondents were notified via electronic mail that they had been selected to participate in the survey (see Appendix G). It was left to the e-mail recipient's discretion whether or not to participate in the survey research.

Data Collection Method

In choosing a data collection method it is important to look at both the objectives as well as the target population. Harmonizing the research objectives and the target population will allow for selecting the best possible survey method that will work better other methods (Babbie, 1998:89). Since Air Force IT and IRM executives are located worldwide, and are frequently away from their work areas on temporary duty, the web-based survey was judged to have the best likelihood for success. This is supported by the thesis research conducted by Franke in the area of web-based survey instruments (Franke, 2001:73).

The goal of a survey is to gain specific information about either a specific group or a representative sample of a particular group. Results are typically used to understand the attitudes, beliefs, or knowledge of a particular group. Also, "A review of all possible methods revealed that the questionnaire is more advantageous than other means of survey data collection" (Biros and Cole, 1992: 27). This observation was based on consideration of cost, opportunity, and anonymity, as well as the time afforded the respondents.

Furthermore, Franke concluded;

> An overall analysis of the findings of this study makes it reasonable to conclude that paper-based and computer-based surveys can be considered equivalent in a voluntary self-report environment. Additionally, evidence shows that complexity and format differences between computer-based surveys do not significantly affect responses or response rates. Finally, the data suggests that it is improbable that significant bias was introduced into survey results based on survey method of administration, gender, or military commission (Franke, 2001).

Based on pre-testing, it is expected that the web-based survey would take approximately 30 minutes to complete. To protect respondent anonymity, responses were input directly in a database with limited capability to identify groups, and no capability to identify individuals. The survey is hosted on a network server operated and maintained by the Air Force Institute of Technology with no requirement for external support. The data collected from the respondents are interpreted by a number of IRM graduate students enrolled at the Air Force Institute of Technology (GIR-02M) to determine appropriate classifications in creating an evolutionary model on AF-CIOs and their outcomes on the USAF.

Questionnaire Design

A questionnaire was constructed to address all five research questions. Screenshots of the questionnaire are located in Appendix F. The web-based survey is designed in three segmented parts that address each of the questions.

The Part 1 questions are designed to answer Research Questions #3, #4, and #5. Part 1 of the survey (outcomes) includes open-ended questions and requires some endurance and patience, as well as a critical and coherent thought process in order to accomplish. Open-ended questions in Part 1 posed the question in the form "what

changes have occurred as a result of the CCA…" in specific areas of interest to the researcher. Part 1 open-ended questions were designed to elicit and explore the outcomes of the AF-CIO office on the USAF, based on the Competencies created by the Federal CIO Council, the performance requirements of the CCA (section 5123), and resulting outcomes reported from public and private sector research and reports.

The Part 2 questions are designed to answer Research Question #2. Continuing Bernard's research, Part 2 of the questionnaire builds on the conceptual model of the Federal CIO Position Model. This research demonstrates the Federal CIO Position Model is applicable to the USAF. The model is intended to be normative and to produce a visually intuitive depiction of the CIO position that indicates that the twelve roles of a Federal CIO operate across different organizational levels of an organization (Bernard, 2001a). Part 2 seeks to model and describe the CIO position from an organization management theory through selection of programmed choices from a drop-down menu.

The Part 3 questions are designed to answer Research Question #1. Also apart of Bernard's research, this survey relies upon the validated Federal CIO Position Evaluation Method (FCPEM). The FCPEM is the method for evaluating whether federal agencies have complied with the intent of the CCA of 1996 as they established CIO positions. The FCPEM contains thirteen evaluation criteria and was tested and validated by Bernard through key actor interviews at four federal agencies and focused on CIO position establishment activity between 1996 and 2000. This is a unique approach in CIO modeling, representing organizational theory and CIO duties or competency areas. The chief reason for placing the CIO competency areas in the context of an organizational structure is to reveal more about how and where these competency areas function in the

complex federal agency organization (Bernard, 2001a). Furthering Bernard's findings, this research is undertaken to "…replicate finding[s] in other agencies and to further validate the use of FCPEM in conducting this type of public policy inquiry" (Bernard, 2001a). Part 3 analyzes a matrix of CIO Role Evaluation Standards to CIO competencies again by selective, programmed choices. Part 3 explores normative models created for the federal agency CIO position and it's roles.

Both the Federal CIO Position Model and the FCPEM have been updated to reflect the changes to the Federal CIO Core Competencies (2000). This research makes use of the enhanced FCPEM recommended by Bernard. Questions were intended to elicit candid answers from the respondent of their own observations of how each of the topic areas have changed the USAF since the implementation of the CCA, EO 13011, and the office of the AF-CIO.

Pilot Testing

Pilot testing was conducted with five active duty USAF graduate students enrolled in the Information Resource Management (GIR-02M) program, CIO Track at the Air Force Institute of Technology. Results were used to identify any questions in the survey that would be misleading, redundant, dichotomous, or would otherwise cause measurement error. Modifications were made based on the judgments and recommendations of these experts. After considerable scoping, a viable instrument was produced which generated reasonable and acceptable results, thereby achieving the intermediate purpose of the data collection effort for this study.

Permission to Conduct Research

The AF-CIO office, Pentagon, Washington D.C., sponsored this research. The Air Force Survey Branch at the Air Force Personnel Center (HQ AFPC/DPSAS) approves all surveys that are administered to active-duty Air Force personnel without specific commander consent. Once the survey was developed, it was provided along with justification for the survey to the Air Force Survey Branch. It was approved on 27 December 2001 with an AFPC Survey Control Number of USAF SCN 02-001, and an expiration of 31 May 2002. Air Force Instruction 36-2601 governs Air Force survey procedures. The researcher adhered to the AFI. Additionally, on 28 December 2001, Dr. Bernard gave permission and support to both modify and utilize the Federal CIO Position Model and the FCPEM survey guide he developed from his PhD dissertation

Selection of Sample Size

The reliability of the collected data is dependent on the size of the sample, not the size of the population or the number of samples solicited (Alreck and Settle, 1995:30). A power analysis was completed to determine the required sample size utilizing the following formula (Department of the Air Force, A Guide for the Development of the Attitude and Opinion Survey, 1974:14-16);

$$\mathbf{n} = \frac{N(Z^2)p(1-p)}{(N-1)(d^2) + (z^2)p(1-p)}$$

where: n = sample size
N = population
p = maximum sample size factor (.5)
d = desired tolerance (.10)
z = factor of assurance; **1.282** for a **90** percent confidence interval

Applying the formula to the data for this research effort, the following n was determined.

$$\mathbf{n=} \quad \frac{249(1.282^2).5(1-.5)}{(249-1)(.10^2) + (1.282^2).5(1-.5)}$$

n = 35

The power analysis of .10 (90%) revealed that 35 returned surveys were needed for this study based on a population of 249.

A second method of determining necessary sample size shows that a minimum of 100 and maximum of 10% of the population is considered appropriate parameters for a survey/questionnaire (Alreck & Settle, 1995:62). In order to achieve statistical power, the sample size was set to attain a respondent pool of at least 35.

Survey Administration

Survey notification was made by e-mail using the AF's standard e-mail naming convention of firstname.lastname@airforcebase.af.mil. Addresses were generated from the list of personnel received from the AFIT Registrar's office and sent from an e-mail account created specifically for this research. To avoid the potential response bias of a person recognizing the name of the researcher, a personal e-mail account was not used. The new account was created with the address AFCIO.survey@afit.edu. All e-mail notification failures were delivered to this account and monitored by the researcher. The text of the notification message explained that the survey was being conducted by the Air Force Institute of Technology to evaluate the impact of the Clinger-Cohen Act of 1996 on the AF-CIO and the USAF. It also stated the research was sponsored by the AF-CIO

Office and that respondents had been chosen because of the CIO relate experience and expertise as an IT/IRM leader in the USAF The web-based survey was hosted on an AFIT web server at the address http://en.afit.edu/env/af-cio.

Data Analysis

Stepwise Analysis

The analytic procedure used in this study consists of four major steps:

1) Stratified sampling occurs in the first step. This entails separating the sampling frame into non-overlapping groups and taking a sample from each one. The individual respondents are classified into 2 independent and mutually exclusive groups based on responses to the background or demographic questions.

2) In the second step individual responses to the self-administered survey on the groups of "outcomes" questions are examined utilizing descriptive statistical methods. A content analysis methodology is also used to explore responses to the open-ended questions. This is an important step as it helps to answer the research question of how the USAF has changed since the passage of the CCA and the creation of the AF-CIO office. It also relates to substantive compliance with the CCA.

3) In the third step the Federal CIO Position Model is tailored for the AF-CIO office, again based on the respondents answers. The descriptive model provides a visually intuitive depiction of the AF-CIO position that indicates the 12 roles of a Federal CIO that operate across different levels of the organization.

4) In the fourth step the enhanced Federal CIO Position Evaluation Method (FCPEM) is used to relate what Bernard termed the CIO Role Evaluation Standards, to

comply with the Clinger-Cohen Act (CCA). These role evaluation standards relate directly to specific mandates of the CIO from the CCA and were validated by Bernard's research. The FCPEM is used to examine if the USAF is in compliance with the CCA.

A statistical analysis software application tool called JMP IN, version 4.0, from the SAS Institute Inc., was specifically used to run the Fisher-Irwin Exactness test for differences in proportions between two populations.

Qualitative Content Analysis

A content analysis of the responses to open ended questions from the web-based survey is used to in order to explore the population under study. A concept is chosen for examination and the analysis involves quantifying and qualifying its presence.

The researcher follows the eight-step process indicated in the Colorado State University guide on content/relational analysis (Content Analysis, 2001), which are;

1) Identify the question,
2) Choose a sample or samples for analysis,
3) Determine the type of analysis,
4) Reduce the text to categories and code for words or patterns,
5) Explore the relationships between concepts (Strength, Sign & Direction),
6) Code the relationships,
7) Perform analyses, and
8) Map out the representations

As a content analysis researcher commented, "There is no simple right way to do content analysis. Instead, investigators must judge what methods are most appropriate for their substantive problems" (Weber, 1990:13). The task of the content analysis for this research begins with identifying concepts present in a given text or set of texts. However, using a subset of concept analysis called relational analysis, the researcher, "…goes beyond the presence of the words by exploring the relationships between the

concepts identified" (Concept Analysis, 2001). The focus of relational analysis is to look for semantic or meaningful relationships among the words. The researcher explores the text to identify if is there is a stronger presence of positive or negative words used with respect to the research questions.

Quantitative Statistical Analysis

Fisher-Irwin Exactness Test

The Fisher-Irwin test is the most powerful test of equality of two proportions if the random variable of interest is qualitative and dichotomous (Marascuilo and McSweeny, 1977: 96). The Fisher-Irwin procedure tests the hypothesis of equality of population proportions:

$$H_o: P_1 = P_2$$

for two independent groups that are classified dichotomously on an outcome measure (Ibid.). The test is used to determine whether the probability parameters of two independent binomially distributed random variables are equal. The hypergeometric distribution is used for calculating probabilities for samples drawn from relatively small populations and without replacement (Devore, 2000:128). Although the hypergeometric distribution will ultimately be used in testing the equality of two population proportions, the distribution itself is presented in terms of a single population (Ibid).

A classification of the respondents resulted in dividing the sample population into two mutually exclusive and independent groups – Executive Level and Managerial Level. The Executive Level group includes AF-CIO staff, members of the AF/SC staff, and EXCOM members, including all USAF Major Command (MAJCOM) CIOs and

Headquarters Air Force (HAF) Functional CIO representatives. The Managerial Level group includes base-level individuals who are responsible for CIO related duties, such as USAF Communications Squadron Commanders and Group Commanders.

This research requires the use of the Fisher-Irwin test to determine whether the distribution of the independent group responses can be expressed as a single population. A test of proportions between populations is used to determine if there is a statistically significant difference between the Executive Level and the Managerial Level groups. The null hypothesis for this study establishes that there is no difference between the executive and managerial groups with regard to the questions in Part 1 of the survey. If a difference exists, we must reject the null hypothesis and declare the groups as significantly different.

Summary

This research polls individuals who perform CIO tasks mandated by the CCA. A web-based survey was created to assist in answering the research questions. The notification to participate in the survey was e-mailed to every individual in the population. Statistical analysis is conducted to infer differences between populations. Content analysis is conducted to surmise and explain the results.

The researcher gathered relevant information on public and private sector research regarding CIOs. Documents on the impacts of federal IRM policy on federal government agencies were reviewed. Interviews were conducted with notable individuals who have influenced the field of federal IRM policy and management. The results of this

information gathering are used to lay the foundation for this grounded theory work in order to provide the structure required to explain and answer the research questions.

The impact of CIO mandates of the CCA were explored in this research through: 1) an analysis of the language of the CCA and other IRM-related federal legislation, 2) a review of information gained through the self administered, web-based survey results of USAF members, 3) information gained from documentation of public sector CIOs and their experiences, and 4) research conducted to bridge the gap between organizational and policy theory, and federal agency CIOs.

This chapter described a research method to investigate the impacts of the CCA on the USAF. It described the survey methodology, content analysis methodology, and grounded theory methodology along with the operationalized constructs. Finally, this chapter described how the collected data was analyzed. The results of the analysis are presented in Chapter IV. The interpretation and findings of this multi-modal study, along with recommendations for future research efforts, are presented in Chapter V.

IV. Results and Analysis

Overview

This chapter provides the overall results of the data collection effort. As stated previously, the purpose of this research is to examine the impact of the Clinger-Cohen Act of 1996 (CCA) on the AF-CIO office and the USAF. The investigative questions to be answered are:

1) Are the USAF implementation efforts consistent with the intent of the CCA?

2) To what extent can a model of the AF-CIO position illustrate the level of the AF-CIO office implementation efforts?

3) What outcomes can be found as a result of the CCA and the AF-CIO office requisite to;

A) The Federal CIO Core Competencies,

B) The performance based aspects of the CCA, Section 5123,

C) Key IRM achievement areas from the public and the private sector,

D) The roles and responsibilities of the AF-CIO.

4) Have changes in USAF operations occurred as a result of instituting an AF-CIO office?

5) How have these changes impacted the USAF?

In order to answer these questions this chapter will present the analytic procedure used for this study. First, an analysis of the response rate is presented. Next, the demographic data of the survey participants is offered. Finally, an analysis of responses from each part and section from the web-based survey is given. Screenshots of each page of the web-based survey are provided in Appendix F.

Response Rates

This research polled the entire population of interest consisting of 249 people. A notification e-mail message to participate in the web-based survey was sent to all 249 potential participants. However, 84 e-mail messages were rejected due to faulty e-mail addresses. The researcher was able to recover 39 of the 84 faulty e-mail addresses. Essentially, 204 successful e-mail notifications to potential respondents (requests to participate in the research survey) were made. Two follow-up e-mailings were made to some of the participants to encourage response. Follow-up e-mail notifications were not made to EXCOM members, AF/SC staff, and C33S4 General Officers out of respect to the positions they hold and the level of responsibility they bear across the entire USAF.

158 of the 204 candidates participated in the research survey for a response rate of 77.5%. Table 15 below lists the response rate results broken down into the applicable parts and sections of the survey instrument.

Table 15: Response Rates for all Respondents

Survey Sections	Number of Respondents	Response Rate
Background	158	77.5%
Part 1a - Competencies	100	49.0%
Part 1b - Performance	87	42.6%
Part 1c - Outcomes	78	38.2%
Part 1d - Roles	72	35.3%
Part 2 - FCPM	66	32.4%
Part 3a - FCPEM	53	26.0%
Part 3b - FCPEM	53	26.0%

Roughly 30% of the individuals beginning the survey actually completed it. Some replies were discarded due to incomplete responses.

Stratification of Data

The intent of the research was to poll the entire population of 249 individuals, and stratify them as either the Executive Level of the Managerial. However, due to a problem with the data collection effort only 38% of the total data collected could be stratified. Therefore, results will be reported by strata where possible, as well as unstratified across all respondents. Doing this resulted in creating and assessing four groups. The Executive Level group contains all those respondents known to be at the Executive Level (n=9). The Managerial Level group contains all those respondents known to be at the Managerial Level (n=50). The combination of the Executive Level and the Managerial Level will be called the Stratified Group (n=59). All Respondents is the name of the group that contains both the Stratified Group and those that could not be stratified (n=158). The table below summarizes the groups.

Table 16: Group Summary

Name of Group	Total Number of Respondents
Executive Level	9
Managerial Level	50
Stratified Group	59
All Respondents	158

Response rates for the stratified data are indicated in Table 17 below.

Table 17: Response Rates for Stratified Population

Survey Sections	Number of Respondents	Response Rate
Background	59	28.9%
Part 1a - Competencies	53	26.0%
Part 1b - Performance	47	23.0%
Part 1c - Outcomes	35	17.2%
Part 1d - Roles	35	17.2%
Part 2 - FCPM	27	13.2%
Part 3a - FCPEM	25	12.3%
Part 3b - FCPEM	23	11.3%

Determining agreement between these groups is important to this study as the results are used to explore the impacts of the CCA on the USAF and to understand the organizational culture, attitudes, beliefs, and knowledge of each group.

Demographic Information

The demographic information was collected in such a way as to protect the anonymity of the respondents while providing a means to stratify between groups in the population. For stratification purposes, the population was separated into 2 groups – Executive Level and Managerial Level. For the purpose of comparing population responses, a Stratified Level group and an All Respondents group were also established. . The following tables express the summaries for each background question.

