Exposure Draft

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EXECUTIVE GUIDE

Maximizing the Success of Chief Information Officers

Learning From Leading Organizations

GAO

Accountability ★ Integrity ★ Reliability

Preface

Information technology (IT) has become integral to providing government services. Information management (IM) in the federal government has moved out of the back office and off the mainframe into the home and office and onto the Internet. As the federal government fully embraces e-commerce and other leading edge implementations of IT that benefit citizens, leadership in the management of the government's information resources becomes of paramount importance. The development of new service approaches and the enhancement of old ones in this new information era require the active participation of information management organizations from the onset.

The efficient, effective, and innovative use of information technology requires a level of leadership and focus that goes beyond what would be provided in a technical support function. Congress recognized the need for greater leadership in information management in the Clinger-Cohen Act of 1996, which mandated the position of chief information officer (CIO) for executive departments and agencies. This act, and other laws, defines the general responsibilities of the CIO and many of the processes required to manage information in the federal government.

Virtually all of the major executive agencies have appointed CIOs, and many have taken positive steps toward the implementation of important information management processes specified by law. To reap the full benefits of information management reform, federal agencies must utilize the full potential of CIOs as information management leaders and active participants in the development of agency strategic plans and policies. The CIOs themselves must meet the challenge of building credible IM organizations, and developing and organizing information management capabilities to meet agency mission needs.

This guide is intended to assist federal agencies in maximizing the success of CIOs. Principles and practices gleaned from the case studies presented in our guide offer concrete suggestions on what agency executives can do to ensure the effectiveness of their CIO organizations.

This guide was prepared under the direction of David L. McClure, Associate Director, Governmentwide and Defense Information Systems. Key contributors were Tamra K. Goldstein, Sondra F. McCauley, and Tomas Ramirez. You may submit comments on this exposure draft to Lester Diamond, Assistant Director, until June 15, 2000, at (202) 512-7957 or diamondl.aimd@gao.gov. Mail may be directed to Mr. Diamond at U.S. General Accounting Office, Room 4T21, 441 G Street, NW, Washington, D.C. 20548.

Jeffrey C. Steinhoff
Acting Assistant Comptroller General

Contents

Figures

Tables

Federal Information Management Reform

The rapid pace of technological change and innovation in the current "information age" poses wide-ranging opportunities for improved information management and enhanced performance in achieving agency missions and goals. At the same time, however, the proliferation of technology has brought with it a range of thorny issues surrounding managing and integrating complex IM processes, computer equipment, and telecommunications networks. In its oversight role, Congress has established a series of laws to define the role of IM[1] in government and to mandate basic processes to manage the government IT investment. This section provides a brief overview of that legislative history.

The federal government's management of its IM investments to date has often produced mixed results. Consistent with reform legislation, agencies have taken constructive steps to implement modern IT strategies, systems, and management practices and policies directed toward achieving cost savings, increasing productivity, and improving the timeliness and quality of federal service delivery. To the extent that the nearly $27 billion in annual planned obligations for information technology can be invested and managed more wisely, federal programs will operate more effectively and at less cost.

For years, Congress has been working to increase the effectiveness of information and technology management in federal government. An early effort was the Brooks Act, enacted in 1965, which called for centralized oversight of federal information technology acquisitions by the General Services Administration (GSA). The Paperwork Reduction Act of 1980 (PRA) applied life cycle management principles to information management and focused on reducing the government's information collection burden. To help accomplish this, PRA designated senior information resources manager positions in the major departments and agencies with responsibility for a wide range of functions, including IM planning, budgeting, organizing, controlling, and training and ensuring that there is no duplication in IT systems. PRA also created the Office of Information and Regulatory Affairs within the Office of Management and Budget (OMB) to provide central oversight of information management activities across the federal government.

In the 1990s, Congress enacted additional laws holding agencies accountable for effective management of public information resources. In particular, the Chief Financial Officers (CFO) Act of 1990 and the Government Management Reform Act of 1994 spelled out an ambitious agenda to remedy the government's lack of useful, relevant, timely, and reliable financial information. For the government's major departments and agencies, these laws (1) established senior-level CFO positions, (2) required annual financial statement audits, and (3) set expectations for more modern systems to support integrated management of budget, accounting, and program information. The Government Performance and Results Act of 1993— commonly known as GPRA or the Results Act

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[1]In this guide IM refers to all aspects of the management of all information resources including technology, funds, human capital, and management processes as well as the underlying information. IT refers to equipment and software.

—required that agencies set strategic goals, measure performance toward the goals, and report on their progress. Effective implementation of the Results Act hinges on agencies' ability to produce the meaningfully integrated information needed to manage performance and measure results. Further, the reauthorization of the PRA in 1995 required that agencies indicate in strategic information resources management plans how they are applying information resources to improve the productivity, efficiency, and effectiveness of government programs, including improvements in the delivery of services to the public.

With this increased focus on agency accountability also came recognition of the need to elevate the agencies' information management positions to executive, more strategic levels, comparable to the CFO positions created in 1990. The Clinger-Cohen Act of 1996 amended the PRA, renaming and elevating former information resources manager positions to executive-level CIOs that report directly to the agency head and have IM as a primary function. The new IM leaders are responsible for not only the range of information management activities outlined in the PRA, but also for more strategic IT functions such as developing architectures, managing portfolios, and measuring performance of information technology investments. Among other things, the Clinger-Cohen Act also (1) required senior executive involvement in IM decision-making, (2) imposed much-needed discipline in acquiring and managing technology resources, (3) called for redesign of inefficient work processes before investing in technology, and (4) repealed the Brooks Act, eliminating GSA's central acquisition authority, and placing procurement responsibility directly with federal agencies.

Together with a number of other laws enacted over the past several years to foster improvements in such areas as financial management, acquisition, and computer security, the legislation discussed above comprises a statutory framework for achieving performance-based management and accountability in not just IM, but overall federal management.[2] (Appendix I provides a list of this key federal IM reform legislation.) As the executive leaders for information and technology management, federal CIOs have a key role in helping their agencies fulfill many of the provisions embodied in this management reform framework.

Even with the guidance provided by OMB for establishing the new IM leadership positions, agencies face distinct challenges in effectively positioning federal CIOs and supporting organizations to ensure that IM adds value in their business/mission performance.[3] CIOs in the federal sector face structural and cultural hurdles generally not found elsewhere. Some of these additional challenges are described in the final section of this guide.

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[2]*Managing for Results: The Statutory Framework for Performance-Based Management and Accountability* (GAO/GGD/AIMD-98-52, January 28, 1998) and *Managing for Results: The Statutory Framework for Improving Federal Management and Effectiveness* (GAO/T-GGD/AIMD-97-144, June 24, 1997).

[3]OMB guidance on implementing federal CIO positions includes Memorandum for the Heads of Executive Departments and Establishments, "Implementation of the Information Technology Management Reform Act of 1996," M-96-20, April 4, 1996, and Memorandum for the President's Management Council, "What Makes a Good CIO?" June 28, 1996.

Overview of Fundamental Principles

We decided that federal agencies could benefit from examples set by a few leading organizations whose CIO organizations have gained a reputation for success in leading outstanding IM in their enterprises. Our work is intended to provide pragmatic guidance that federal agencies can consider in determining how best to integrate CIO functions into their respective organizations. Our target audience includes senior federal executives and managers, although our observations can also provide insights for senior IM officials throughout the public and private sectors. (Appendix II provides more details on the objectives, scope, and methodology for our work.) Based on our interviews with private sector and state CIOs and other research, we have developed a framework of critical success factors and leading principles. The balance of this report describes this framework and its application to CIOs in the federal government.
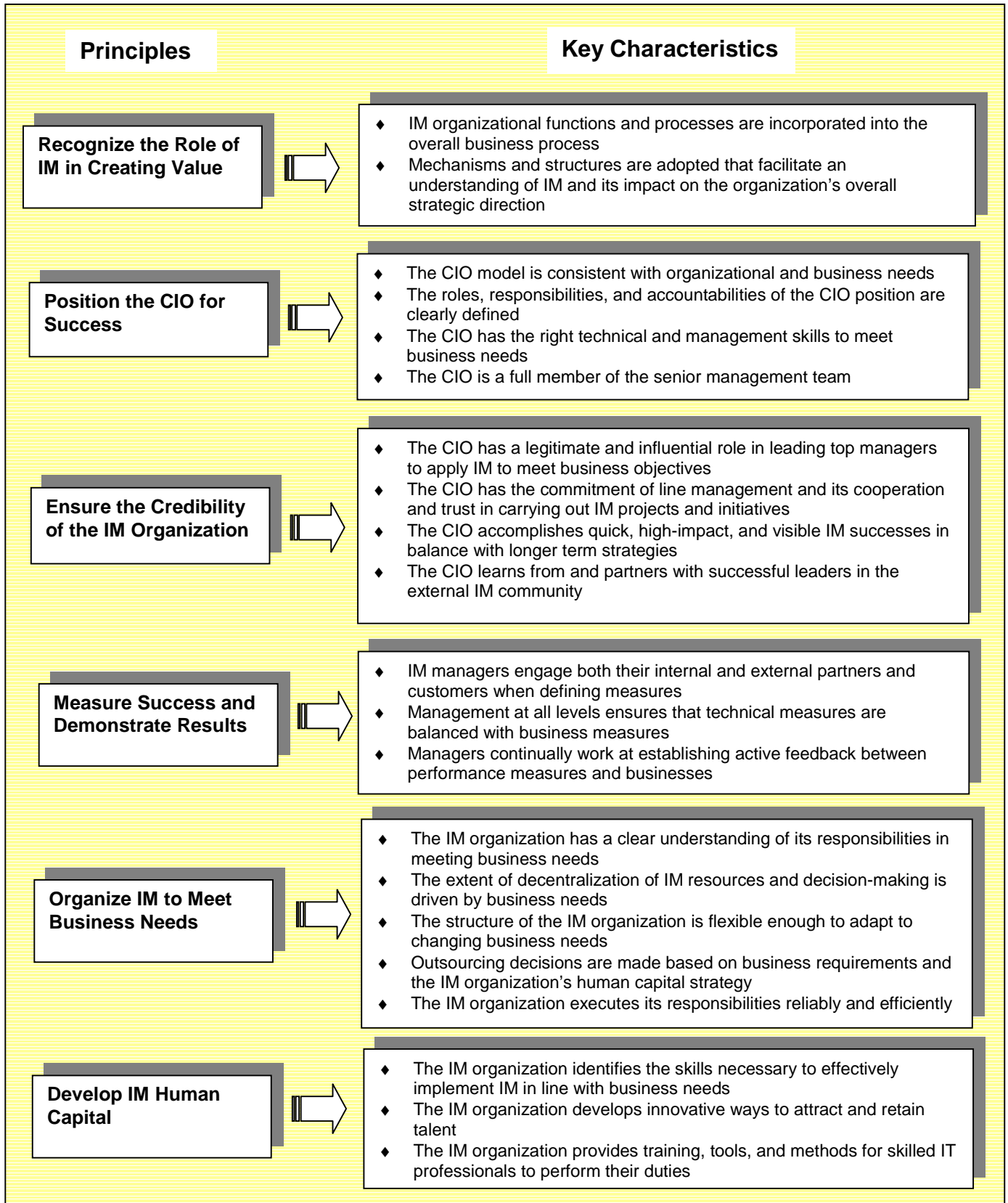
As we conducted our interviews, we found that the CIOs of leading organizations described a consistent set of key principles of IM that they believed contributed to the successful execution of their responsibilities. These principles touch on specific aspects of their organizational management such as formal and informal relationships between the CIO and others, business practices and processes, and critical CIO functions and leadership activities. The specific nature of these principles varied based on the organization's mission, size, culture, and other factors, but each underlying key principle was consistently observed.

The CIOs interviewed considered these principles instrumental because they address critical organizational and operational aspects of the CIO's role. Notably, the principles address senior executives' responsibility for creating an effective management context for their CIOs, as well as the CIOs' responsibilities for building credibility and organizing the IM function to meet business needs. The practices are not new ideas in the general management of organizations, but they are the application of well-founded principles in the IM area.