Table 18: Years of Experience Summary

Years of Experience							
Group	Respondents	Mean	Standard Dev.	Std Error	Median	Max	Min
Executive	9	26.44	1.81	0.60	26	30	24
Managerial	50	17.18	5.77	0.82	18	30	4
Stratified	59	18.59	6.31	0.82	19	30	4
All	158	16.95	6.58	0.52	18	30	1

Table 19: Years in Current Position Summary

Years in Current Position							
Group	Respondents	Mean	Standard Dev.	Std Error	Median	Max	Min
Executive	9	3	1.73	0.58	3	7	1
Managerial	50	1.76	1.89	0.27	1	10	0.5
Stratified	59	1.95	1.90	0.25	2	10	0.5
All	158	1.59	1.46	0.12	1	10	0.5

Table 20: Years in Current Organization Summary

Years in Current Organization							
Group	Respondents	Mean	Standard Dev.	Std Error	Median	Max	Min
Executive	9	2.44	0.88	0.29	2	4	1
Managerial	50	1.86	1.91	0.27	1.5	10	0.5
Stratified	59	1.95	0.23	0.23	2	10	0.5
All	158	1.83	2.09	0.17	1	20	0.5

Analysis of Survey Responses

Part 1: Outcomes

Part 1 of the web-based survey addresses Research Questions #3, #4, and #5. Analyses of Part 1 of the web-based survey are described through statistical analysis and content analysis

Fisher-Irwin Exactness Test Procedure

The Fisher-Irwin Exactness Test was conducted between the 4 groups (Executive and Managerial, Stratified and All Respondents) to check for equality between population proportions of each groups' answers. The results for each of 4 groups through 42 different questions were independently loaded into JMP IN® to determine the results of the Exact Test.

		Group		
	Count Total % Col % Row %	1	2	
Yes=1 No=2	1	8 17.39 88.89 25.81	23 50.00 62.16 74.19	31 67.39
	2	1 2.17 11.11 6.67	14 30.43 37.84 93.33	15 32.61
		9 19.57	37 80.43	46

Left	0.9817
Right	0.1257
2-Tail	0.2348

Figure 8: Results of Fisher-Irwin Exactness Test

Using an alpha value of .05, this p-value result of .2348 indicates we should not reject the null hypothesis since the p-value is greater than the alpha value. Therefore, we fail to reject the null hypothesis that there is no statistical difference between these two groups with respect to the responses for this question. The distribution of the independent group responses can be expressed as a single population; there is no statistical difference between the Executive and Managerial Level.

Following a premise of "It has been six years since Congress passed the Clinger-Cohen Act," respondents were asked "As a result of the CCA and the AF-CIO office, is the USAF different today in these specific areas?" Content analysis was performed to reveal relationships among the comments and to determine the impact areas. The researcher explored the comments to look for word patterns, identify the presence of themes, define the categories, classify text, and to determine the impact areas. IRM

graduate students at the Air Force Institute of Technology and various members of the researchers thesis committee verified the impact areas.

Section 1a, Federal CIO Core Competencies

Respondents were asked if they believed the USAF was different today as a result of the Clinger-Cohen Act and the AF-CIO office, with respect to the 12 Federal CIO Core Competencies. A total of 100 individuals responded to this series of questions. Nearly 300 comments were received.

The following table shows the results of the Fisher-Irwin Exactness Test regarding the Federal CIO Core Competencies 2000. In 11 of the 12 competency areas, there is no significant difference between the Executive Level and the Managerial Level groups. The corresponding p-value for the core competency question regarding Project and Program Management is .02, leading to the rejection of the null hypothesis.

Table 21: Stratified Level Test Results for Federal CIO Competencies 2000

Fisher-Irwin Exactness Test Results (α = .05)			
Federal CIO Core Competencies (2000)	**Executive Level (n=9)**	**Managerial Level (n=44)**	**p value**
IR Strategy & Planning	5	24	1.00
E-Gov / E-Bus / E-Comm	6	28	1.00
IT Security / Information Assurance	6	25	0.72
Leadership / Managerial	7	27	0.46
Policy / Organizational	7	25	0.29
Acquisition	4	11	0.25
Technical	4	11	0.25
Desktop Technology Tools	4	10	0.22
Capital Planning & Investment Assessment	4	9	0.20
Performance Assessment: Models and	4	8	0.18
Process / Change Management	7	18	0.07
Project / Program Management	5	7	0.02

An analysis was also conducted to test equality between proportions of the Stratified Level group and the All Respondents group in the area of the Federal CIO Core Competencies. Again, the Fisher-Irwin test was used. The following results show that there is no significant difference between the two groups.

Table 22: Stratified vs. All Respondents Test Results for Federal CIO Competencies 2000

Fisher-Irwin Exactness Test Results (α = .05)			
Federal CIO Core Competencies (2000)	**Stratified Level (n=53)**	**All Respondents (n=100)**	**p value**
IR Strategy & Planning	29	52	0.87
E-Gov / E-Bus / E-Comm	34	57	0.49
IT Security / Information Assurance	31	59	1.00
Leadership / Managerial	34	60	0.73
Policy / Organizational	32	60	1.00
Acquisition	15	40	0.16
Technical	15	32	0.71
Desktop Technology Tools	14	35	0.36
Capital Planning & Investment Assessment	13	35	0.20
Performance Assessment: Models and	12	29	0.45
Process / Change Management	25	42	0.61
Project / Program Management	12	24	1.00

The content analysis established 48 impact areas. The following table reports the results of the most frequent responses. The entire response list can be viewed in Appendix G.

Table 23: Reported Changes to the USAF Due to the Federal CIO Core Competencies

Part 1a, Impact from Core Competencies	# of Comments
Standardized Approach	19
Working Groups at Base/MAJCOM Level	15
Centralized Management of Networks	12
Responsive Organizational Structure	11
IT Enterprise Policy Awareness	10
Business Case Development	8
Information as a Strategic Resource	8
CIO Mandated by Law	7
Consolidation of Neworks/Servers	7
Development of TCO	7
More Clear Direction	7
Network Centric Awareness	6
IT Initiatives	5
Strategic Information Approach	5
Architecture Office Established	4
Better Performance Measures	4
Config Control AF-wide	4
Enterprise Strategy	4
Network Consolidation	4
Timely Acquisition	4

Based on the results of the analysis, the impact areas are reported as a single set of impacts specific to the Federal CIO Core Competencies. However, since the analysis shows a difference in responses regarding the Competency of Project and Program Management question, the results are reported separately in the table below.

Table 24: Impact Area Responses for Project / Program Management

Project / Program Management			
	Executive Level	Managerial Level	Unstratified Group
1	Network Centric Awareness	Business Case Development	More Clear Direction
2	Strategic Information Approach	Standardized Approach	SPO Overhead too Costly
3	Consolidation of Neworks	Centralized Management	Working Groups at Base/MAJCOM
4	Responsive and Lean Org Structure	Responsive Org Structure	IT Enterprise Policy Awareness
5		Working Groups at Base/MAJCOM	Development of TCO
6		Untimely Acquisition Process	PPBS Hasn't Changed Enough
7		Non-standardized Approach	
8		Too Slow to Catch On	

Section 1b, Performance

Respondents were asked if they believed the USAF was different today as a result of the Clinger-Cohen Act and the AF-CIO office, with respect to Section 5123, Performance and Results Based Management, of the Clinger-Cohen Act of 1996.

Table 25 shows the results of the Fisher-Irwin Exactness Test of equality of population proportions regarding the performance aspects of the CCA, section 5123. None of the null hypotheses were rejected in this area. These results suggest there is no difference between the groups.

Table 25: Stratified Level Test Results For Performance

Fisher-Irwin Exactness Test Results (α = .05)			
Performance (CCA Section 5123)	**Executive Level (n=9)**	**Managerial Level (n=38)**	**p value**
Delivering Services	3	17	1.00
Ensuring Perfomance Measures Support	2	12	0.70
Establishing Goals	5	16	0.49
Qualitative Benchmarking	4	10	0.42
Ensuring Prescribed Performance Measures	5	13	0.27
Analyzing Air Force Missions	2	18	0.26
Ensuring Adequate Information Security P^3	8	23	0.23
Preparing Annual Report to Congress	4	6	0.08

Note: P^3 = Policy, Procedure, Performance

An analysis was also conducted to compare the results of the Stratified Level group against those of All Respondents in the area of Section 5123 of the CCA. There was no significant difference between the two groups.

The content analysis established 65 impact areas for this section. Table 26 reports the results of the most frequent responses. The entire response list can be viewed in Appendix G. Based on the results of the statistical analysis, the impact areas are reported as a single set of impacts

Table 26: Reported Changes to the USAF Due to the Performance Aspects of the CCA

Part 1b, Impact from CCA, Section 5123	# of Comments
Use of Business Models	9
IT Initiatives	8
Too Soon to Tell	8
High Level Support	7
Working Groups at Base/MAJCOM Level	5
Enterprise Solution	4
IT Enterprise Policy Awareness	4
Little Change to PPBS	4
Accountability Greater	3
CIO Leadership	3
Equipment and Config Control Better	3
Responsive Org Structure	3
Strategic Planning	3
TCO	3

Section 1c, Outcomes and Outputs

Respondents were asked if they believed the USAF had achieved significant outcomes relative to Key IRM Achievement Areas identified in previous IRM/IT research and reports, and found in the Chapter 2. This section asked 18 questions. The respondents answered either yes or no. Individual responses were requested for each of the questions. The respondents were also requested to explain their answers. A total of 78 individuals responded to this series of questions. Over 300 comments were received

The following table shows the results of the Fisher-Irwin Exactness Test of equality of population proportions regarding key IRM achievement areas from public and

the private sector research and reports. It shows there is no difference between the groups on most items. However, the p-value for the key IRM area of Budget Requests is .0033. This signifies that the null hypothesis is rejected for this item.

Table 27: Stratified Level Test Results for Outcomes and Outputs

Fisher-Irwin Exactness Test Results (α = .05)			
Outcomes and Outputs (previous research)	**Executive Level (n=9)**	**Managerial Level (n=26)**	**p value**
Compliance Standards	4	10	1.00
Strategic Planning	5	15	1.00
Investments	3	9	1.00
Customer Satisfaction	2	8	1.00
Lifecycle Maintenance	2	5	1.00
IT Reliability	4	10	1.00
Enterprise Solution	5	15	1.00
USAF Operations	5	12	0.71
IT Usability	5	11	0.70
National Security Systems	3	7	0.69
Business Processes	2	8	0.69
Architecture	6	13	0.46
IT Availability	3	13	0.46
Performance Measurements	3	5	0.40
Deployment of Services	5	8	0.24
Contingency Preparedness	3	3	0.16
Disclosure of Costs	4	4	0.16
Budget Requests	6	3	0.00

An analysis was also conducted to compare the results of the Stratified Level group against those of All Respondents in the area of key IRM achievement areas from public and the private sector research and reports. Again, the Fisher-Irwin test was used. There is no significant difference between the two groups.

The content analysis established 63 impact areas. Table 28 reports the results of the most frequent responses. The entire response list can be viewed in Appendix G.

Table 28: Reported Changes to the USAF Due to Key IRM Achievement Areas

Part 1c, Impacts from Key IRM Achievement Areas	# of Comments
Realistic to IT, Not Ops	25
Too Soon to Tell	24
Process Not Understood	19
High Level Support	16
TQM Culture Hinders	15
Goals tied to Money and Staffing	12
Perfomance Oriented	12
Little Change to PPBS	11
Using Business Models	10
Slow Implementation	9
Network Centric Ops Support	9
Stale Metrics	5
Enterprise Approach	5
NOSC is Key	5
Responsive Org Structure	5
No Money	4
Not Reactive	4
AF Portal	4
IT Initiatives	4
Stovepiped	3

Based on the results of the analysis, the impact areas are reported as a single set of impacts specific to the Key IRM Achievement Areas. However, since the statistical shows a difference exists in the responses regarding the Budget Requests question the results are reported separately in the table below.

Table 29: Impact Area Responses for Budget Requests

	Budget Requests		
	Executive Level	**Managerial Level**	**Unstratified Group**
1	CIO Effective	Budget Requests not Successful	Realistic to IT not Ops
2	No Authority	CIO Office not Effective	Stovepiped
3	Politics with Functionals	Using Business Models	Perfomance Oriented
4			High Level Support
5			NOSC is Key
6			Slow Implementation
7			Process Not Understood
8			Little Change to PPBS
9			No IT Priorities

Section 1d, CIO Roles

The CIO Roles section analyzes the possibility of identifying appropriate roles and responsibilities of the CIO. The stratified responses explore Executive Level and Managerial Level agreement for the roles specified in Appendix C, "MAJCOM CIOs and HAF Functional CIO Representatives Roles and Responsibilities, 2 January 2002." Strength areas and shortfalls in this area are identified.

The survey did not ask respondents to rank their roles in reference to those included in Appendix C. However, a content analysis of the responses revealed some roles were selected more frequently than others. The following table lists the results.

Table 30: CIO Roles Selection for All Respondents

CIO Roles and Responsibilities	# Times Selected (n=72)	Selection Rate
Capital Planning and Investment Control:	55	76.4%
Information Assurance:	53	73.6%
Technology Assessment:	51	70.8%
Standards & Architecture:	50	69.4%
Training and Education:	49	68.1%
Strategic Planning:	48	66.7%
Information Technology Acquisition:	47	65.3%
Process Improvement:	46	63.9%
Performance Measures:	43	59.7%
E-Government/E-Business:	42	58.3%
Information and Knowledge Management:	40	55.6%

Asked about the appropriateness of these same roles, nearly 85% of respondents agreed the listed roles were appropriate for their level. A majority of those who did not agree cited that Standards and Architecture belonged at the Executive Level. Also, those at the Managerial Level felt while the roles were important, the roles at their level should be focused on technology and providing operations capability with the best equipment technology and availability. Both the Managerial Level and the Executive Levels agreed that strategic planning should be directed from the top and implemented at the base and functional level.

Over 80% responded that current roles and responsibilities should remain intact, without adding or eliminating any at this time. A majority of the rest proposed that process improvement, quality control, and metrics should be eliminated from the Managerial Level role. There was no further explanation. However, Managerial Level respondents also stated Budget Controls should be initiated at their level in order to reduce redundant systems and to realize the products they budget years in advance for

instead of using the funds for other priorities. By far, the greatest number of comments received was in answer to the question regarding "shortfalls." The following table summarizes the shortfalls from all respondents.

Table 31: CIO Roles Shortfalls (All Respondents)

Shortfalls Identified	# Times Cited (n=72)	Selection Rate
Manpower and Staffing	34	47.2%
Funding	24	33.3%
Leadership Priorities	17	23.6%
Empowerment / Ownership of Mission	16	22.2%
Training	15	20.8%
Workload Tempo	13	18.1%
Controlling Changes	7	9.7%
Equipment / Technology	7	9.7%
No Vision into Base-level and Functional Spending	7	9.7%

Under Leadership Priorities, respondents stated that in the recent past, with the new IT initiatives, everything has been a priority. This is very similar to the Controlling Changes shortfall area except that this area appears to be originating from within the Managerial Level only. Collateral effects are experienced from Manpower and Staffing shortages. Under Empowerment/Ownership of Mission, respondents cited they have no authority, or they lack influence, when providing a business case at their level. Frequently, operations and functional organization leaders impose their own technical solutions, suboptimizing resources without regard to the implications of buying, integrating, and maintaining the implemented solution.

Changes in the USAF Since the CCA

The open-ended questions in Part 1 posed the question in the form "what changes have occurred as a result of the CCA and the AF-CIO…" for specific areas. Therefore, the perceived changes are specifically attributed to the CCA and the AF-CIO office. The following table summarizes the changes that were indicated from the content analysis. While specific mission operations were not generally mentioned, the comments did cover support operations specific to IT and IRM.

Table 32: Sample Responses Relating to Changes Made in the USAF Since the CCA

Impacts to the USAF as a Result of the CCA	# of Comments	Sample Response
Too Soon to Tell	32	Processes are still in development.
Business Case Development / Models	27	Change in focus streamlined AF networks to behave as IT business entities, rather than simply support organizations.
IT Initiatives	27	IT initiatives and the famous west -coast meetings really opened our eyes.
Realistic to IT, Not Ops	25	Varying opinions on what we are supporting. Appears that SC interests take front seat to what missions IT systems are supporting.
Support From High Levels	23	Senior AF leadership is more aware of the need for the establishment and enforcement of enterprise IT policy and guidance.
Working Groups at Base/MAJCOM Level	20	Comparisons easier to make based on total cost of ownership studies, ROI tracking, etc.
Not All Process are Understood	19	This area has suffered from bureaucratic paralysis for the past several of years
Standardized Approach	19	Development of comprehensive standards, and their enforcement
Little Change to PPBS	15	Needs to be updated, but combination of IRM strategic plan produced under C3I guidance and C&I strat plan started a process that links to APPG and POM; efforts now under way in AF CIO to rebuild.
Network Centric Awareness / Ops Support	15	Concentrated effort is making a difference, but we need it faster and with money.
TQM Culture Hinders Results	15	Process change is experiencing somewhat of a TQM backlash in the AF at this time.
IT Enterprise Policy Awareness	14	Policy is now more visible and defendable. Plus the right organization to implement
Goals tied to Money and Staffing	12	CIO working to integrate CCA requirements into AF corporate structure and processes; CIO directed the first cross-cutting IT investment review during the FY03 POM process starting at the Panel level
Perfomance Oriented Measurements	12	Commands build PMs/metrics based on CIO vision.
Responsive Organizational Structure	11	CIO is trying to make significant visibility changes in this area.
CIO Providing Leadership	10	Evident by the fact that IT drives much of how we do business today.
Information as a Strategic Resource	8	IT now an integral part of all AF activities and not an after-thought.
Development of Total Cost of Ownership	7	Believe we still sometimes put manpower, training, and sustainment concerns behind the program instead of upfront where they belong; also technology keeps outpacing our ability to effectively train and produce current policy.
More Clear Direction	7	Believe CIO is making progress in getting the AF to look big picture, vice MAJCOM/base county option.
Enterprise Solution	4	Much more structure and finding efficiencies when looking at IT in its entirety.