These principles are most effective when implemented together in a mutually reinforcing manner. As ad hoc efforts, each individual principle addresses a single aspect that is necessary, but is not sufficient for success by itself. The failure to execute a single principle may render the others less effective. Further, although there is no precedence among the principles, organizational conditions may make it more feasible to address one principle before another. For example, the chief executive officer (CEO) may "position the CIO for success" in advance of hiring a new CIO while the other principles await the CIO's attention.
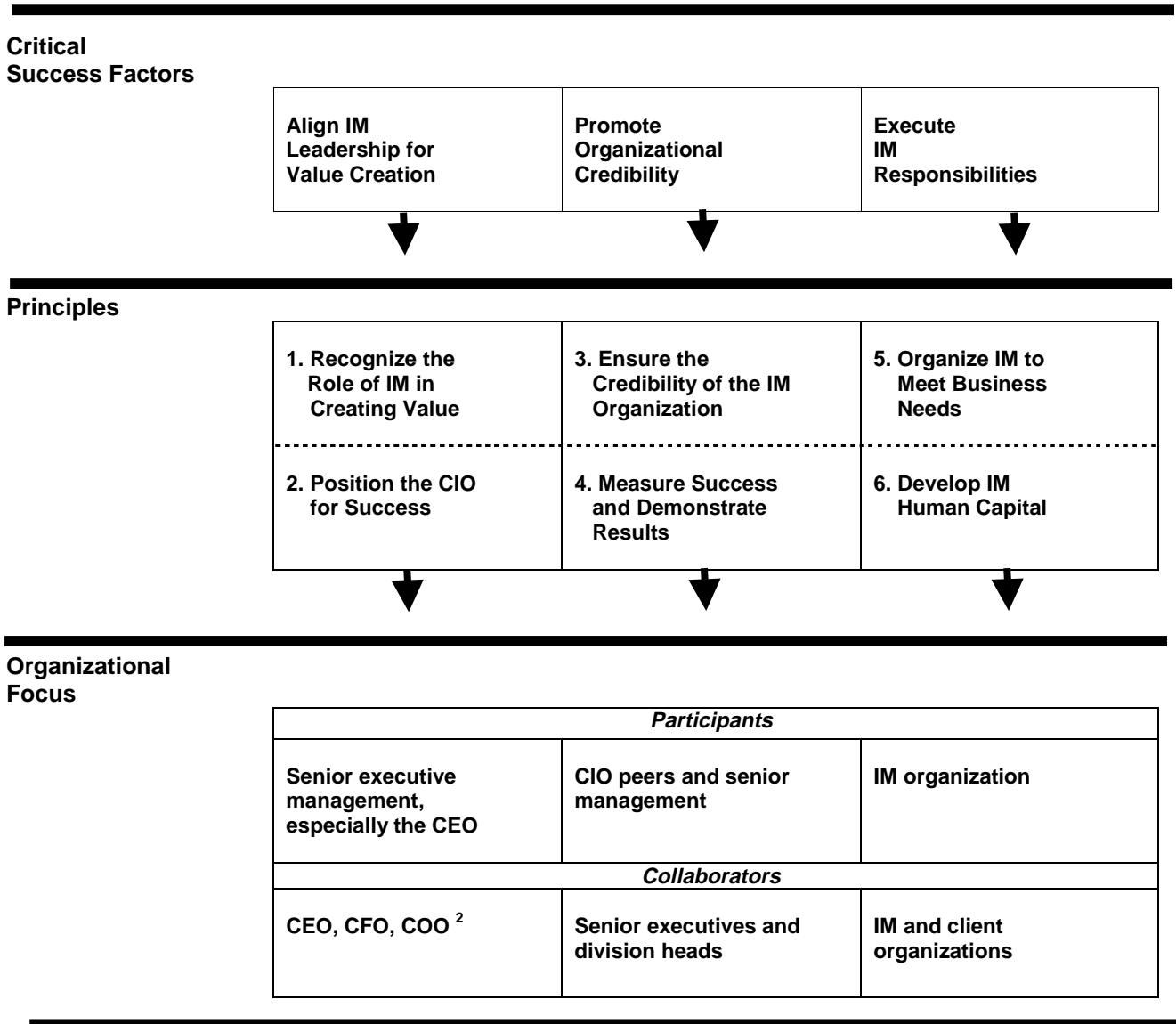
Figure 1 lists the six fundamental principles described by the CIOs interviewed during the development of this guide. In addition, several key characteristics of organizations that successfully execute these principles are listed for each principle. These key characteristics can provide insights into what constitutes successful CIO organizations.

Figure 1: <u>Six Principles and Key Characteristics of CIO Management in Leading Organizations</u>

Principles	**Key Characteristics**
Recognize the Role of IM in Creating Value	♦ IM organizational functions and processes are incorporated into the overall business process ♦ Mechanisms and structures are adopted that facilitate an understanding of IM and its impact on the organization's overall strategic direction
Position the CIO for Success	♦ The CIO model is consistent with organizational and business needs ♦ The roles, responsibilities, and accountabilities of the CIO position are clearly defined ♦ The CIO has the right technical and management skills to meet business needs ♦ The CIO is a full member of the senior management team
Ensure the Credibility of the IM Organization	♦ The CIO has a legitimate and influential role in leading top managers to apply IM to meet business objectives ♦ The CIO has the commitment of line management and its cooperation and trust in carrying out IM projects and initiatives ♦ The CIO accomplishes quick, high-impact, and visible IM successes in balance with longer term strategies ♦ The CIO learns from and partners with successful leaders in the external IM community
Measure Success and Demonstrate Results	♦ IM managers engage both their internal and external partners and customers when defining measures ♦ Management at all levels ensures that technical measures are balanced with business measures ♦ Managers continually work at establishing active feedback between performance measures and businesses
Organize IM to Meet Business Needs	♦ The IM organization has a clear understanding of its responsibilities in meeting business needs ♦ The extent of decentralization of IM resources and decision-making is driven by business needs ♦ The structure of the IM organization is flexible enough to adapt to changing business needs ♦ Outsourcing decisions are made based on business requirements and the IM organization's human capital strategy ♦ The IM organization executes its responsibilities reliably and efficiently
Develop IM Human Capital	♦ The IM organization identifies the skills necessary to effectively implement IM in line with business needs ♦ The IM organization develops innovative ways to attract and retain talent ♦ The IM organization provides training, tools, and methods for skilled IT professionals to perform their duties

As we evaluated the six principles we observed that they naturally fell into three distinct sets based on the overarching intent of the principle. For example, the principle that addresses the need to organize IM to meet business needs and the principle that addresses the need to develop IM human capital both focus on the CIO's effectiveness in carrying out the IM organization's specific responsibilities. This higher order "principle" can be thought of as a critical success factor, and the underlying principles are the activities that must take place in order to achieve the critical success factor. Figure 2 illustrates the six principles and their relationship with the three critical success factors.