Part 2: AF-CIO Position Model

Part 2 of the web-based survey addresses Research Question #2. In Part 2, the AF-CIO Position Model analysis is reported. The results are based on Bernard's research and the respondent's answers to questions regarding the Federal CIO Core Competencies and the understanding of the Parsons/Thompson theory of organizations. Table 33 below presents the largest proportional responses for each competency and level of importance and organizational level defined by Parsons and Thompson.

Table 33: AF-CIO Position Model Results (Sorted by Importance)

Federal CIO Core Competency	Importance	# (n=66)	Selection Rate	Org Level	# (n=66)	Selection Rate
IT Security / Information Assurance	Very	62	93.94%	Technical	30	46.2%
Capital Planning & Investment Assessment	Very	58	87.88%	Institutional	45	69.2%
Leadership / Managerial	Very	55	83.33%	Managerial	37	56.9%
Policy / Organizational	Very	55	83.33%	Institutional	55	84.6%
IR Strategy & Planning	Very	51	77.27%	Institutional	42	64.6%
Process / Change Management	Very	45	68.18%	Managerial	40	62.5%
Acquisition	Very	45	68.18%	Managerial	30	46.2%
Project / Program Management	Very	39	59.09%	Managerial	41	63.1%
Technical	Very	35	53.03%	Technical	47	72.3%
Desktop Technology Tools	Somewhat	37	56.06%	Technical	43	65.2%
E-Gov / E-Bus / E-Comm	Somewhat	37	56.06%	Institutional	44	67.7%
Performance Assessment: Models and Methods	Somewhat	33	50.00%	Managerial	33	50.8%

The results indicate that as a large federal service organization under the agency of the DoD, the USAF shares some organizational results similar to other large federal government agencies. There was no recognizable pattern between the assigned importance level rating of competencies and the level at which they were identified as operating agencies. Also, according to Bernard, key-actors indicated that the agency CIO should operate at a very high level and should not engage in hands-on management activities (Bernard, 2001: 139). Further, sub-agency level CIOs should then work at the level of implementation and integration, and focus on the how-to-do-it side of IRM.

However, Bernard noted that IT workforce issues, while seemingly a sub-agency responsibility, are implemented at the Executive Level especially in light of the imminent aging workforce and the possibility of losing knowledge and skills once they retire.

A threshold was established at 45% or greater for any particular level of importance and organizational level defined by the Parsons/Thompson model. As mentioned earlier, Bernard fashioned the Parsons/Thompson organizational structure dimension to his CIO Position Model in order to provide a conceptual model of how the two are related and to reveal whether a basic relationship exists.

The following table shows the results of Part 2, The AF-CIO Position Model, from the survey. The highlighted areas under "Level of Importance" and "Org Level" show the highest response rates for each of the Federal CIO Core Competencies.

Table 34: AF-CIO Position Model Results

Federal CIO Core Competency	Importance	# Voted	% of Vote	Org Level	# Voted	% of Vote
Policy / Organizational	**Very**	55	83.3%	Technical	3	4.6%
	Somewhat	10	15.2%	**Institutional**	55	84.6%
	Not	1	1.5%	Managerial	7	10.8%
Leadership / Managerial	**Very**	55	83.3%	Technical	4	6.2%
	Somewhat	9	13.6%	Institutional	24	36.9%
	Not	2	3.0%	**Managerial**	37	56.9%
Process / Change Management	**Very**	45	68.2%	Technical	8	12.5%
	Somewhat	20	30.3%	Institutional	16	25.0%
	Not	1	1.5%	**Managerial**	40	62.5%
IR Strategy & Planning	**Very**	51	77.3%	Technical	6	9.2%
	Somewhat	12	18.2%	**Institutional**	42	64.6%
	Not	3	4.5%	Managerial	17	26.2%
Performance Assessment: Models and Methods	Very	30	45.5%	Technical	17	26.2%
	Somewhat	33	50.0%	Institutional	15	23.1%
	Not	3	4.5%	**Managerial**	33	50.8%
Project / Program Management	**Very**	39	59.1%	Technical	14	21.5%
	Somewhat	24	36.4%	Institutional	10	15.4%
	Not	3	4.5%	**Managerial**	41	63.1%
Capital Planning & Investment Assessment	**Very**	58	87.9%	Technical	4	6.2%
	Somewhat	5	7.6%	**Institutional**	45	69.2%
	Not	3	4.5%	Managerial	16	24.6%
Acquisition	**Very**	45	68.2%	Technical	8	12.3%
	Somewhat	20	30.3%	Institutional	27	41.5%
	Not	1	1.5%	**Managerial**	30	46.2%
E-Gov / E-Bus / E-Comm	Very	23	34.8%	Technical	5	7.7%
	Somewhat	37	56.1%	**Institutional**	44	67.7%
	Not	6	9.1%	Managerial	16	24.6%
IT Security / Information Assurance	**Very**	62	93.9%	**Technical**	30	46.2%
	Somewhat	3	4.5%	Institutional	23	35.4%
	Not	1	1.5%	Managerial	12	18.5%
Technical	**Very**	35	53.0%	**Technical**	47	72.3%
	Somewhat	25	37.9%	Institutional	5	7.7%
	Not	6	9.1%	Managerial	13	20.0%
Desktop Technology Tools	Very	21	31.8%	**Technical**	43	65.2%
	Somewhat	37	56.1%	Institutional	13	19.7%
	Not	8	12.1%	Managerial	10	15.2%

Based on the information in the table above, conceptual model of the AF-CIO position was created.

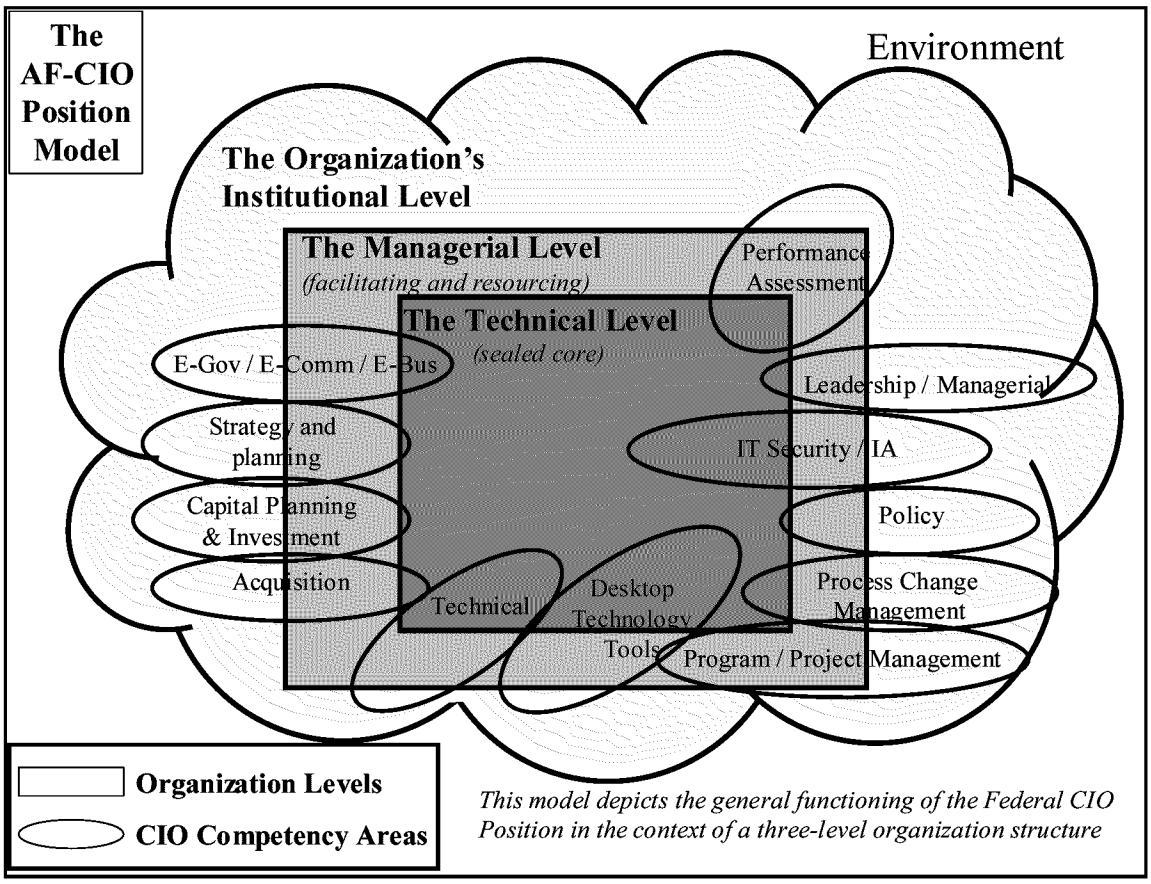


Figure 9: The AF-CIO Position Model (Adapted from Bernard's Research)

The consequence of this model is the realization that the AF-CIO operates primarily in the Institutional and Managerial Layer of the USAF. This presumably is a fair representation of exactly where the USAF desires the AF-CIO to concentrate it's time and resources. As pointed out earlier, the Technical Level represents the production base or implementation point of Managerial and Institutional guidance.

Part 3: Federal CIO Position Evaluation Method

Part 3 of the web-based survey addresses Research Question #1. In Part 3, the enhanced Federal CIO Position Evaluation Method (FCPEM) analyses are presented using the CIO Role Evaluation Standards developed by Bernard. The FCPEM is

established here for the USAF. The results of Part 3 are utilized to examine technical and substantive compliance with the CCA. Determining the degree of compliance in each area gives both a functionally specific, and in summary, an overall indication of support for the CIO provisions of the CCA. Both compliance with and variance from CCA-CIO mandates are potentially valuable information for policy studies on what the effect of this portion of the law has been.

Under the category of "Goal", the selection most frequently chosen is reflected for each Role Evaluation Standard. Bernard added "goal for" and "goal of" as a measure to provide greater understanding of agency motivations in implementing the Clinger-Cohen Act (CCA). A goal for an agency is interpreted to be "externally induced"; a goal of as "internally generated". A "goal for" an agency implies the agency would not have accomplished the role had it not been mandated. A "goal of" means the agency had already been attempting to implement it before mandated. In the case of the AF-CIO office, 7 of 13 role evaluations standards reflect a "goal for" the organization. The remaining 6, including those listed as "both" are considered "goals of" the AF-CIO.

Along with goals, there are levels of complexity. Bernard added complexity to "assess it as a risk element and then mitigate a wider spectrum of disruption sources, accepting that this will not be a foolproof exercise. Things will still happen, and when they do, it is not necessarily the mark of poor CIO or agency head performance" (Bernard, 2001:228). The survey indicates that there are six highly complex roles that the AF-CIO must perform, some of them concurrently. This further indicates that the AF-CIO position is one that requires experience in a number of management and technical

areas, as well as good organizational and interpersonal skills. The goal and complexity results are listed in the table below.

Table 35: FCPEM Goal and Complexity Level Results

FCPEM Role Evaluation Standards	Goal	Goal Counts (n=53)	Complexity	Complexity Counts (n=53)
Position Established	For	26		
CIO Designated Executive Level IV	Both	19		
CIO established in writing	For	20		
Does document make IRM principal duty	For	22		
Facilitate Reviews for efficient IRM processing	Of	21	High	24
CIO supports defining process need/strategies	Both	23	High	37
Facilitate evaluation of information collection	Of	19	High	22
Capital planning process	For	23	High	36
Architecture to Capital Planning	For	23	High	27
Review IT program for <10% variance	Of	22	Medium	24
Strategic plan and Performance Report	For	22	High	24
Workforce Plan	Of	20	Medium	25
Annual IRM Progress Reporting	For	31	Medium	24

A matrix of responses for the FCPEM Role Evaluation Standards to the Federal CIO Core Competencies are included in Table 36 below. Only competencies which were selected greater that 30% of the time for each standard is reflected in the table. This is a subjective call by the researcher to present an overall view of relevant information.

Table 36: FCPEM Competency Selection Results

FCPEM Role Evaluation Standards	Competency (> 30% selection rate)	# Times Chosen (n=53)	Selection Rate %
Facilitate Reviews for efficient IRM processing	Policy / Organizational	29	54.72%
	Leadership / Managerial	27	50.94%
	Process Change Management	23	43.40%
	IR Strategy and Planning	20	37.74%
CIO supports defining process need/strategies	Leadership / Managerial	28	52.83%
	IR Strategy and Planning	28	52.83%
	Capital Planning & Investment Assessment	27	50.94%
	Policy / Organizational	25	47.17%
	Process / Change Management	16	30.19%
Facilitate evaluation of information collection	Leadership / Managerial	17	32.08%
	Performance Assessment: Models & Methods	16	30.19%
	Policy / Organizational	16	30.19%
Capital planning process	Policy / Organizational	25	47.17%
	Leadership / Managerial	25	47.17%
	Capital Planning & Investment Assessment	24	45.28%
	IR Strategy and Planning	21	39.62%
	Acquisition	20	37.74%
	Project / Program Management	16	30.19%
Architecture to Capital Planning	Capital Planning & Investment Assessment	25	47.17%
	Policy / Organizational	22	41.51%
	Leadership / Managerial	19	35.85%
Review IT program for <10% variance	Leadership / Managerial	19	35.85%
	Project / Program Management	19	35.85%
	Capital Planning & Investment Assessment	18	33.96%
	Performance Assessment: Models & Methods	18	33.96%
	Policy / Organizational	17	32.08%
Strategic plan and Performance Report	Leadership / Managerial	25	47.17%
	IR Strategy and Planning	25	47.17%
	Policy / Organizational	23	43.40%
Workforce Plan	Leadership / Managerial	27	50.94%
	Policy / Organizational	25	47.17%
	IR Strategy and Planning	18	33.96%
Annual IRM Progress Reporting	Policy / Organizational	31	58.49%
	Leadership / Managerial	26	49.06%
	Performance Assessment: Models & Methods	17	32.08%

Results of the FCPEM for the AF-CIO

Independent results to the 13 Role Evaluation Standards are discussed below.

CCA/CIO Role #1 (Establish a CIO Position/Title):

The USAF has designated a CIO in writing. Dr. Lawrence Delaney, Assistant Secretary of the Air Force for Acquisitions and the Air Force CIO, accomplished this in August of 1996. The Current Secretary of the Air Force, Dr. James G. Roche, recently restructured the AF-CIO organization establishing direct reporting between the Under Secretary of the Air Force and the AF-CIO in November 2001.

The CCA/CIO mandate is satisfied since the USAF has a CIO. The USAF is not a group of agencies, it is but one military department. Having a CIO at the major and mid-command level is an industry and government-proven "best practice" which provided additional value to mission accomplishment. Given the IT-related objectives of Joint Vision, 2010, Joint Vision -2020, and the Quadrennial Defense Review, that case could be made DoD-wide.

CCA/CIO Role #2 (CIO Designated at Executive Level-IV):

The AF-CIO is a member of the Senior Executive Service. The AF-CIO position is designated Executive Level-IV and SES Level 5/6 which meets the intent of the CCA.

CCA/CIO Role #3 (CIO reports directly to the agency head):

As instructed by SAF Order 560.1, November 26, 2001, The Secretary of the Air Force, Dr. James G. Roche, restructured the AF-CIO organization, establishing direct reporting between the Under Secretary of the Air Force and the AF-CIO.

CCA/CIO Role #4 (IRM is the CIOs principle duty)

As with the above role, SAF Order 560.1, November 26, 2001, The Secretary of the Air Force, restructured the AF-CIO organization. This order readdresses IRM as the AF-CIO primary duty. The AF-CIO is designated the principal adviser on information management, business processes and information technology standards. The AF-CIO and the Deputy CIO are responsible for overall implementation of information technology management policy for the USAF.

CCA/CIO Role #5 (CIO facilitates reviews to ensure efficient IRM processes, including reducing information collection burdens on the public):

Evidence of compliance is listed on the AF-CIO web page, in CIO designation mission documents, and in reviews such as the EXCOM and CIOMB meetings, as well as through the meeting minutes of the EXCOM meetings. Survey response feedback indicated that the AF-CIO office routinely performs this responsibility at the executive and base levels.

CCA/CIO Role #6 (CIO supports defining the agency's program information needs, strategies, systems, and capabilities):

AF-CIO office visibility in this process is evident. There are several instances where evidence of AF-CIO activity are observed, such as the Information Technology Management Plan, the draft IT Strategic Plan, the Air Force Strategic Plan, and the program selection phase of the capital planning processes. The Air Force Information Technology Investment Performance Measurement Guide is being developed to support the development of performance measures that demonstrate the value of the IT contribution to the USFA mission.

CCA/CIO Role #7 (CIO heads a process to evaluate proposed agency collections of information):

The AF-CIO office has a process to evaluate collection of information through the Air Force Information Collection and Reports Program. Survey response feedback indicates this is a highly complex task and continues to be a goal for the AF-CIO office. References to the federal government policy are made in the AF-CIO Strategic Plan, indicating acknowledgement of the responsibility for this role. The researcher found evidence of it's accomplishment through the USAF report to the Secretary of Defense, and the Annual Report to Congress and the President. Efforts are continuing to establish best-practice commercial and government benchmarks for this process.