Figure 2: <u>Critical Success Factors and Organizational Relationships</u>

Critical Success Factors

Align IM Leadership for Value Creation	Promote Organizational Credibility	Execute IM Responsibilities

Principles

1. Recognize the Role of IM in Creating Value	3. Ensure the Credibility of the IM Organization	5. Organize IM to Meet Business Needs
2. Position the CIO for Success	4. Measure Success and Demonstrate Results	6. Develop IM Human Capital

Organizational Focus

Participants		
Senior executive management, especially the CEO	CIO peers and senior management	IM organization
Collaborators		
CEO, CFO, COO [2]	Senior executives and division heads	IM and client organizations

2
COO – Chief Operating Officer

The principles advocating the need to recognize the role of IM in creating value and positioning the CIO for success both address issues of senior executive support. Both

principles require that the leaders of the enterprise embrace the critical role IM can play in the success of the organization and the leadership role the CIO must play in order for IM to meet its potential. The first principle addresses the acceptance of this premise by senior executive management, and the second assures that the CIO has the organizational legitimacy to execute his or her role.

The principle that addresses the need to ensure the credibility of the IM organization and the principle that encourages measuring success and demonstrating results, if executed successfully, will lead to the confidence of those with operational responsibility in the enterprise. Without credibility, the IM organization will struggle to be accepted as a full participant in the development of new organizational systems and processes. While the first success factor refers to legitimacy at a strategic planning level, this success factor addresses a more operational level.

As mentioned above, organizing IM to meet business needs and developing IM human capital will provide the foundation for the CIO's effectiveness in carrying out the IM organization's specific responsibilities. This is the third leg of the success factors. Once executive management endorses the centrality of the IM organization, and IM becomes a partner in the development of new systems, the IM organization must execute its responsibilities successfully.

Understanding the six principles in terms of critical success factors is particularly useful because of features that are shared by principles within the same factor. For example, both principles within a single critical success factor require the same organizational units to collaborate in their execution. Also, both principles within a critical success factor focus on the same organizational units as the targets of their implementation. In the case of the critical success factor, "Promote Organizational Credibility," both principles rely on the collaboration of senior executives and division heads for success and have as their target the senior management of the enterprise.

The common features within a critical success factor can become especially significant as the CIO, and other players, plan the execution of the six principles described in this guide. As this group plans its strategy, it can utilize the commonality between principles to link initiatives and utilize the synergy between related efforts. For example, while organizing IM to meet enterprise needs and developing IM human capital are distinct initiatives, they share extensive areas of commonality. Executing both principles in conjunction with each other can create opportunities for efficiency and effectiveness not available otherwise.

Finally, the organization of principles into critical success factors illustrates the extent to which the work of a successful CIO must extend throughout the enterprise. In particular, the role that the CEO and other senior managers play in ensuring the success of the CIO should be noted. While it is the responsibility of the CIO to execute the specific responsibilities of his or her position, it became clear to us during our case studies that the successful CIO relies extensively on vertical and horizontal relationships within the enterprise in order to carry out these responsibilities.

This executive guide includes examples from our case study organizations, as well as information from selected federal organizations, which helped us confirm the applicability of our findings to federal government experience. At the conclusion of each principle, we provide a case study to describe the principle in practice at one of the organizations we visited as well as strategies to consider when implementing the principle. Although this guide focuses on fundamental practices rather than detailed guidance, the examples illustrate and complement much of the specific guidance contained in similar and related GAO products cited in appendix III.

Current Federal CIO Environment

The CIO position in the federal government is still evolving. Agencies are learning how a CIO can help improve effectiveness and efficiency and better realize the benefits of their IM investments. Current federal CIOs are learning how to carry out their responsibilities in the federal environment with all of the incumbent expectations and constraints. Both the agencies and the CIOs are working to meet the letter and intent of the Clinger-Cohen Act and associated legislation effectively. The principles offered in this guide are intended to provide insight into what CIOs at leading organizations consider critical to their success and provide advice to federal CIOs and senior agency management as they work to improve the use of IM in the federal government.

The federal CIO faces an environment that includes many of the elements encountered by CIOs interviewed for this guide. At the same time, the federal CIO faces additional challenges as a result of his or her specific legislative responsibilities (e.g., records management and defined contracting requirements). The federal CIO is also subject to a funding process that is more complex and uncertain than in most other organizations. The effect of the appropriations process and the highly distributed management structures found in several federal agencies tends to move some of the control of processes having to do with IM away from the CIO. Together, these characteristics, among others, differentiate the federal CIO environment from other IM environments. These differences, and their impact on the framework developed in this guide, will be discussed in the "Using this Guide" section. The following discussion focuses on the common elements among the private, state, and federal sectors and the application of the framework across all three.

In a series of one-on-one interviews with half of the Federal CIO Council, we found that federal organizations face many of the same IM issues as their private sector and state government counterparts. Specifically, federal organizations must overcome the challenges of effectively linking IM to agency missions, positioning and legitimizing IM leadership, measuring performance, and building IM capabilities and skills. Our meeting with five members of the Federal Small Agency CIO Council and a number of independent studies provide similar conclusions.[4] The six principles that emerged from our discussions with private sector and state government CIOs also describe the general areas that federal CIOs agreed needed to be addressed. However, the specific approaches to executing those principles tended to differ between the various sectors.

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[4]*The Federal Chief Information Officer: Third Annual Top Ten Challenges Survey*, Association for Federal Information Resources Management, November, 1998.
Implementing Best Practices, Capital Planning and IT Investment Committee, Federal CIO Council, June 1998.
The Impact of Change: Clinger-Cohen Act Implementation, Laying the Foundation for Year 2000 and Beyond, Eighth Annual ITAA Survey of Federal CIOs, Grant Thornton LLP, December 1997.
IAC/CIO Task Force Draft Report, Federal Chief Information Officer's Working Group and Industry Advisory Council, July 9, 1996.

In three of the principle areas, the level to which practices of leading versus federal organizations have evolved is significantly different. For example, in principle I, while leading organizations generally include their CIOs in executive business decision-making, in the federal government setting, IM is still often managed as a support function rather than a strategic asset. Leading organizations also consider various IM leadership models and position their CIOs at a clear, executive level, as in principle II. In contrast, federal CIO implementation is in more nascent stages, lacking criteria for matching CIO types with organizational needs. Further, in principle V, while leading organizations are flexible in reassigning IM staff and structuring capabilities across business and technology lines, federal IM staffing practices and organizational structures are less flexible in nature.

Performance measurement (principle IV) and IM human capital development (principle VI) are two areas that private, state, and federal CIOs all agreed must be addressed in order for the CIO and the supporting IM organization to be successful. Practices used by both the private and public sectors in the area of performance measurement are still evolving. In both performance measurement and human capital development, practices used by the federal CIOs differed from those of CIOs in leading organizations, though federal CIOs were actively trying to address the issues. Differences in the approaches used probably resulted from specific constraints in the federal CIO environment, including a focus on nonfinancial program benefits, rather than financial return on investments.

Credibility building, principle III, is the one area in which private sector, state government, and federal CIOs have all adopted similar practices. The precise application of the practices depended on the specific contexts of their organizations, but the approaches were consistent. It may be noted that this is one of the few principles that CIOs may address themselves, without regard to organizational constraints or CEO support. Of course, as stated earlier, the effectiveness of this principle is moderated by the extent to which the other principles have been implemented.

The following table summarizes the practices of our sample organizations in each principle area and compares them with practices in the federal CIO environment.

Table 1: <u>Comparison of Leading Practices and Federal CIO Management Practices</u>

Critical Success Factors	Principle	What a Leading Organization Does	What the Federal Government Does
Align IM Leadership for Value Creation	Recognize the Role of IM in Creating Value	• CEOs and governors ensure that the IM organization is a key business player • CIO is part of the executive decision-making process	• IM generally still viewed as a support function instead of as a strategic activity • CIO is not always involved in strategic and policy making decisions
	Position the CIO for Success	• Defines clear CIO role and authorities • Matches CIO type and skills set with business needs • Forges CIO partnership with CEO and other senior executives	• Does not always clearly define CIO role or authority • Does not always match CIO selection with agency needs • Does not always provide executive support for the CIO position
Promote Organizational Credibility	Ensure the Credibility of the IM Organization	• CIO builds credibility through effective IM leadership, good working relationships, track records, and partnering with customers and peers	• Uses practices similar to leading organizations
	Measure Success and Demonstrate Results	• Strong links exist between business objectives and performance measures • Performance management structure still evolving	• Weak links between agency goals and IM/IT performance measures • Required annual performance plans still in preliminary stages
Execute IM Responsibilities	Organize IM to Meet Business Needs	• Reassigns IT staff as needed to best serve interests of customers • Structures the organization along business lines as well as IM functional areas	• Tries to meet needs of customers with a fixed organizational structure • Structures the organization primarily along IM functional areas
	Develop IM Human Capital	• Maintains up-to-date professional skills in technology management • Outsources entry-level positions but largely hires at all levels of experience	• Provides limited amount of training in technology management • Assumes entry-level IM staff will remain in federal service as a career

In terms of critical success factors, federal CIO organizations tend to trail the CIOs interviewed for this guide in the "Align IM Leadership for Value Creation" and the "Execute IM Responsibilities" factors. While we did not investigate specifically why these differences exist, we observed that the successful execution of these two critical success factors depends to a great extent on officials other than the CIO. In the first success factor, the CIO depends to a great extent on the other senior executive officers to support the inclusion of the CIO in critical strategic discussions. In the other factor, the federal CIO tends to be constrained by organizational attributes typical of the federal sector. These attributes include, but are not limited to, relatively little flexibility in

financial reward systems and highly distributed organizational structures in a number of federal agencies.
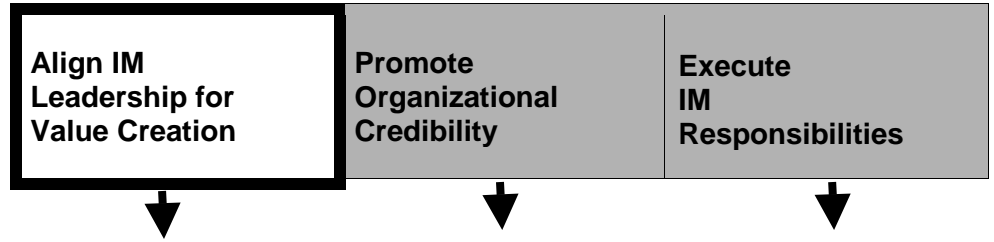
This is not to say that there are no examples of progress in the federal sector in either of these two success factors. The federal response to the Year 2000 computing challenge created an opportunity in many agencies for IM and program organizations to partner in responding to specific agency mission needs. This partnering took place at the senior executive level and contributed to the success of the federal Y2K effort. In addition, the CIO Council, the Office of Personnel Management, and individual agencies have been working together to develop new approaches to compensating and retaining IM workers.