CCA/CIO Role #8 (CIO provides advice to agency head/management to ensure IT is acquired and IRM done in accordance with PRA'95 and agency-head priorities):

The AF-CIO office is complying with the CCA-mandated IT Capital Planning processes. The AF-CIO office takes part in or leads the IT capital planning and investment control process. The process occurs within the existing corporate structure and the programming and budget process.

CCA/CIO Role #9 (CIO develops, maintains, facilitates an integrated agency IT architecture):

Analysis of documents and reviews of the AF-CIO web page for architecture initiatives indicates that the AF-CIO office is leading the development and implementation of integrated IT and business architectures. The AF-CIO architecture initiatives include documentation of the four general layers (business, data, applications, and technical) and a technical standards reference model. The AF-CIO strategy is to

integrate architecture into core Air Force planning and system development processes. Development of Air Force architecture products is being done within Domain Architecture Councils led by operational and functional communities. The processes being used to develop architecture products are using a collaborative model with cross Air Force and joint service participation.

CCA/CIO Role #10 (CIO monitors/evaluates IT program performance and advises continuation):

IT-related program monitoring is being accomplished in the AF-CIO office, through the CIO Management Board (CIOMB). The process occurs within the existing corporate structure and the programming and budget process. The AF-CIO office oversees an integrated review process of IT expenditures AF-wide to support IT decision making . The process begins at the MAJCOM level. The AF-CIO office does not have broad budget approval authority over IT programs AF-wide. Briefings given by members of the AF-CIO office indicate this impacts CIO effectiveness in controlling IT programs that are over budget, or behind schedule, or not performing well. A result of this lack of control over IT AF-wide programs leads to suboptimizing of resources.

CCA/CIO Role #11 (CIO participates in fiscal year Agency strategic planning and performance evaluation processes):

The AF-CIO office participates in high-level agency strategic planning and performance evaluation processes. Document analyses, survey response feedback, and AF-CIO office briefings indicate a significant involvement in high-level agency strategic planning. The goal is that the CIOs provide an integrated view of information technology programming and budget requests and advise the Air Force senior leadership to ensure

that the funds are appropriately allocated. The CIOs at the MAJCOM level as well as functional communities are now working to establish resource oversight processes so that the AF-CIO can advise USAF leadership on how to apportion funding currently allocated to information technology to support Server/Network Consolidation, Portal and other key IT initiatives.

CCA/CIO Role #12 (CIO assesses IRM skill requirements, develops strategies to rectify deficiencies with plans for hiring, training, and professional development):

The AF-CIO office is continuing its assessment of IRM related skills of the present and future workforce. Evidence suggests that training and educating the IT / IRM workforce is key to institutionalizing the principle of information as an Air Force strategic resource and has been designated as being critical to the future of the Air Force. The USAF continues to certify IT and IRM professionals through the National Defense University, Information Resource Management College (IRMC), Fort McNair, Virginia.

CCA/CIO Role #13. (CIO reports annual progress in improving IRM capability to the agency head):

The AF-CIO reports annual progress in improving IRM capability to the Secretary of the Air Force and the Secretary of Defense. Evidence of an annual performance plan is documented through the AF-CIO web page. Also, many public sources showed objective evidence of the progress of the USAF in this area. The plan submitted is complete with USAF IT initiatives, progress, goals, measures, and results. The plan appears to be updated frequently. Major IT initiatives include the One Air Force—One Network vision, Air Force Server Consolidation, the Air Force Portal, the Global Information Grid, and AF Way.

The FCPEM Checklist for the AF-CIO

Fashioning the Federal CIO Core Competencies to the FCPEM evaluation method provides evaluation criteria for the entire range of IRM-related CIO duties described in the CCA and in other legislation that was linked to the CCA, such as PRA'95. The FCPEM fills a gap in federal guidance, in that no other compliance "checklist" exists. The following table provides support to the AF-CIO office in regard to compliance with the CCA.

Table 37: FCPEM for the AF-CIO

	CIO Roles, Per the CCA (Section 5125)	The Evaluation Standard for Each CIO Role	Goal for/of Agency	Complexity of the CIO Role Area	Related CIO Competency (>30%)	Additional Federal Reference(s)
1	Agency establishes a CIO position/title. 5125(a)(1)(A)&(B)	Was A CIO position formally designated and established?	For	N/A	N/A	OMB 96-02, EO-13011, PRA'95
2	CIO designated at Executive Level-IV 5125 (e)	Is the CIO a member of the Senior Executive Service, Level IV?	Both	N/A	N/A	Title 44 U.S. Code Section 5315
3	CIO reports directly to the agency head 5125 (a)(1)(A)&(B)	Is direct CIO-agency head reporting established in writing?	For	N/A	N/A	PRA'95, OMB Memo96-02
4	IRM is the CIOs principle duty. 5125(c)(1)	Does the designation document make IRM the CIO's principle duty?	For	N/A	N/A	OMB Memo96-02
5	CIO ensures efficient IRM processes, including reducing information collection burdens on the public 5125 a(1)(c)	Does the CIO facilitate reviews to improve IRM-related processes, including reducing the public information collection burden?	Of	High	1, 2, 3, 4	PRA '95, OMB A-130, GPEA, GAO Reports
6	CIO supports defining the agency's program information needs, strategies, systems, and capabilities. 5125 (a)(1)(c)	Is there a CIO & CFO facilitated process for identifying all agency program IT needs, strategies, systems, capabilities?	Both	High	2, 4, 7, 1, 3	PRA '95, OMB A-130, GAO Reports
7	CIO heads a process to evaluate proposed agency collections of information. 5125 (a)(2)	Does the CIO facilitate the evaluation of information collections independent of CIO program roles?	Of	High	2, 5, 1	PRA '95,
8	CIO provides advice to agency head/management to ensure IT is acquired & IRM done IAW PRA '95 and agency head priorities. 5125 (b)(1)/5122(a)	Does the CIO facilitate an IT Capital Planning process, advise agency head/mgmt, & ensure IT is acquired & IRM/ITA are done IAW PRA'95 & agency head priorities?	For	High	1, 2, 7, 4, 8, 6	PRA '95, OMB A-130, OMBMemo96-02, FAR
9	CIO develops, maintains, facilitates an integrated agency IT Architecture (ITA) 5125 (b)(2)	Does the CIO facilitate an ITA that ties to Capital Planning and follows OMB A-130/OMB 97-16 format/guidance?	For	High	7, 1, 2	CIO Council's FEAF, OMB Memo97-02, OMB Memo97-16, OMB A-130
10	CIO monitors/evaluates IT program performance & advises continuation 5125 (c)(2)	Does the CIO review IT programs for <10% variance in cost, schedule, performance?	Of	Medium	2, 6, 7, 5, 1	OMB A-11, OMB A-130, GPRA, PRA'95
11	CIO participates in FY agency strategic planning & performance evaluation processes. 5125 (c)(3)	Is there an agency IT Strategic Plan and is it reflected in the FY Strategic Plan and the Performance Report?	For	High	2, 4, 1	GPRA, OMB A-11
12	CIO assesses IRM skill requirements, develops strategies to rectify deficiencies, w/ plans for hiring, training, professional development 5125 (c)(3)(A),(B)&(C)	Does the agency have a CIO-facilitated IT Workforce Plan that addresses needed IRM skills, training, hiring, & professional development?	Of	Medium	2, 1, 4	OMB A-11, OMB A-130, CIO Council
13	CIO reports annual progress in improving IRM capability to agency head. 5125 (c)(3)(D)	Does the CIO report in writing to the agency head each year on how IRM capability is improving?	For	Medium	1, 2, 5	OMB A-11, PRA'95

V. Discussion

Overview

This chapter discusses the results obtained in chapter four along with implications, limitations of the study, and suggestions for future research. This chapter offers conclusions to the research by summarizing the research done in the previous chapters. This study relied on a self-report of impacts of the Clinger-Cohen Act on the USAF. Results of the content analysis of the respondent perceptions are reported. These data are used to answer the investigative questions, as well as make recommendations regarding future implications of the CCA and its impact on the USAF.

Discussion of Research Questions

Research Question #1)

Are the USAF implementation efforts consistent with the intent of the CCA?

This study shows that the USAF and the AF-CIO Office is highly compliant with the requirements of the CCA in all areas evaluated using the FCPEM. The USAF has set-up its CIO position in accordance with the mandates of the Clinger-Cohen Act. The FCPEM was specifically designed to evaluate compliance with mandated CIO roles against a matrixed set of Role Evaluation Standards and the Federal CIO Core Competencies.

Research Question #2)

To what extent can a model of the AF-CIO position illustrate the level of the AF-CIO office implementation efforts?

This study reports the results of the Federal CIO Position Model representing the AF-CIO. Bernard's Federal CIO Position Model was usable for this task. The model was tailored for the AF-CIO position by recommendation from Bernard (Bernard, 2001b). The respondents responded to the model in a meaningful way. The respondents were able to respond to the questions from Bernard's FCPEM model, indicating it was appropriate for the AF-CIO organization. The results of the analyses made sense in light of the purpose of the study. This model appears to be appropriate because it recognizes the social/managerial characteristics of the CIO position and the organizational environment in which the CIO works. Bernard's validation of the model made it applicable to this study. The model depicts what a CIO should know and where that knowledge should be applied in the organization. It also provides a greater understanding of how the AF-CIO position relates to IRM policy implementation and how to evaluate it in terms of the CCA

The model is representative of current events in the USAF. Recently, in a letter to Deputy Chief of Staff (DCS) for Communications and Information (AF/SC) dated 25 Jan 02, the AF-CIO re-delegated a large amount of its inherent technical responsibilities to AF/SC in preparation for transition to a new organizational structure and creation of the office of the DCS for Warfighting Integration (AF/XI), and the Directorate of Communications and Operations (AF/ILC). AF/XI and AF/ILC subsumes AF/SC by 1 April 02 (DAF, 2002a; DAF, 2002b).

The organizational structure change supports the results of this study. Figure 19 in Chapter 4 depicts the AF-CIO Position Model that relates to this recent change in organizational structure. The organizational structure change positions the AF-CIO to provide enterprise architecture, framework policy, and business process reengineering guidance for the USAF. This is characteristic of the managerial and institutional level of an organization as identified in the Parsons/Thompson model. AF/XI and AF/ILC will be responsible to implement AF-CIO guidance across the USAF. This is also characteristic of the Parsons/Thompson model in that the core technical processes, the product and service producing division of the organization, are responsible to implement direction from the institutional and managerial levels.

Research Question #3)

What outcomes can be found as a result of the CCA and the AF-CIO office.

A) The Federal CIO Core Competencies,

48 outcome/impacts areas were reported. Over 95% of the comments received were categorized as positive. One of the most frequently reported positive responses regarded a standardized approach to accomplishing CIO duties. For example, standard approaches to IT services and performance measures have reportedly made an impact on IRM processes and implementation efforts. Another example relates to a teaming approach that optimizes base resources. Localized working groups have formed that capitalize on information sharing, policy implementation, and IRM.

Less than 5% of the comments received were classified as negative outcomes. An example of one negative comment stated that the USAF has too many System Program Offices running high overheads, yet share little information with the rest of the USAF.

B) The performance based aspects of the CCA, Section 5123,

65 outcome/impact areas were reported. Over 75% of the comments received were categorized as positive. The most frequently reported positive response related to the USAF incorporation of business or industry models when developing IT/IRM policy, managing projects, and establishing IT performance measures. While there were a few comments that suggested caution with this approach due to the nature of military purposes, they generally supported benchmarking from industry. Another example regards the results of what is commonly referred to as the "famous west coast meetings" by USAF senior leaders. The USAF and AF-CIO IT initiatives that resulted from the meeting were generally regarded as positively influencing the direction of IT performance in the future. However, a few comments mentioned that comparing the USAF to Silicon Valley and their centralization approach was irrational.

Less than 25% of the comments received were classified as negative. An example of an area of negative comments related to the USAF IT budget. Apparently some organizations have lost significant amounts of their budgets because they could not demonstrate improvements had occurred in their operational missions as a result of a previously implemented IT investment. Another example of a high number of negative responses simply stated that it was too soon to tell what the impacts are in the area of performance and results based measurements. The researcher categorized this as a negative comments because of the length of time the mandates have been in affect.

Although it was apparent from the responses that enforcing the requirements has been difficult for a number of political and economic reasons.

C) Key IRM achievement areas from the public and the private sector,

63 outcome/impact areas were reported. Nearly 60% of the comments received were categorized as negative. The section asks "Has the AF-CIO Office achieved significant outcomes related to [Key IRM Achievement Areas identified through previous research and reports]." The most frequent negative response reported was that while the outcome/impacts may be realistic to IT/IRM, it was not realistic to USAF operations. Reasons behind this response range from explanations that "it's too early to make an assessment," to citing the USAF is going the right direction but "lacks funding, staff, and leadership at the current time." Other negative responses mentioned much of the IT policies and vision of the AF-CIO office is not understood, citing that carryovers from the Total Quality Management (TQM) culture hinders understanding, and reporting.

The positive outcomes/impacts in this section relate to the effort the AF-CIO office has made in leading IRM transformation in the USAF. Many respondents recognized that it may be too early to compare measurements of Key IRM Achievement Areas in the private sector to the USAF. They also mentioned that the AF-CIO office is proceeding in the right direction, evidenced by an enterprise approach, network-centric operations support, and a responsive organizational structure to carryout strategic plans.

D) The roles and responsibilities of the AF-CIO.

In January of 2002, the AF-CIO office outlined the roles and responsibilities of MAJCOM CIOs and HAF Functional CIO representatives. The descriptions are found in Appendix C. Survey respondents were asked to judge this product. 85% felt it was

appropriate. 80% felt it should not be changed at all. When asked about roles in terms of the level they are currently serving, more than half stated they performed all of the roles and responsibilities cited by the AF-CIO office.

The analysis of shortfalls revealed Manpower and Staffing being cited as the largest shortfall by nearly 50% of the respondents. Funding was a close second with a selection rate of over 33%. An implication of this data is that while leadership is dealing with the burden to make major changes related to CIO duties, their jobs are made even more difficult by the fact that they lack the resources of manpower and funding to carry them out. Many respondents offered suggestions. For example, some respondents related that there is no way to get visibility into what functional users are spending on IT. Further, they "need this type of data to be able to show how consolidated efforts can save the AF and MAJCOMs funds, manpower, etc." Others explain that with greater responsibility for capital planning and investment control in the AF-CIO hands, "…it somehow gets lost at the MAJCOMs when the money for IT seems to find its way into budgets other than the SC's." Lastly, suggestions were made regarding the participation of the AF-CIO in the command/functional coordination with Pentagon Functional organizations where "lots of money is being wasted looking strictly at functional requirements only, without regard to organic support at the local bases", suggesting optimization of resources could result if the suggestions are followed.

Research Question #4)

Have changes in USAF operations occurred as a result of instituting an AF-CIO office?

Based on the self report responses from Part 1 of the web-based survey, and a content analysis of those responses by the researcher, the evidence supports the conclusion that many changes have occurred in the USAF as a result of the CCA and the AF-CIO office. Over 20 areas were identified by the researcher as having notable changes, based on the content analysis of the perception of the respondents. While a number of the impact areas cited positive changes, others revealed that possible confusion and a lack of action have effected little change.

Though it has been nearly six years since the passage of the CCA, it was noted that a large number of respondents perceived it was generally to soon to tell if the CCA has made changes in the USAF. This could possibly be explained by the amount of change that has been occurring at the highest levels of the AF-CIO office, such as changes of leadership and organizational structure occurring continuously since 1998. Lending to this observation is the perception that shortages in staffing and funding make it difficult to prioritize and execute mission and support operations.

What is commonly known as the USAF "IT Initiatives" garnered a large number of positive comments. IT Initiatives included projects such as AFWay, the AF Portal, AF E-mail/Server/Network Consolidation, and Improved Visibility in IT Expenditures. The IT Initiatives resulted from the IT Summit after a visit to successful IT industry performers by top Air Force officials. Related to this change was an equally large number of comments related to Business Case/Model Development. Several comments

noted a change in focus to IRM as business entities, as opposed to IT being a utility provided by a support organization.

Research Question #5)

How have these changes impacted the USAF?

Based on the self reported responses from Part 1 of the web-based survey, and a content analysis of those responses by the researcher, the data suggests there are perceived changes in the USAF as a results of the CCA and that these changes have purportedly impacted the USAF in a number of ways. The study suggests that, overall the changes mentioned previously have impacted the USAF. A thematic summary technique was used to categorize the changes. Categories of comments were judged on themes rather than exact wording or word counts making it flexible enough to combine like themes for the purpose of summarizing how the perceived changes have impacted to the USAF since the CCA. It cannot be said conclusively that these changes have occurred, only that an observation of the respondents perceptions suggest these changes have impacted the USAF as a result of the CCA and the influence of the AF-CIO office.

1. IRM responsiveness contributes to effective mission accomplishment.
2. Strategic planning includes IT and the information.
3. Technology has improved efficiency.
4. Baseline performance measurements are more realistic.
5. Alignment of organizational structure provides critical services.
6. Standardization of policy and processes optimizes IT resources.

As evidenced in previous chapters, research into the management of information and information resources has focused on these particular areas over the past few years.