It is interesting to note that the remaining critical success factor, "Promote Organizational Credibility" is executed about the same within all sectors, since all sectors approach principle III similarly, and no sector executes principle IV well. As noted above, it is within this critical success factor that the CIO is able to operate with the greatest individual flexibility.
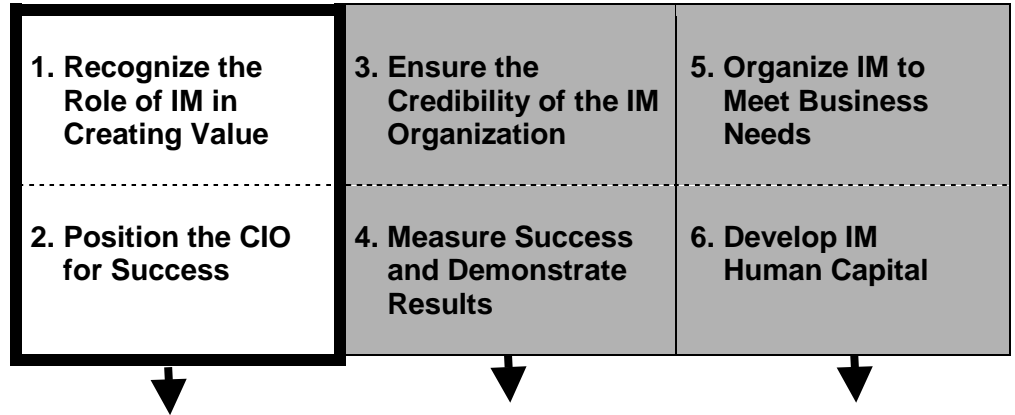
Table 1 indicates that a gap exists between the practices of federal CIOs and CIOs of leading organizations. Areas where gaps exist should be examined carefully to understand the basis for the differences as well as opportunities for greater implementation of the principles. It is possible that the business context for federal CIOs is sufficiently different from that of CIOs in leading organizations that lessons learned may not be applicable. Some of these differences are described in the final section of this guide that addresses possible limits to its applicability. At the same time, an understanding of the IM practices of leading organizations could certainly contribute to the development of improved CIO management practices in the federal sector.

The following sections describe each of the general principles and practices we discovered in our work with leading CIO organizations. Case studies are provided to illustrate the application of the practices. We intend, through this presentation of leading practices, to provide a guide for federal CIOs on management approaches that have worked in successful organizations.

**Critical
Success Factors**

Align IM Leadership for Value Creation	Promote Organizational Credibility	Execute IM Responsibilities

Principles

1. Recognize the Role of IM in Creating Value	3. Ensure the Credibility of the IM Organization	5. Organize IM to Meet Business Needs
2. Position the CIO for Success	4. Measure Success and Demonstrate Results	6. Develop IM Human Capital

**Organizational
Focus**

	Participants	
Senior executive management, especially the CEO	CIO peers and senior management	IM organization
	Collaborators	
CEO, CFO, COO	Senior executives and division heads	IM and client organizations

Critical Success Factor:

Align IM Leadership for Value Creation

The IM organization and the CIO must have active support and commitment at the very top of the enterprise or they will remain limited and tangential to the business, despite their potential contribution to mission accomplishment. This first critical success factor focuses on the role of the senior executive management of the enterprise in developing a culture that includes the CIO in senior-level decision-making and that assumes the potential of IM in creating value for the enterprise. Executive leadership is essential to the successful execution of this factor.

A common theme among the CIOs we interviewed was that the message of the importance of IM to the organization must be communicated at the highest levels. Senior executives must embrace the central role of technology, and the CIO must be at the table with them as business strategy is discussed. This effort begins with the CEO, who sets the example for senior and mid-level executives and, through them, the rest of the organization. In addition, the participation of the CIO in long-range strategic planning is necessary to take full advantage of the opportunities IT can provide and to ensure that the technology infrastructure is in place as business strategies develop.

Principle I: Recognize the Role of IM in Creating Value

"The CIO's ability to add value is the biggest single factor in determining whether the organization views IT as an asset or a liability."

<table>
<tr><td>Key Characteristics
• IM organizational functions and processes are incorporated into the overall business process
• Mechanisms and structures are adopted that facilitate an understanding of IM and its impact on the organization's overall strategic direction</td></tr>
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Instituting an effective CIO organization does not start with selection or placement of an IM leader, nor does it begin with establishing a structure for managing information resources and activities. Rather, it begins with consideration on the part of executive-level managers of the role of IM and how vital it is to accomplishing mission objectives. It also entails thinking about ways to incorporate the IM leader in the executive-level management structure and create an environment that facilitates business/technology sharing and exchange of ideas. Moreover, CEOs and governors can set powerful examples through their own strong relationships with CIOs. Such relationships symbolize the importance of IM within their organizations.

Key Characteristics

Senior executives have primary responsibility for setting the business context for their CIOs and formulating strategies for integrating IM into their business operations. Executives of leading organizations no longer regard technology management as a separate support function and instead strive to understand how IM investments are made and how they integrate with other investments and the overall business vision. The executives also increasingly focus on the management, operations, program and service delivery benefits, and performance of their major strategic IM investments. CEOs have a key role in setting the example for the rest of the agency to follow in seeking to understand IM concepts and appreciating the strategic role that IM can play in helping to accomplish business objectives. Viewing information and technology management not just as a function to manage in and of itself, these CEOs assign their IM leaders a prominent role in business decision-making. Recognizing the business transformation potential of IM, these executives also position their CIOs as change agents with responsibility for applying technology to achieve major improvements in fundamental business processes and operations. With CEO support, the CIOs are in a good position to have significant impact on not just IM, but the entire business enterprise.

Following the CEO's lead, members of the senior executive team learn to value the advice of their peers in IM in setting business directions and developing strategies for improving organizational capabilities and competitiveness. They seek to embrace fundamental IM principles and work with their CIOs to develop a shared vision of the role of IM within the business context. They engage in dialogue on ways that technology can be incorporated to improve business processes, outputs, and outcomes. They include IM as an intrinsic part of their business planning and decision-making processes,

discussing the benefits and risks associated with specific strategies for improving service, reducing cycle time, or reducing costs.

In leading organizations, senior managers make joint decisions on IM investments, formulate business plans, and set performance expectations. Increasingly, managers make IM investment decisions based on the value of the investments to their enterprises, not just to a specific business unit or function. By asking strategic and operational questions at the beginning of the planning and evaluation period, senior managers gain a better understanding of the potential benefits and value of IM. Managers in leading organizations are also adopting processes that help them quantify and align IM projects with their organizations' business planning and measurement processes. They produce IT plans that link to overall business plans and assign IM managers to act as liaisons between business units and IM organizations. Increasingly, IM managers also focus on measuring reliability, responsiveness, and customer satisfaction, which in the eyes of senior management, are just as important as strictly financial measures.

Leading organizations work to create environments that are conducive to sharing ideas on how IM can support the businesses and vice versa. They adopt formal mechanisms and structures that facilitate the ability of their businesses and IM leaders to understand and communicate one another's issues and work together to accomplish a shared business vision. These mechanisms and structures include forums, councils, and boards for discussion and exchange on business and technology issues. Such forums help promote organizationwide perspective and facilitate the ability to achieve consensus or stakeholder buy-in to business/technology directions. For example, one state has a strategic planning forum that brings together major stakeholders statewide to identify strategic and tactical issues, including IT issues confronting the state. The state prepares a strategic planning document based on this stakeholder input. This process has helped to integrate IM into overall business planning by aligning IT products and services with business functions and linking technology to the state's overall strategic direction.

To further support the business/technology collaboration, leading organizations adopt a common business language, skillfully avoiding technical jargon and instead using language that general managers and legislatures can understand. They use analogies, terminology, and processes that help fuse business and IM interests and ideas together. Other strategies for business/IM learning include informal activities such as newsletters, presentations, IM reports, and service level results placed in common areas to communicate the effectiveness of their IM organizations. Leading organizations further the two-way exchange of ideas and perspectives by bringing in experts from the field to advise or educate managers on recent trends and developments in both the business and technology arenas. Realizing that attitudes, expectations, and culture seldom change quickly, they plan for whatever time and resources are necessary to create a common ground and organizational cohesiveness. Their efforts go a long way in shoring up commitment from across the organization to strategies for achieving common goals.

Leading organizations also focus on hiring IM managers that bring a hybrid of business and technical expertise to the organization. One large multinational corporation uses "technical facilitators" to support its IM initiatives. In the past, this company had

experienced problems in sharing IM resources. Managers in the different lines of business were unwilling to share IM resources because each felt his or her particular line of business was too unique. Because technology was becoming critical to future success in this business sector, top managers were increasingly assigned to support and manage the company's internal IM functions. Several of the managers assigned had both business and technology acumen and had the ability to raise business issues from a technical perspective in a nonthreatening manner. In resolving the business issues, they were sometimes able to identify more efficient technical opportunities.

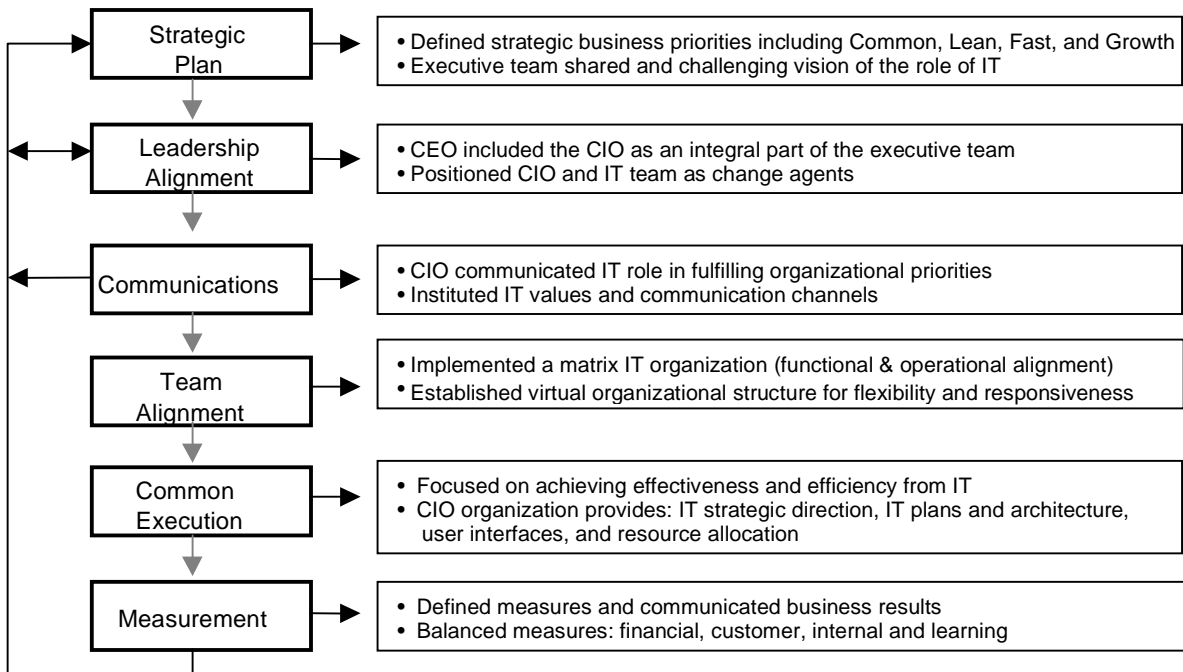**Case Study on Recognizing the Role of IM in Creating Value**

Due to changes in market conditions and requirements for increased productivity through commonization, this large manufacturing company decided that it needed to make major changes in the way it managed IT to support the business. The company had outsourced its IM function, but lacked the infrastructure to provide strategic direction, discipline, and overall management of IM to ensure optimal implementation and cost. Given this situation, the company was faced with a proliferation of legacy systems and inefficient business processes built around them. The company also met with bureaucratic business resistance to change to a common information systems environment.

By way of improvement, senior executives adopted a new IT strategic direction and focus which tracks back to the company's business priorities--"common, lean and fast, global, and growth." Senior management then hired a CIO as a change agent, reporting to the Vice Chairman and the company's senior decision-making council, and gave him responsibility for transforming the IT function thereby making him an enabler of the function and an integral part of the business strategy.

The CIO recruited an IT management team that understood both the business and technical sides of the enterprise. He instituted a matrix management organization, creating a leadership structure that provided flexibility for meeting future IM needs as well as maintaining existing IT systems. The new IT organization became responsible for such strategic activities as participating in the development of overall business strategies; prioritizing IT requirements; generating IT business plans; setting technical and architectural standards; managing user interfaces, outsourcing contracts, suppliers, and systems engineering; and allocating IT resources. To assess performance, the IT organization instituted several sets of measures that link directly to the business objectives and priorities defined by the CEO in the company's strategic plan.

The overall framework, outlining the major steps that the company took to improve, is illustrated in figure 3 below.