Limitations

As with all studies, there are limitations. This study relied on a self-report of impacts of the Clinger-Cohen Act on the USAF. Therefore, this study can be no more accurate than the respondent's knowledge, experience of, and willingness to disclose their perceptions of what they believe the CCA impacts to be on the USAF. The survey used in this study posed the question in the form "what changes have occurred as a result of the CCA…" in specific areas of interest to the researcher. However, it did not specifically address other areas where the CCA may have had impacted. A follow on survey that addresses this may produce different results.

The survey instrument administered in this study was based, in part, on a validated instrument that was originally administered though face-to-face interviews. Though it was based on research undertaken by others, it had not been previously validated as a web based survey instrument. Further validation of the survey should gain more accurate and generalizable results.

Some of the stratification information was lost during the process of data collection. However, statistical analysis of the data suggests that this did not appreciably alter the analysis or conclusions.

The focus of this study was on USAF issues and AF CIO leaders/managers, not others with potentially useful information. The study proposed that asking IRM leaders at various organizational levels in the USAF would likely be the best approach to determining what impacts the CCA has had on the USAF. A follow-on study including individuals in the enlisted corps or various operations/support organizations may produce different results.

While the goal was to survey the entire population of AF CIO leaders/managers, about 20% were not reached. The AFIT/RR database used for identifying the theoretical population appeared to have correct individual personnel data in the database, but incorrect or non-updated data fields specific to the duty location where the individuals are actually assigned. Losing partial capability to conduct a census may have impacted the reliability and accuracy of the results. Also, it is impossible to know exactly how many participants attempted to complete the survey but were unable due to technical difficulties such as web server errors or communications failures, but few people actually reported such problems to the researcher.

Finally, the hypothesis test at an alpha level of .05 resulted in 2 of the 42 questions asked being rejected. At the 95% level, it is statistically likely that this would happen through sampling error. As a result, it is uncertain whether the categories of Project and Program Management, and Budget Requests may be a statistical artifact. A follow-on study may produce different results.

Recommendations for Future Research

This study applied a model to assess compliance with the Clinger Cohen Act (CCA) by the USAF and the impacts it has had as a result. Using a model to verify compliance with federally mandated legislation is just one approach. Other approaches could be pursued to research the impacts. A verification of the results of this exploratory study through other methodologies could be undertaken. Verifying the results of this study would confirm if the two of forty questions where equality between the populations was rejected is repeatable, or if they exist as statistical artifacts. Conducting research on

specific topics such as financial assessment, interoperability assessment, strategic IT assessment, or IT performance assessment could further the research and add to the body of knowledge of IRM research.

Another possible research effort could be conducted to compare the branches of the military service. Undertaking similar studies of other military services for comparison could provide a plausible list of DoD best practices or areas to avoid. The results could benefit IRM researchers as well as practitioners.

Researchers could conduct studies over time to follow the continued evolution of impacts of Clinger-Cohen Act. Academics could replicate or otherwise explore the hypothesis tests conducted in this study to test for validity of research findings. One approach would be to take the findings of this research and develop hypotheses and a research design to quantify the outcomes in terms of correlation and statistical power.

Lastly, using the results of this study, a follow-on study could be undertaken to explore how the AF-CIO has addressed the IT spending portion of the Clinger-Cohen Act. The study explore the AF-CIO office in its efforts to reduced overall IT expenditures, increase the performance of IT programs, or improve the quality and impact of federal IT management.

Conclusions

Responses to the web-based survey substantiate the USAF is in compliance with the CCA according to the analysis of survey respondents. The Clinger-Cohen Act requires that agencies appoint Chief Information Officers and implement procedures to improve capital planning, performance measurement and enterprise architectures to

ensure efficient management of IT. Bernard's FCPEM provides a means to determine compliance with the CCA. This research concludes the USAF is highly compliant with the CCA.

Results from this study suggest that the Clinger-Cohen Act impacts have had a positive affect on the USAF in key areas. Key areas have been identified by the survey respondents where results have been experienced and changes have been made. Several respondents stated it is too early to tell what impacts have been made yet. Even today these areas are being closely studied for their potential to affect changes in the USAF.

Evidence suggests that Bernard's model is relevant to AF-CIO position. This research demonstrated the first use of the FCPEM and CIO Position Model for CCA compliance and an explanation from an organizational theory perspective for a military service under the Department of Defense (DoD). The model depicts what a CIO should know and where that knowledge is to be applied in the organization.

Responses reveal impact areas for further study. The continued and future trends and developments that can be expected by the AF-CIO, and those involved with the management of information, are likely to cover three broad areas; 1) involvement in high-level strategic business planning, 2) focus on technology as business opportunities and solutions, and 3) organizational culture and structure in the provisioning of critical services.

This study was conducted to explore and better understand the impacts of the CCA on the USAF. It is intended the information gathered could be useful to the AF-CIO office, as well as information researchers. As the Air Force's deployment and use of information initiatives evolves, the needs of its members will change. This exploratory

study of the impacts of the Clinger-Cohen Act on the USAF provides an interim step in the assessment of IT and IRM within the Air Force organization.

Appendix A

Clinger-Cohen Act of 1996

Reporting: SEC. 5123. PERFORMANCE AND RESULTS-BASED MANAGEMENT.

In fulfilling the responsibilities under section 3506(h) of title 44, United States Code, the head of an executive agency shall--

(1) establish goals for improving the efficiency and effectiveness of agency operations and, as appropriate, the delivery of services to the public through the effective use of information technology;

(2) prepare an annual report, to be included in the executive agency's budget submission to Congress, on the progress in achieving the goals;

(3) ensure that performance measurements are prescribed for information technology used by or to be acquired for, the executive agency and that the performance measurements measure how well the information technology supports programs of the executive agency;

(4) where comparable processes and organizations in the public or private sectors exist, quantitatively benchmark agency process performance against such processes in terms of cost, speed, productivity, and quality of outputs and outcomes;

(5) analyze the missions of the executive agency and, based on the analysis, revise the executive agency's mission-related processes and administrative processes as appropriate before making significant investments in information technology that is to be used in support of the performance of those missions; and

(6) ensure that the information security policies, procedures, and practices of the executive agency are adequate.

(c) DUTIES AND QUALIFICATIONS- The Chief Information Officer of an agency that is listed in section 901(b) of title 31, United States Code, shall--

(1) have information resources management duties as that official's primary duty;

(2) monitor the performance of information technology programs of the agency, evaluate the performance of those programs on the basis of the applicable performance measurements, and advise the head of the agency regarding whether to continue, modify, or terminate a program or project;

and

(3) annually, as part of the strategic planning and performance evaluation process required (subject to section 1117 of title 31, United States Code) under section 306 of title 5, United States Code, and sections 1105(a)(29), 1115, 1116, 1117, and 9703 of title 31, United States Code--

(A) assess the requirements established for agency personnel regarding knowledge and skill in information resources management and the adequacy of such requirements for facilitating the achievement of the performance goals established for information resources management;

(B) assess the extent to which the positions and personnel at the executive level of the agency and the positions and personnel at management level of the agency below the executive level meet those requirements;

(C) in order to rectify any deficiency in meeting those requirements, develop strategies and specific plans for hiring, training, and professional development; and

(D) report to the head of the agency on the progress made in improving information resources management capability.

SEC. 5303. REPORT.

(a) REQUIREMENT- Not later than 180 days after the completion of a pilot program under this title, the Administrator shall--

(1) submit to the Director a report on the results and findings under the program; and

(2) provide a copy of the report to Congress.

(b) CONTENT- The report shall include the following:

(1) A detailed description of the results of the program, as measured by the criteria established for the program.

(2) A discussion of any legislation that the Administrator recommends, or changes in regulations that the Administrator considers necessary, in order to improve overall information resources management within the federal government.

(3) COMPTROLLER GENERAL REVIEW AND REPORT- (A) Not later than three years after the date on which the pilot program is established, the Comptroller General of the United States shall review the pilot program and report to the Congress on the results of the pilot program.

(B) The report shall include the following:

(i) An evaluation of the extent to which there is competition for the orders placed under the pilot program.

(ii) The effect that the streamlined procedures under the

pilot program have on prices charged under multiple award schedule contracts.

(iii) The effect that such procedures have on paperwork requirements for multiple award schedule contracts and orders.

(iv) The impact of the pilot program on small businesses and socially and economically disadvantaged small businesses.

Appendix B

Roles, responsibilities, and accountability. CCA section 5125 :

(b) GENERAL RESPONSIBILITIES - The Chief Information Officer of an executive agency shall be responsible for--

(1) providing advice and other assistance to the head of the executive agency and other senior management personnel of the executive agency to ensure that information technology is acquired and information resources are managed for the executive agency in a manner that implements the policies and procedures of this division, consistent with chapter 35 of title 44, United States Code, and the priorities established by the head of the executive agency;

(2) developing, maintaining, and facilitating the implementation of a sound and integrated information technology architecture for the executive agency; and

(3) promoting the effective and efficient design and operation of all major information resources management processes for the executive agency, including improvements to work processes of the executive agency.

(c) DUTIES AND QUALIFICATIONS- The Chief Information Officer of an agency that is listed in section 901(b) of title 31, United States Code, shall--

(1) have information resources management duties as that official's primary duty;

(2) monitor the performance of information technology programs of the agency, evaluate the performance of those programs on the basis of the applicable performance measurements, and advise the head of the agency regarding whether to continue, modify, or terminate a program or project; and

(3) annually, as part of the strategic planning and performance evaluation process required (subject to section 1117 of title 31, United States Code) under section 306 of title 5, United States Code, and sections 1105(a)(29), 1115, 1116, 1117, and 9703 of title 31, United States Code--

(A) assess the requirements established for agency personnel regarding knowledge and skill in information resources management and the adequacy of such requirements for facilitating the achievement of the performance goals established for information resources management;

(B) assess the extent to which the positions and personnel at the executive level of the agency and the positions and personnel at management level of the agency below the executive level meet those requirements;

(C) in order to rectify any deficiency in meeting those requirements, develop strategies and specific plans for hiring, training, and professional development; and

(D) report to the head of the agency on the progress made in improving information resources management capability.

Appendix C

MAJCOM CIOs and HAF Functional CIO Representatives
Roles and Responsibilities
2 January 2002

The Air Force has been remarkably successful in exploiting information technology to become the most powerful force on earth. Now, our leaders expect even more from technology--and we can deliver. This paper outlines our roles and responsibilities for working together, as a CIO Community, so we can do even more than we have done in the past. As CIOs, our primary duty is to advise the mission leaders on the most effective use of IT. As a community, our common obligation is to share ideas, insights, and inspirations to help us collectively meet or exceed mission objectives. Whether implementing the global strike task force or taking better care of Air Force people, senior leadership is counting on IT and the CIO Community to make a difference.

The following roles and responsibilities provide a top-level framework to carry out our challenge. Sound capital planning and investment can give senior leadership a decision support structure for IT investments. Practical acquisition principles can ensure reliable, consistent development and fielding of computer systems (hardware, software, operational processes, etc.). Performance measures are necessary to set our goals and demonstrate our progress toward achieving them. Information assurance must be "designed-in" and an integral part of all our processes and decisions. We must be careful to distinguish between standards (which we want) and standardization (which we may not want or may want in specific instances). Strategic planning is the handshake (on mutual expectations of mission improvement) among the commanders, functionals, and the IT community. Architectures must be developed and used to drive investments and capabilities fielded. Training and education gives the workforce the IT skills, knowledge, and ability to carry out their duties. Finally, knowledge management provides the foundation to tap into the workforce mission/business intelligence and convert that expertise into electronic intellectual capital.

Capital Planning and Investment Control:

· Establish Capital Planning and Investment Control processes to oversee management and evaluation of MAJCOM/Functional IT investments (based on sound business process analysis/reengineering and business case analysis). Identify IT contract efforts which experience significant deviation from cost, performance, or schedule goals.

· Integrate IT resource decisions with the HAF and MAJCOM planning, budgeting, and program management processes and priorities.

· Analyze Functional or MAJCOM budget inputs and expenditures to certify IT budget requests are clearly identified and comply with Air Force IT guidelines regarding standards, architectures, and business process improvements.

· Determine whether the functional mission or MAJCOM function to be supported by new IT investments should be performed by AF personnel, contracted support, or privatized.
· Ensure appropriate reviews of the Air Force systems compliance databases to optimize reuse and minimize duplication of systems/applications. Include proposed new systems in the systems compliance database. Where appropriate, use a modular contracting approach (as defined by Clinger-Cohen Act) which may be helpful in evaluating IT contracting effectiveness.

Information Technology Acquisition:
· Advise and assist the Headquarters Air Force Functional two-letter, or MAJCOM/CC and other senior MAJCOM management to acquire IT in accordance with enterprise objectives. Life cycle management should focus on projected versus actual costs, benefits and risks, IAW AF-CIO policies and procedures.
· Ensure a Command, Control, Communications, Computers and Intelligence Support Plan (C4ISP), Certificates of Networthiness, and Certificates to Operate are obtained for all new and major modifications to existing functional systems.
· Participate in Clinger-Cohen Act Compliance reviews for AF systems and conduct reviews as required for MAJCOM or Functional unique systems.
· Ensure IT acquired meets the requirements of 5 U.S.C Section 508, or can be adapted to meet Sec 508, to ensure equal access to information environments for people with disabilities.

Performance Measures:
· Assist HAF Functional areas/ MAJCOM level and Functional organizations in establishing goals for improving productivity, efficiency and effectiveness of operations and the delivery of services through appropriate and effective use of IT.
· Assess IT investments and progress on key Air Force IT initiatives against performance goals.

Information Assurance:
· Monitor information protection states for all network/systems within the MAJCOM/HAF Functional area and participate in risk-based evaluations to support operational upgrades or operational decisions.
· Ensure new systems comply with security architectures and are properly certified/accredited and support an overall security plan.
· Provide oversight for MAJCOM/Functional systems reporting processes for Government Information Security Reform Act (GISRA).
· Enforce AF CIO's vision and strategy with respect to information assurance to include the five pillars of IA (availability, integrity, confidentially, authenticity, and non-repudiation).
· Capture and report standardized information assurance metrics as indicated in AF-CIO policy to support the Clinger-Cohen Act, Government Information Security Reform Act (GISRA) and other DoD and Federal Government requirements.

· Ensure IT resource decisions include robust information assurance considerations and are integrated with the HAF and MAJCOM planning, budgeting, and program management processes.
· Ensure personnel receive appropriate information security training.

Standards & Architecture:
· Facilitate development, and provide oversight to ensure compliance with AF Enterprise and applicable domain architectures and IT standards.

Strategic Planning:
· Advise/assist the AF-CIO in defining strategic direction, deciding issues, and in reviewing proposed policies, methods and approaches.
· Develop and maintain a functional area or MAJCOM information resources management (IRM) strategy consistent with the AF-CIO direction and incorporate the strategy in the Functional or MAJCOM strategic plan.
· Help develop, mature, and implement the AF-CIO Strategy.
· Include information management public law issues in all planning, programming and budgeting. This includes records management, The Privacy Act, The Freedom of Information Act, The Paperwork Reduction Act, The Information Technology Management Reform Act, Government Paperwork Elimination Act and OMB Circular A-130.

Training and Education:
· Provide oversight of the IT workforce development program.
· Provide continuing education for the CIO Community.
· Provide oversight of IT user training.

Information and Knowledge Management:
· Promote effective information sharing and management.
· Oversee and develop strategic guidance for the Records Management and Administrative Communications Program.
· Oversee and develop strategic guidance for the MAJCOM Data Administration Program.
· Oversee and interpret AF guidance for the MAJCOM Freedom of Information Act and Privacy Act Programs.
· Enforce federal statutory and regulatory requirements that impact information management.

Process Improvement:
· Develop active partnerships with mission and business owners seeking to transform their operations with information technology infusions.

Technology Assessment:
· Advocate state of the art technology that gives us the competitive edge while balancing the technological risk, costs, and objectives when fielding new technologies.

E-Government/E-Business:

· Advocate E-initiatives, such as E-Commerce, that lead to more effective and efficient mission/business practices.

Appendix D

AF-CIO Focus Areas

"Architecture: Integrated Operational, Systems, and Technical Architectures or "views" will comprise the Air Force Information Technology Architecture required by the Information Technology Management Reform Act/Clinger-Cohen Act of 1996. This set of integrated IT architectures will help the Air Force CIO guide the evolution and maintenance of its existing information technology (IT) systems, and the acquisition of new IT systems, to achieve Air Force strategic missions and goals for the 21st century.

Business Process Reengineering: The fundamental re-thinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed. Seeks breakthroughs, not by enhancing existing processes, but by discarding and replacing them with entirely new ones. The ITMRA require processes to be redesigned and improved before the acquisition of technology.

Capital Planning and Investment Control: The CIO shall provide assistance to the Secretary of the Air Force and other senior management personnel to ensure that information technology is acquired and information resources are managed in a manner that implements the ITMRA and the PRA.

Information Resource Management: Information Resource Management (IRM) is a management function dealing with efficient management of information and data elements throughout their lifecycle. IRM encompasses the planning, budgeting, and supervising of the facilities, systems and organizations associated with government information in accordance with public laws and regulations. It covers both the information itself and related resources, such as personnel, hardware, software, funds, and technology. The Air Force's IRM program supports the delivery of Air Force programs and the conduct of internal management functions through the administration of computer, telecommunications and related technologies and management of forms, reports, and automated and manual information systems.

Information Technology Acquisition: Section 5124 of the ITMRA restored the IT acquisition authority of Federal Executive Agencies, which included the Military Services. In general, this authority includes the following:

1) To acquire IT as authorized by law.

2) To enter into a contract that provides for multi agency acquisitions of IT in accordance with guidance issued by the Director of OMB.

3) If the OMB Director finds that it would be advantageous for the federal government to do so, to enter into a multi-agency contract for procurement of commercial items of IT that requires each Executive Agency covered by the contract, when procuring such items, either to procure the items under that contract or to justify an alternative procurement of the items.

Performance Measures: In fulfilling the responsibilities of the Information Technology Management Reform Act/Clinger-Cohen Act 1996 (ITMRA), Paper Reduction Act (PRA), and the Government Performance Results Act (GPRA), the Secretary of the Air Force establishes goals for improving the efficiency and effectiveness of Air Force operations. The Air Force CIO advises the Secretary on improving the effectiveness of Air Force operations through the effective use of information technology.

Standards: Conform to standards outlined in the JTA and DISA Center for Standards.

Strategic Plan: The Air Force Director of Communications and Information produced an Information Technology Management Strategic Plan in 1997, in direct response to the Clinger-Cohen Act 1996. A new plan is under development to more closely align the AF-CIO with Air Force strategic planning. The AF-CIO Strategic Plan, is intended to guide development of more detailed plans but will not address specific programs, projects, or detailed budgets. Implementation plans will pick up where the strategic plan ends.

Training and Education: Training and educating all Air Force personnel in the concepts and tenets of Information Resources Management IRM) is key to the successful use of Information Technology (IT) by the Air Force. Institutionalizing the precept of information as an Air Force strategic resource is critical to the future of the Air Force. The CIO is charged with these responsibilities."

Appendix E

Clinger-Cohen Core Competencies
Revised September 2000

The Clinger-Cohen Core Competencies have been endorsed to serve as a baseline to assist government agencies in complying with Section 5125(C)(3) of the Clinger-Cohen Act. To perform effectively in each competency area below, an organization should possess the knowledge, skills and abilities in each competency.

1.0 Policy and Organizational

1.1 Department/Agency missions, organization, functions, policies, procedures
1.2 Governing laws and regulations (e.g., Clinger-Cohen, GPRA, PRA, GPEA, OMB Circular A-130 , PDD 63)
1.3 Federal government decision-making, policy making process and budget formulation and execution process
1.4 Linkages and interrelationships among Agency Heads, COO, CIO, and CFO functions
1.5 Intergovernmental programs, policies, and processes
1.6 Privacy and security
1.7 Information Management

2.0 Leadership/Managerial

2.1 Defining roles, skill sets, and responsibilities of Senior Officials, CIO staff and stakeholders
2.2 Methods for building federal IT management and technical staff expertise
2.3 Competency testing - standards, certification, and performance assessment
2.4 Partnership/team-building techniques
2.5 Personnel performance management techniques
2.6 Principles and practices of knowledge management
2.7 Practices which attract and retain qualified IT personnel

3.0 Process/Change Management

3.1 Techniques/models of organizational development and change
3.2 Techniques and models of process management and control
3.3 Modeling and simulation tools and methods
3.4 Quality improvement models and methods
3.5 Business process redesign/reengineering models and methods

4.0 Information Resources Strategy and Planning

- 4.1 IT baseline assessment analysis
- 4.2 Interdepartmental, inter-agency IT functional analysis
- 4.3 IT planning methodologies
- 4.4 Contingency planning
- 4.5 Monitoring and evaluation methods and techniques

5.0 IT Performance Assessment: Models and Methods

- 5.1 GPRA and IT: Measuring the business value of IT, and customer satisfaction
- 5.2 Monitoring and measuring new system development: When and how to "pull the plug" on systems
- 5.3 Measuring IT success: practical and impractical approaches
- 5.4 Processes and tools for creating, administering, and analyzing survey questionnaires
- 5.5 Techniques for defining and selecting effective performance measures
- 5.6 Examples of and criteria for performance evaluation
- 5.7 Managing IT reviews and oversight processes

6.0 Project/Program Management

- 6.1 Project scope/requirements management
- 6.2 Project integration management
- 6.3 Project time/cost/performance management
- 6.4 Project quality management
- 6.5 Project risk management
- 6.6 Project procurement management

7.0 Capital Planning and Investment Assessment

- 7.1 Best practices
- 7.2 Cost benefit, economic, and risk analysis
- 7.3 Risk management- models and methods
- 7.4 Weighing benefits of alternative IT investments
- 7.5 Capital investment analysis- models and methods
- 7.6 Business case analysis
- 7.7 Integrating performance with mission and budget process
- 7.8 Investment review process
- 7.9 Intergovernmental, Federal, State, and Local Projects

8.0 Acquisition

8.1 Alternative functional approaches (necessity, government, IT) analysis
8.2 Alternative acquisition models
8.3 Streamlined acquisition methodologies
8.4 Post-award IT contract management models and methods, including past performance evaluation
8.5 IT acquisition best practices

9.0 E-Government/Electronic Business/Electronic Commerce

9.1 Strategic business issues & changes w/advent of E-Gov/EB/EC
9.2 Web development strategies
9.3 Industry standards and practices for communications
9.4 Channel issues (supply chains)
9.5 Dynamic pricing
9.6 Consumer/citizen information services
9.7 Social issues

10.0 IT security/information assurance

10.1 Fundamental principles and best practices in IA
10.2 Threats and vulnerabilities to IT systems
10.3 Legal and policy issues for management and end users
10.4 Sources for IT security assistance
10.5 Standard operating procedures for reacting to intrusions/misuse of federal IT systems

11.0 Technical

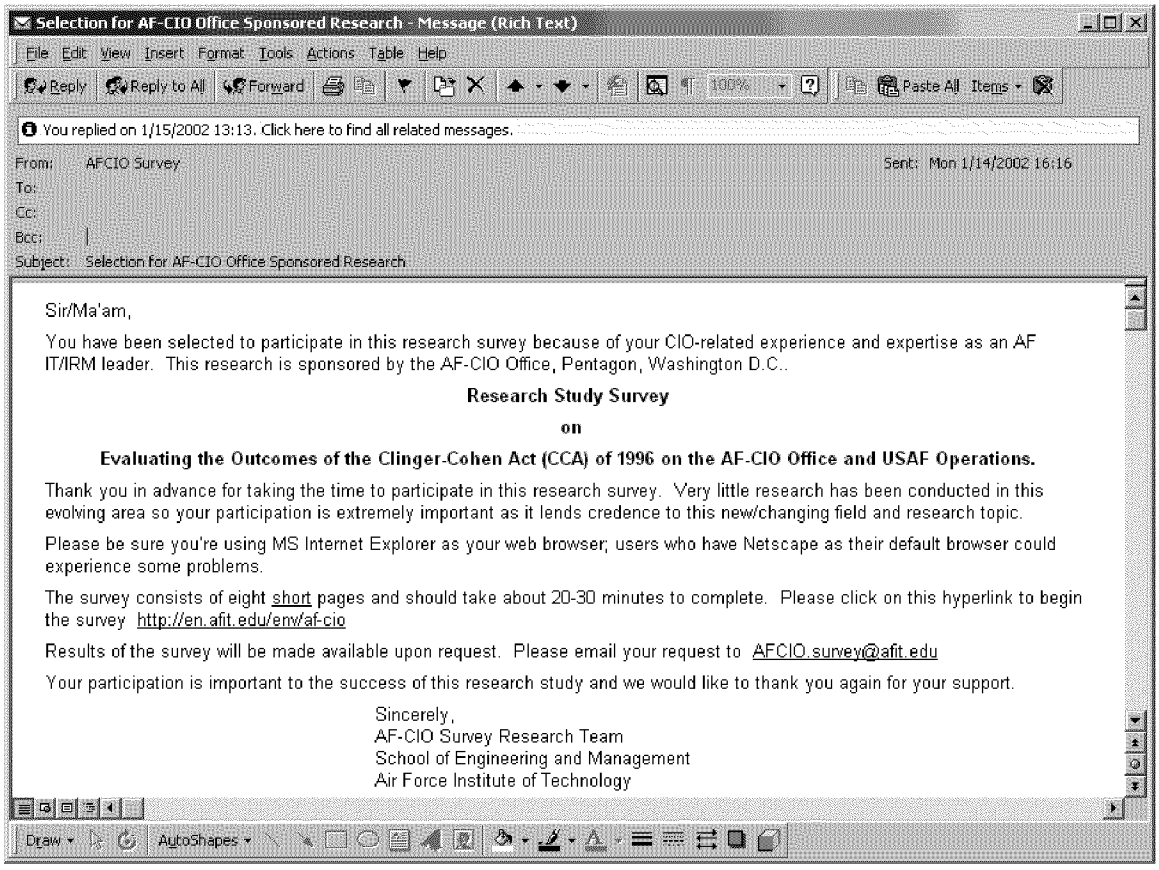
11.1 Information technology architectures, client/server, collaborative processing, telecommunications
11.2 Emerging/developing technologies
11.3 Information delivery technology (internet, intranet, kiosks, etc.)
11.4 Software development
11.5 Data management

12.0 Desk Top Technology Tools

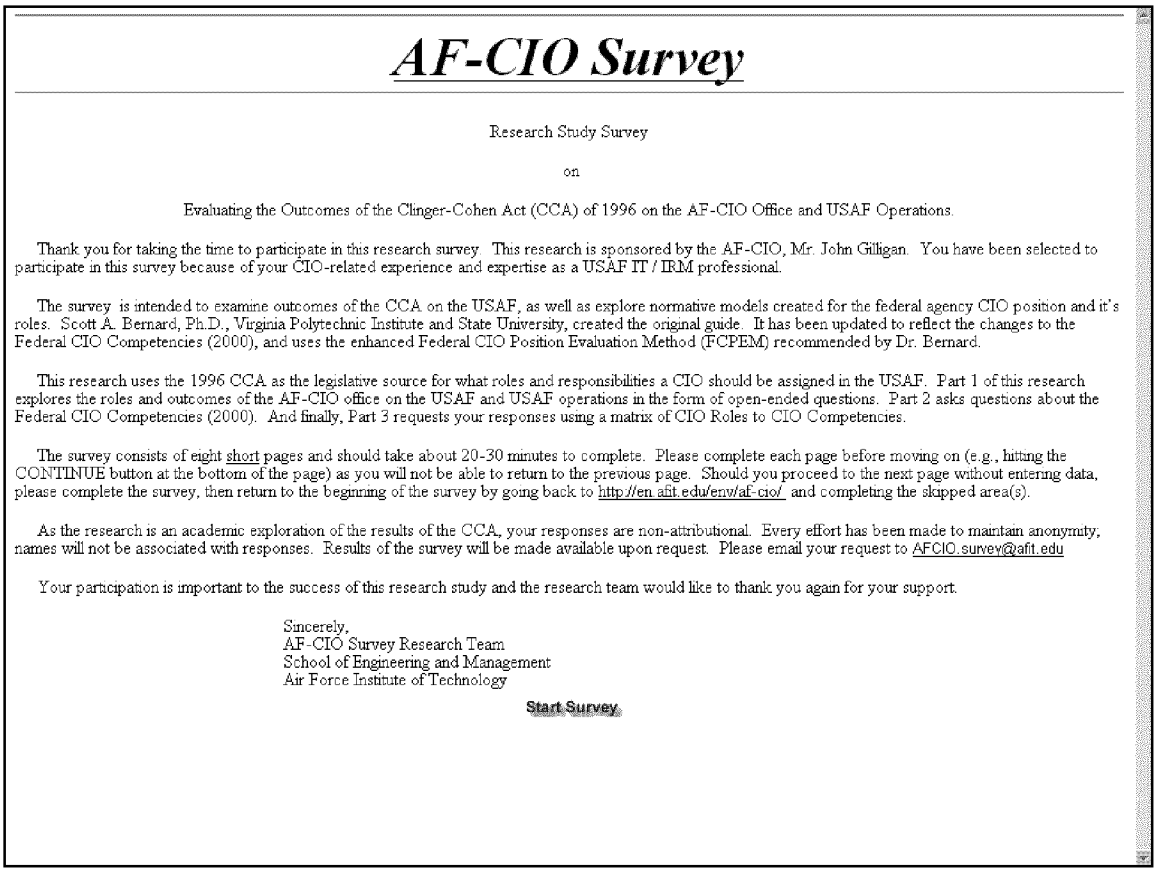
Appendix F

Screenshots of the web-based survey.

Screenshots of the original e-mail notification sent to 204 potential respondents



Screenshot of the Introduction page



AF-CIO Survey

Research Study Survey

on

Evaluating the Outcomes of the Clinger-Cohen Act (CCA) of 1996 on the AF-CIO Office and USAF Operations.

Thank you for taking the time to participate in this research survey. This research is sponsored by the AF-CIO, Mr. John Gilligan. You have been selected to participate in this survey because of your CIO-related experience and expertise as a USAF IT / IRM professional.

The survey is intended to examine outcomes of the CCA on the USAF, as well as explore normative models created for the federal agency CIO position and it's roles. Scott A. Bernard, Ph.D., Virginia Polytechnic Institute and State University, created the original guide. It has been updated to reflect the changes to the Federal CIO Competencies (2000), and uses the enhanced Federal CIO Position Evaluation Method (FCPEM) recommended by Dr. Bernard.

This research uses the 1996 CCA as the legislative source for what roles and responsibilities a CIO should be assigned in the USAF. Part 1 of this research explores the roles and outcomes of the AF-CIO office on the USAF and USAF operations in the form of open-ended questions. Part 2 asks questions about the Federal CIO Competencies (2000). And finally, Part 3 requests your responses using a matrix of CIO Roles to CIO Competencies.

The survey consists of eight short pages and should take about 20-30 minutes to complete. Please complete each page before moving on (e.g., hitting the CONTINUE button at the bottom of the page) as you will not be able to return to the previous page. Should you proceed to the next page without entering data, please complete the survey, then return to the beginning of the survey by going back to http://en.afit.edu/env/af-cio/ and completing the skipped area(s).

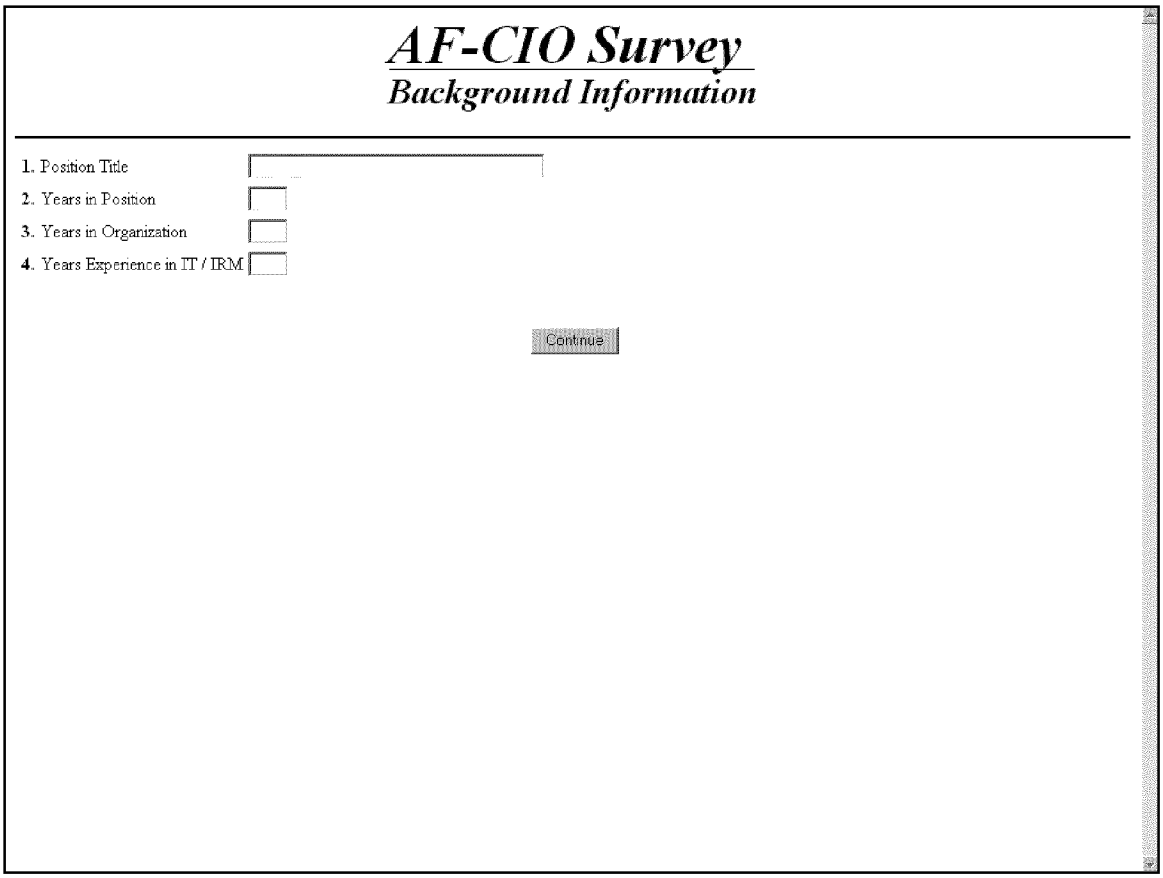
As the research is an academic exploration of the results of the CCA, your responses are non-attributional. Every effort has been made to maintain anonymity; names will not be associated with responses. Results of the survey will be made available upon request. Please email your request to AFCIO.survey@afit.edu

Your participation is important to the success of this research study and the research team would like to thank you again for your support.

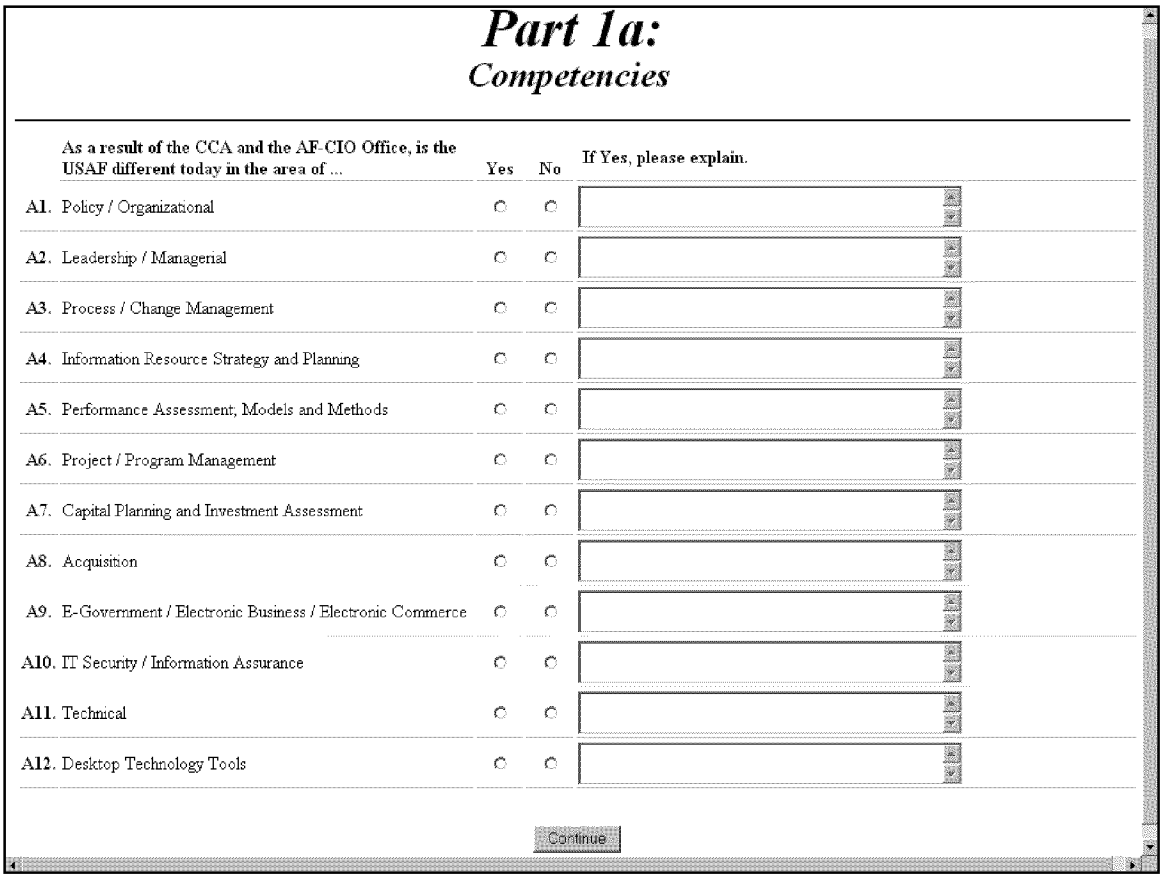
Sincerely,
AF-CIO Survey Research Team
School of Engineering and Management
Air Force Institute of Technology

Start Survey

Screenshot of the Background page



Screenshot of Part 1a

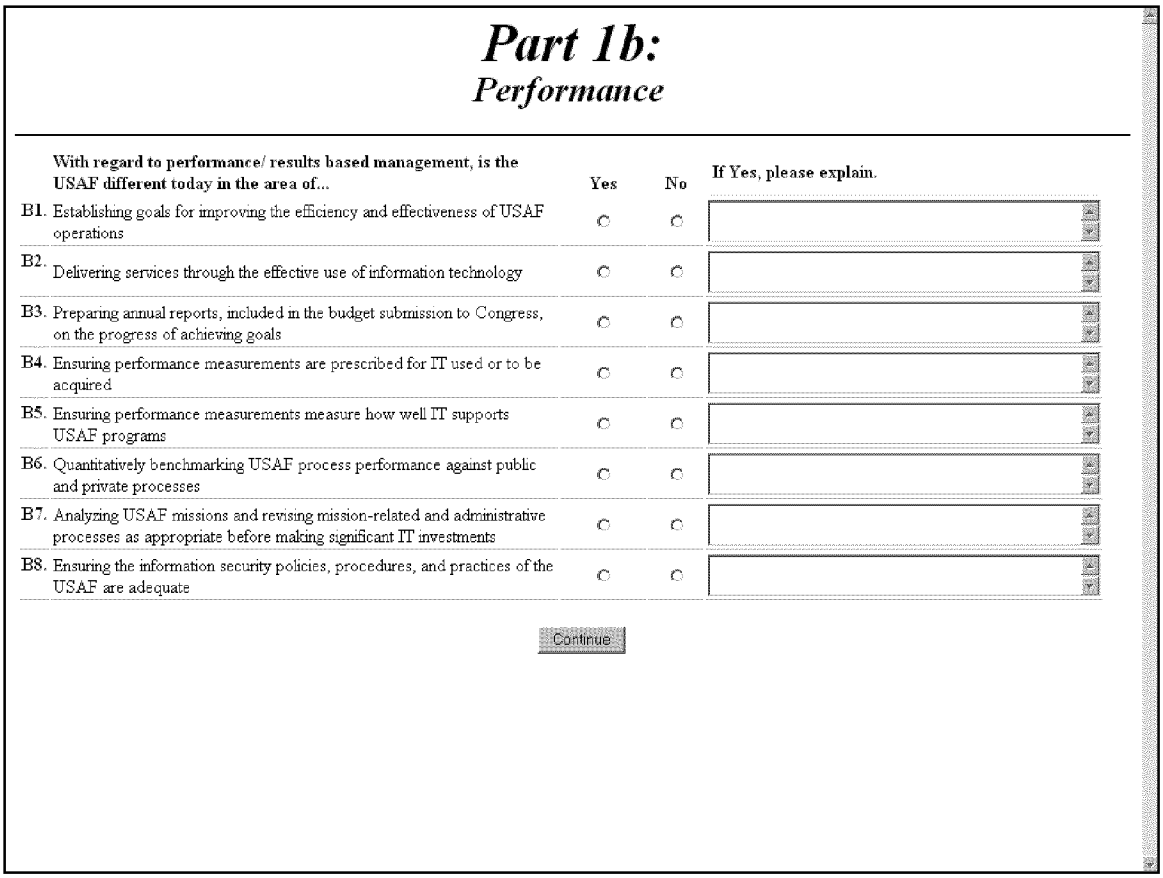


Part 1a:
Competencies

	As a result of the CCA and the AF-CIO Office, is the USAF different today in the area of ...	Yes	No	If Yes, please explain.
A1.	Policy / Organizational	○	○	
A2.	Leadership / Managerial	○	○	
A3.	Process / Change Management	○	○	
A4.	Information Resource Strategy and Planning	○	○	
A5.	Performance Assessment, Models and Methods	○	○	
A6.	Project / Program Management	○	○	
A7.	Capital Planning and Investment Assessment	○	○	
A8.	Acquisition	○	○	
A9.	E-Government / Electronic Business / Electronic Commerce	○	○	
A10.	IT Security / Information Assurance	○	○	
A11.	Technical	○	○	
A12.	Desktop Technology Tools	○	○	

Continue

Screenshot of Part 1b

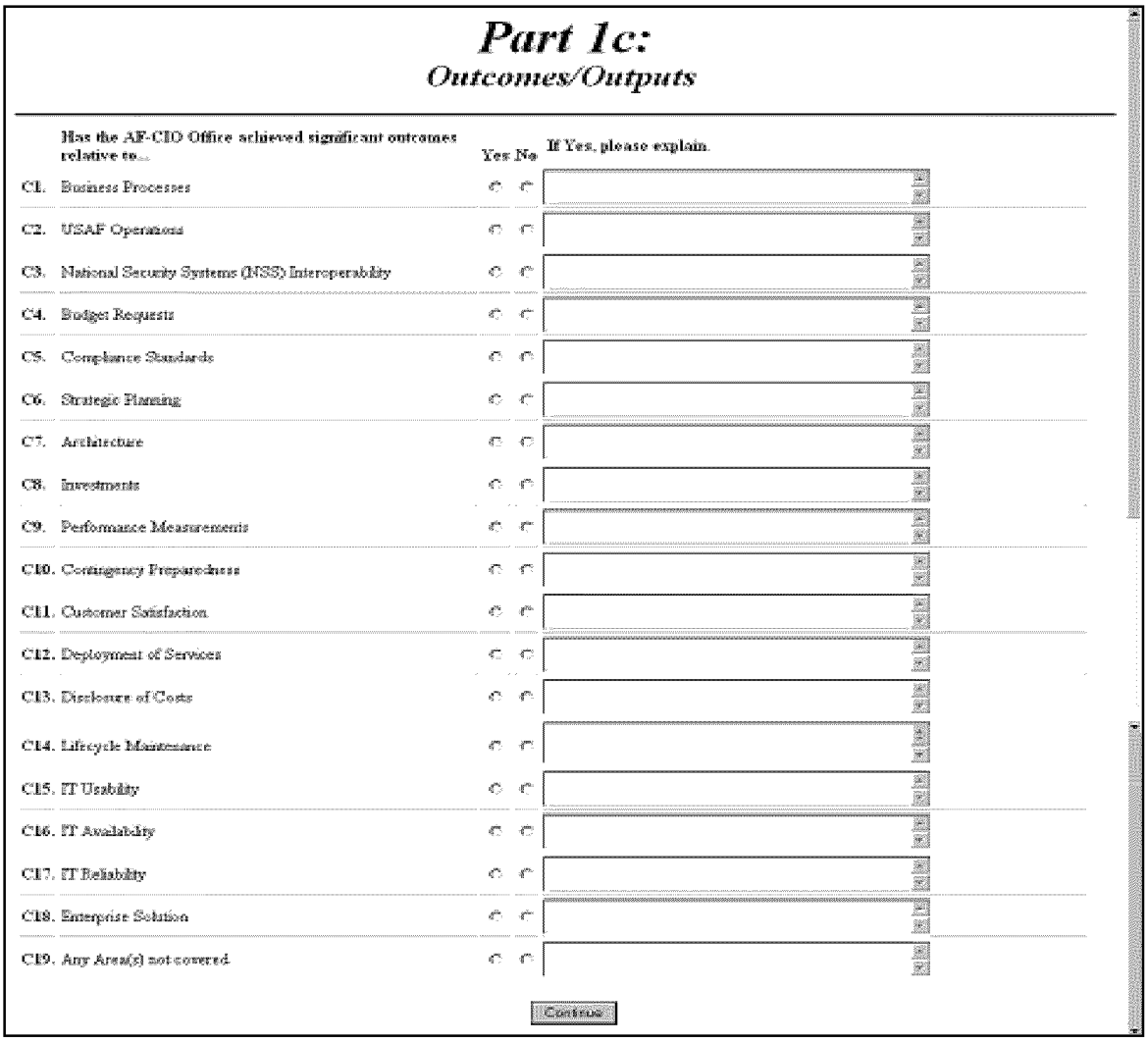


Part 1b:
Performance

	With regard to performance/ results based management, is the USAF different today in the area of...	Yes	No	If Yes, please explain.
B1.	Establishing goals for improving the efficiency and effectiveness of USAF operations	○	○	
B2.	Delivering services through the effective use of information technology	○	○	
B3.	Preparing annual reports, included in the budget submission to Congress, on the progress of achieving goals	○	○	
B4.	Ensuring performance measurements are prescribed for IT used or to be acquired	○	○	
B5.	Ensuring performance measurements measure how well IT supports USAF programs	○	○	
B6.	Quantitatively benchmarking USAF process performance against public and private processes	○	○	
B7.	Analyzing USAF missions and revising mission-related and administrative processes as appropriate before making significant IT investments	○	○	
B8.	Ensuring the information security policies, procedures, and practices of the USAF are adequate	○	○	

Continue

Screenshot of Part 1c

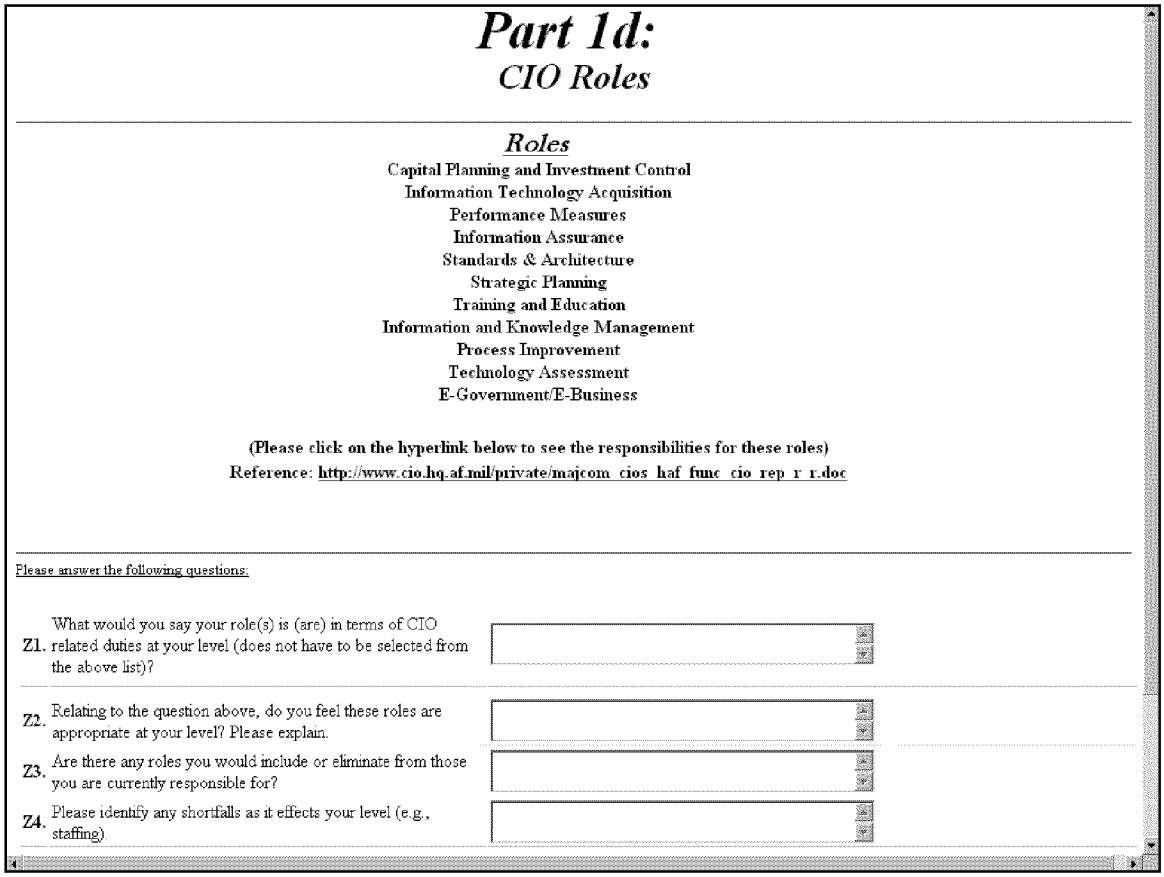


Part 1c:
Outcomes/Outputs

	Has the AF-CIO Office achieved significant outcomes relative to...	Yes	No	If Yes, please explain.
C1.	Business Processes	○	○	
C2.	USAF Operations	○	○	
C3.	National Security Systems (NSS) Interoperability	○	○	
C4.	Budget Requests	○	○	
C5.	Compliance Standards	○	○	
C6.	Strategic Planning	○	○	
C7.	Architecture	○	○	
C8.	Investments	○	○	
C9.	Performance Measurements	○	○	
C10.	Contingency Preparedness	○	○	
C11.	Customer Satisfaction	○	○	
C12.	Deployment of Services	○	○	
C13.	Disclosure of Costs	○	○	
C14.	Lifecycle Maintenance	○	○	
C15.	IT Usability	○	○	
C16.	IT Availability	○	○	
C17.	IT Reliability	○	○	
C18.	Enterprise Solution	○	○	
C19.	Any Area(s) not covered	○	○	

Continue

Screenshot of Part 1d



Part 1d:
CIO Roles

Roles

Capital Planning and Investment Control
Information Technology Acquisition
Performance Measures
Information Assurance
Standards & Architecture
Strategic Planning
Training and Education
Information and Knowledge Management
Process Improvement
Technology Assessment
E-Government/E-Business

(Please click on the hyperlink below to see the responsibilities for these roles)
Reference: http://www.cio.hq.af.mil/private/majcom_cios_haf_func_cio_rep_r_r.doc

Please answer the following questions:

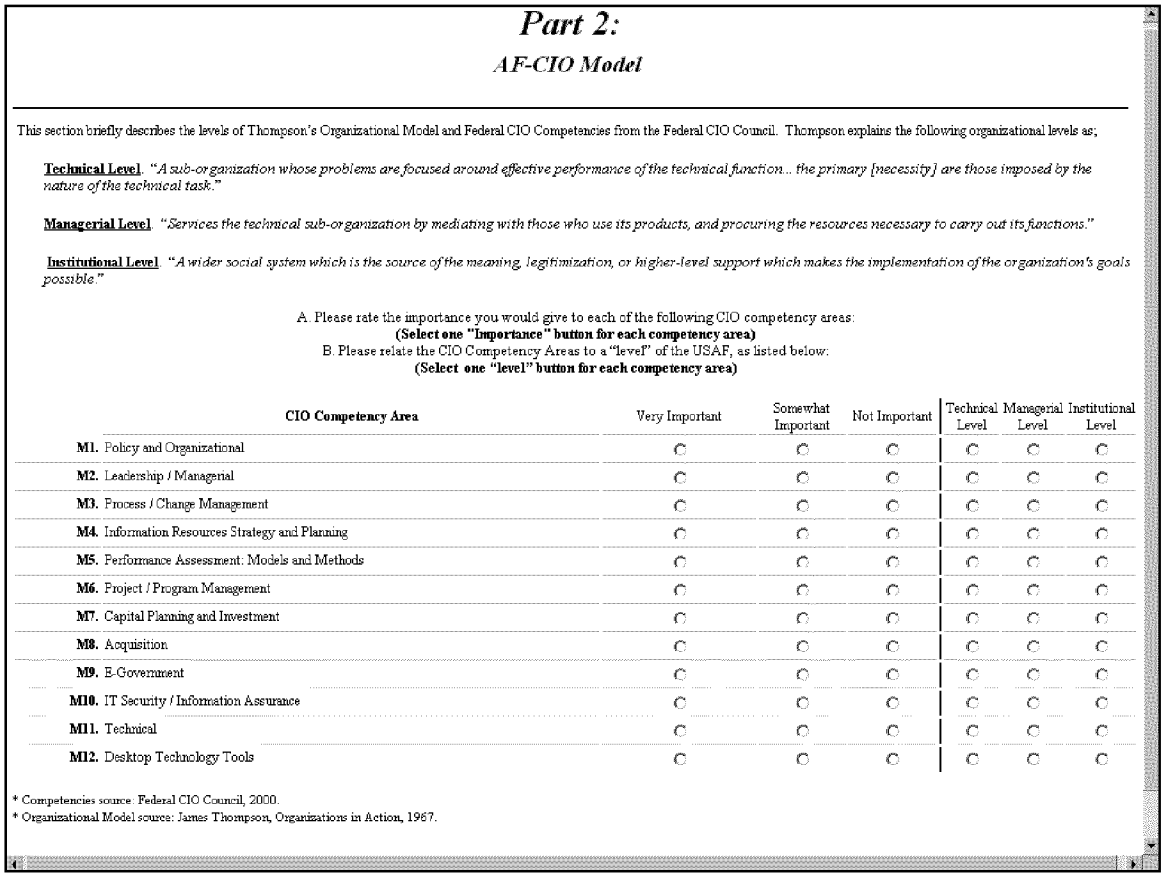
Z1. What would you say your role(s) is (are) in terms of CIO related duties at your level (does not have to be selected from the above list)?

Z2. Relating to the question above, do you feel these roles are appropriate at your level? Please explain.

Z3. Are there any roles you would include or eliminate from those you are currently responsible for?

Z4. Please identify any shortfalls as it effects your level (e.g., staffing).

Screenshot of Part 2



Part 2:

AF-CIO Model

This section briefly describes the levels of Thompson's Organizational Model and Federal CIO Competencies from the Federal CIO Council. Thompson explains the following organizational levels as;

Technical Level. *"A sub-organization whose problems are focused around effective performance of the technical function... the primary [necessity] are those imposed by the nature of the technical task."*

Managerial Level. *"Services the technical sub-organization by mediating with those who use its products, and procuring the resources necessary to carry out its functions."*

Institutional Level. *"A wider social system which is the source of the meaning, legitimization, or higher-level support which makes the implementation of the organization's goals possible."*

A. Please rate the importance you would give to each of the following CIO competency areas:
(Select one "Importance" button for each competency area)
B. Please relate the CIO Competency Areas to a "level" of the USAF, as listed below:
(Select one "level" button for each competency area)

CIO Competency Area	Very Important	Somewhat Important	Not Important	Technical Level	Managerial Level	Institutional Level
M1. Policy and Organizational	○	○	○	○	○	○
M2. Leadership / Managerial	○	○	○	○	○	○
M3. Process / Change Management	○	○	○	○	○	○
M4. Information Resources Strategy and Planning	○	○	○	○	○	○
M5. Performance Assessment: Models and Methods	○	○	○	○	○	○
M6. Project / Program Management	○	○	○	○	○	○
M7. Capital Planning and Investment	○	○	○	○	○	○
M8. Acquisition	○	○	○	○	○	○
M9. E-Government	○	○	○	○	○	○
M10. IT Security / Information Assurance	○	○	○	○	○	○
M11. Technical	○	○	○	○	○	○
M12. Desktop Technology Tools	○	○	○	○	○	○

* Competencies source: Federal CIO Council, 2000.
* Organizational Model source: James Thompson, Organizations in Action, 1967.

Screenshot of Part 3a

Part 3a:

Federal CIO Position Evaluation Method (FCPEM)

A. Please indicate whether each mandate is a "goal for' or goal of" the organization. (Goals "for" an organization are externally induced. Goals "of" an organization are internally developed).
(Use "F", "O", or "Both" in the box below)

B. Please indicate the degree of complexity for each mandate (High, Medium or Low).
(Use "H","M", or "L" in the box below)

	The Evaluation Standard for Each CIO Role	Goal for/of Agency F	O	Both	Complexity of the CIO Role Area H	M	L
E1.	Was a CIO position formally designated and established?	○	○	○	n/a		
E2.	Is the CIO a member of Executive Level IV?	○	○	○	n/a		
E3.	Is direct CIO-agency head reporting established in writing?	○	○	○	n/a		
E4.	Does the designation document make IRM the CIOs principle duty?	○	○	○	n/a		
E5.	Does the CIO facilitate reviews to improve IRM-related processes, including reducing the public information collection burdens?	○	○	○	○	○	○
E6.	Is there a CIO & CFO facilitated process for identifying all agency program IT needs, strategies, systems, capabilities?	○	○	○	○	○	○
E7.	Does the CIO facilitate the evaluation of information collections independent of CIO program roles?	○	○	○	○	○	○
E8.	Does the CIO facilitate an IT Capital Planning process, advise agency head/mgmt, & ensure IT is acquired & IRM/ITA are done IAW PRA'95 & agency head priorities?	○	○	○	○	○	○
E9.	Does the CIO facilitate an ITA that ties to Capital Planning and follows OMB A-130/OMB 97-16 format/guidance?	○	○	○	○	○	○
E10.	Does the CIO review IT programs for <10% variance in cost, schedule, performance	○	○	○	○	○	○
E11.	Is there an agency IT Strategic Plan and is it reflected in the FY Strategic Plan and the Performance Report?	○	○	○	○	○	○
E12.	Does the agency have a CIO-facilitated IT Workforce Plan that addresses needed IRM skills, training, hiring, & professional development?	○	○	○	○	○	○
E13.	Does the CIO report in writing to the agency head each year on how IRM capability is improving?	○	○	○	○	○	○

Continue

Screenshot of Part 3b

Part 3b:

Federal CIO Position Evaluation Method (FCPEM)

C. This page relates the CIO roles from the Clinger-Cohen Act of 1996, Section 5125, with the Federal CIO Council Competencies 2000 list. Please indicate the related CIO competency to the CIO roles per the CCA. Please use the number related to each competency. You may use more than one competency for each role.

Federal CIO Council Competencies (2000)

1 - Policy and Organizational
2 - Leadership / Managerial
3 - Process / Change Management
4- Information Resources Strategy and Planning
5 - Performance Assessment: Models and Methods
6 - Project / Program Management
7 - Capital Planning and Investment Assessment
8 - Acquisition
9 - E-Government / E-Business / E-Commerce
10 - IT Security / Information Assurance
11 - Technical
12 - Desktop Technology Tools

CIO Roles From the CCA, Section 5125	CIO Competencies From the Federal CIO Council, 2000 (Please check all that apply)											
CIO Role Evaluation Standard	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
F1. The CIO facilitates reviews to improve IRM-related processes, including reducing the public information collection burdens	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F2. A CIO & CFO facilitated process identifies all agency program IT needs, strategies, systems, and capabilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F3. The CIO facilitates the evaluation of information collections independent of CIO program roles	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F4. The CIO facilitates an IT Capital Planning process, advises agency head/mgmt, & ensures IT is acquired & IRM/ITA is done IAW PRA'95 & agency head priorities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F5. The CIO facilitates an ITA that ties to Capital Planning and follows OMB A-130/OMB 97-16 format/guidance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F6. The CIO reviews IT programs for <10% variance in cost, schedule, and performance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F7. The agency IT Strategic Plan is reflected in the FY Strategic Plan and the Performance Report	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F8. The agency has a CIO-facilitated IT Workforce Plan that addresses needed IRM skills, training, hiring, & professional development	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
F9. The CIO reports in writing to the agency head each year on how IRM capability is improving	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Do you have any additional comments you would like to add?

Please write any comments you have below.

The survey is now complete! Again, thank you for taking the time to complete this survey. Your responses are extremely valuable to this research.

Finish

Appendix G

Table 38: Data from web-based survey, Part 1a

Part 1a, Impact from Core Competencies	# of Comments	Part 1a, CCA Impact from Core Competencies	# of Comments
Standardized Approach	19	Better Working Relationship with Functionals	2
Working Groups at Base/MAJCOM Level	15	BPR is Practiced	2
Centralized Management of Networks	12	Centralized IT Project Selection	2
Responsive Organizational Structure	11	Certification Processes	2
IT Enterprise Policy Awareness	10	DODCERT Effective	2
Business Case Development	8	Equipment and CC Better	2
Information as a Strategic Resource	8	Greater Level of Empowerment	2
CIO Mandated by Law	7	No Budgetary Authority	2
Consolidation of Neworks/Servers	7	SPO Overhead too Costly	2
Development of TCO	7	Vision is Unclear	2
More Clear Direction	7	Application Improvements	1
Network Centric Awareness	6	Better Visibility into IT Spending	1
IT Initiatives	5	Customer Admin Tools	1
Strategic Information Approach	5	Greater Interopability	1
Architecture Office Established	4	Higher Level Better Involved	1
Better Performance Measures	4	Manpower Shortages Apparent	1
Config Control AF-wide	4	Non-standardized Approach	1
Enterprise Strategy	4	Oversight Council	1
Network Consolidation	4	PPBS Hasn't Changed Enough	1
Timely Acquisition	4	Reuse Emphasis	1
AFCERT Effective	3	Roles are Still Unclear	1
Certificates of Networthiness	3	Technology More Available to Users	1
Industry Best Practices	3	Too Slow to Catch On	1
Too Focused on Technology	3	Untimely Acquisition Process	1

Table 39: Data from web-based survey, Part 1b

Part 1b, Impact from CCA, Section 5123	# of Comments	Part 1b, Impact from CCA, Section 5123	# of Comments
Use of Business Models	9	Architecture Office	1
IT Initiatives	8	Better Technical Guidance	1
Too Soon to Tell	8	Budget Doesn't Reflect Actual Purchases	1
High Level Support	7	Capability Based Metrics	1
Working Groups at Base/MAJCOM Level	5	Capability Too Slow	1
Enterprise Solution	4	Cost Tracking is Better	1
IT Enterprise Policy Awareness	4	Difficult to Measure	1
Little Change to PPBS	4	DODcert is Effective	1
Accountability Greater	3	Focus Change to Business Entity	1
CIO Leadership	3	Force Multiplier	1
Equipment and Config Control Better	3	Funding Tied to performance	1
Responsive Org Structure	3	Integration Better	1
Strategic Planning	3	Lack of Funding for Missions	1
TCO	3	Lack of Process for Budget Planning	1
AF Portal	2	Metrics Poor Between IT and Ops	1
AFCERT is Effective	2	More Clear Direction	1
BPR has Improved	2	Multiple Channels of Connectivity	1
Goals Tied to Money and Staffing	2	Network Centric	1
Information Collection	2	New Reporting Process	1
IT Treated as Weapon System	2	Leadership not Responsive	1
Low Visibility in Reporting	2	Outcome Measures	1
Metrics Measure Activity, not Performance	2	Performance Reporting Improvement Slow	1
Network Consolidation	2	Policy Implementation Poor	1
NOSC is Key	2	QOS Good Measures	1
Not Possible to Measure Performance	2	ROI Tracking	1
Performance Metrics Good	2	Roles are Still Unclear	1
Policies not Joint	2	Set the Standard for DoD in security	1
Politics Hinder Reporting	2	Slow Implementation	1
Process Not Understood	2	Stale Metrics	1
Realistic to IT not Ops	2	Standardization	1
Requirements not certain	2	Tied budget to Expenditure Reporting	1
TQM Culture Hinders	2	Training Suffers	1
Vision is Unclear	2		

Table 40: Data from web-based survey, Part 1c

Part 1c, Impacts from Key IRM Achievement Areas	# of Comments	Part 1c, Impact from Key IRM Achievement Areas	# of Comments
Realistic to IT, Not Ops	25	Business Model	1
Too Soon to Tell	24	Certificates of Networthiness	1
Process Not Understood	19	Certification of Personnel	1
High Level Support	16	CIO Effective	1
TQM Culture Hinders	15	CIO office not Effective	1
Goals tied to Money and Staffing	12	Contracting Support Better	1
Perfomance Oriented	12	Contrating Efforts Better	1
Little Change to PPBS	11	Cost Reporting not Understood	1
Using Business Models	10	Costs not Itemized	1
Slow Implementation	9	Critical Systems Support	1
Network Centric Ops Support	9	Data Standards	1
Stale Metrics	5	Decreased Budget	1
Enterprise Approach	5	Education Needed	1
NOSC is Key	5	Improved Bandwidth	1
Responsive Org Structure	5	Improved Tech Refresh	1
No Money	4	IT as a Weapons System	1
Not Reactive	4	Leadership Not Reactive	1
AF Portal	4	Legacy too Costly	1
IT Initiatives	4	Leveraged Technology	1
Stovepiped	3	MAJCOM/Base Working Groups	1
CIO responsibilty	2	MAJCOMs Now Lead	1
CITS improved Planning	2	Need BPR	1
No IT Priorities	2	No Authority	1
Not CIO Job	2	No Staffing	1
Politics with Functionals	2	Reuse	1
Problems Integrating with Ops	2	Robust Networks	1
Standardization	2	Sharing Info NSS	1
Strategic Planning	2	Short of Staff	1
Activity Based, not Performance	1	System Security Reviews	1
Architecture Standards	1	TCO Accountability	1
BP not Standardized	1	Theater Deployables	1
Budget not Requests Successful	1		

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Vita

Captain Edward H. Drollette was born in 1966 in Bountiful, Utah, near Salt Lake City. He grew up in the small town of Hooper, Utah. He graduated from Roy High School, Roy, Utah, in 1984. He was married in February 1986. After attending college for 2 years he enlisted in the U.S. Air Force as a Logistics Specialist in May of 1986. Captain Drollette is married, with five children ranging in age from 15 to 3 years.

His first assignment was to Misawa AB, Japan in September of 1986. Enjoying overseas duty, he served his next assignment with his family at Lindsey AS, Wiesbaden Germany in the Fall 1989. A veteran of Operation Desert Storm, he served with the HQ USCENTAF FWD LG staff in Riyadh, Saudi Arabia. Capt Drollette earned his BS degree in Management and Management Sciences from the University of Maryland, University College. He then served special duty with the 649th Combat Logistics Support Squadron (CLSS) at Hill AFB, Utah.

Captain Drollette was selected for officer training on April 1, 1993. He was commissioned on January 21, 1994. His first officer assignment was at Falcon AFB, CO., as a MILSTAR Comm-Watch Commander with the 4th Space Ops Squadron. On crew duty for nearly two years, he later progressed to the position of Flight Commander in the 3rd Space Ops Squadron. In June of 1997 Captain Drollette was assigned to the Space and Missile Systems Center, Satellite and Launch Control Systems Program Office, Los Angeles AFB, CA. as a Program Manager for several satellite ground systems upgrades to the Air Force Satellite Control Network. While at LAAFB Captain Drollette attended SOS in residence and earned APDP Level II certifications in Comm-Computer Acquisitions and in Program Management. In March of 2002 he graduated from the Air Force Institute of Technology, at Wright-Patterson AFB, OH with a Master of Science Degree in Information Resource Management.

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14. ABSTRACT

Over the past decade, a considerable amount of attention has been given to federal legislation in making the federal government operate more efficiently and effectively by concentrating on Information Resource Management and Information Technology. In 1996, the Clinger-Cohen Act was passed, creating the role of Chief Information Officer (CIO) in each agency of the Federal Government. This study assesses the impacts of the Clinger-Cohen Act (CCA) on the USAF, with an emphasis on the Federal CIO Council Core Competencies. Given that this law and supporting policies have been in place for nearly six years, it would be valuable to assess USAF compliance with CCA as well as its impact on the USAF. It is intended that the information gathered may help the USAF to be a better steward of the nations critical information and financial resources, and to better provide critical information capabilities to the warfighter, thus ensuring information superiority over our nations adversaries.

Findings of this survey provide evidence that the USAF is in compliance with the CCA, and identifies impacts of the CCA on the USAF. Among these impacts are: IRM responsiveness has contributed to mission accomplishment, Strategic planning includes information as well as IT, Technology has improved efficiency, Baseline performance measures are more realistic, Alignment of organizational structure improves critical services, and Standardization of policy and processes optimizes IT resources.

15. SUBJECT TERMS

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