Figure 3: Framework and Steps for Transforming Business Operations Using IM

Step	Details
Strategic Plan	• Defined strategic business priorities including Common, Lean, Fast, and Growth • Executive team shared and challenging vision of the role of IT
Leadership Alignment	• CEO included the CIO as an integral part of the executive team • Positioned CIO and IT team as change agents
Communications	• CIO communicated IT role in fulfilling organizational priorities • Instituted IT values and communication channels
Team Alignment	• Implemented a matrix IT organization (functional & operational alignment) • Established virtual organizational structure for flexibility and responsiveness
Common Execution	• Focused on achieving effectiveness and efficiency from IT • CIO organization provides: IT strategic direction, IT plans and architecture, user interfaces, and resource allocation
Measurement	• Defined measures and communicated business results • Balanced measures: financial, customer, internal and learning

Strategies to Consider

Instituting IM as a support function separate from the business is an ineffective and outdated model. Leading organizations recognize the role of IM in supporting mission accomplishment and seek to integrate it with business operations. The following outlines the strategies that senior executives in leading organizations commonly use to promote IM leadership involvement in business decision-making and maximize the benefits from their IM investments.

Focus on efforts to incorporate the IM organization into the overall business by:

- Ensuring executive leadership and commitment for the CIO organization, both at the career and political levels.
- Positioning the CIO as a senior management partner.
- Developing structured approaches for exploring the broad range of IM opportunities and strategies available to enhance the business.
- Focusing technology initiatives on creating value and providing the information needed by internal and external customers.

Provide an atmosphere that supports executive understanding of IM by:

- Creating and using formal and informal executive communication channels to make the business case for integrating IM into organizationwide decision-making.
- Emphasizing returns and metrics that clearly link IM with an organization's business needs.

Principle II: Position the CIO for Success

"There is no cookie cutter approach, so knowing what fits in an organization is key to finding the right CIO to match with the organization."

Key Characteristics
- The CIO model is consistent with organizational and business needs
- The roles, responsibilities, and accountabilities of the CIO position are clearly defined
- The CIO has the right technical and management skills to meet business needs
- The CIO is a full member of the senior management team

There is no one right way to establish a CIO position. Diversities in corporate missions, structures, cultures, and capabilities prohibit a prescriptive approach to IM leadership. There are nonetheless a number of practices and alternative strategies that senior managers in leading organizations use to help define and institute their CIO positions to effectively meet business needs. This section examines those practices, providing pragmatic guidance that other organizations can also consider in determining how best to integrate CIO functions into their respective organizations.

Key Characteristics

Senior executives in leading organizations recognize that there is no one-size-fits-all solution to establishing IM leadership. Rather, they take responsibility for ensuring that their CIO models are consistent with the business, technical, and cultural contexts of their enterprises. Executives do so by examining their internal environments and asking a series of questions about the problems that need fixing, how IM can help, and how a CIO might best fit within their management structures to guide technology solutions. The answers to these questions help them choose from a range of alternative CIO approaches.

Specifically, by defining mission improvement objectives, senior executives determine whether their organization needs a CIO who is a networking/marketing specialist, business change agent, operations specialist, policy/oversight manager, or any combination thereof. Studying existing IM capabilities helps define the structure and responsibilities of the new CIO organization. Considering the centralized or decentralized nature of the enterprise helps determine the corporate CIO's authority level and how the CIO shares IM responsibility with other managers across the agency. Further, appreciating organizational culture and change readiness helps define the pace and extent to which CIOs can accomplish business transformation.

Business executives keep in mind that initial CIO models adopted should not be set in stone, but may have to be adjusted over time as their enterprises grow or mature. For example, while a company may need a business strategist to build a new IM capability, over time another type of CIO may be better suited to sustain operations. This evolution in the CIO role is also reflected by the introduction of variant IM leadership positions, (i.e., chief knowledge officers or chief technical officers) that diffuse IM responsibility

across several senior-level managers. For example, one industry organization that we visited has multiple product line CIOs. The most senior IM executive positioned at a level above these CIOs asserts that he is not the "corporate CIO" and does not want to be. With the belief that one person cannot embody all the knowledge needed to effectively direct IM in an organization, this executive uses an executive-level technology committee as a forum for building consensus for IM initiatives.

In conjunction with determining their CIO models, senior executives clearly define up front the roles, responsibilities, and accountabilities of their CIOs for enterprisewide IM, better enabling their CIOs to operate effectively within the parameters of their positions vis-à-vis those of their senior management counterparts (i.e., CFO, COO). Typically, CIOs serve as a bridge between top managers, IM professionals, and end users. CIOs provide leadership and vision, focusing senior executives on high-value IM issues, investments, and decisions. They may also serve as business change agents, challenging conventional approaches and developing new methods and systems for delivering mission benefits. The case study at the end of this section provides an example of a CIO hired specifically to help transform IM and business operations.

In this strategic capacity, CIOs have a key role in integrating information and technology management and performance across the entire information life cycle. They are responsible for such activities as IM planning, setting standards and policies, and designing and managing architectures to guide introduction of technology products and services. While all CIOs do not necessarily have hands-on IM responsibility, their purview may also incorporate any or all of the operational elements of information and technology management, such as data processing, infrastructure management, or systems acquisition.

Senior executives provide their CIOs with the authority they need to effectively carry out their diverse responsibilities. Executives ensure this by giving the CIO a role in investment decision-making, providing IM budget control, or ensuring leadership backing for IM programs and initiatives. Formally documenting or, in the case of public sector organizations, legislating CIO roles and responsibilities can help in managing performance and expectations of both the enterprise and the CIO. For example, the position of one state government CIO that we interviewed was based on a specific statute establishing the CIO at the cabinet level and assigning clear-cut responsibilities for funding and overseeing IT operations statewide.

While there is no template for doing so, senior managers apply consistent criteria in selecting their CIOs. The most obvious criterion is relevant IM expertise. Rather than being technical experts specifically, their CIOs intuitively understand IM principles and trends and act as strategists, applying technology and IM approaches skillfully to help resolve or overcome daunting business challenges. But even while IM expertise is important, their CIOs are business managers first, with experience in administrative, financial, and corporate management. Such experience better enables the CIOs to work with business managers to build a shared vision for meeting mission needs. For instance, one state government CIO attributed his success to his breadth of experience across a

variety of financial, retail, and IT units, which facilitates his ability to get buy-in from stakeholders in the state. Additional proficiencies critical to CIO success include leadership ability, innovation and flexibility, effective communications skills, interpersonal skills, and political astuteness. The weight that senior executives assign each of these criteria in selecting a CIO depends on the IM leadership model and the needs of the enterprise.

CIOs are no longer tied to a single functional unit—i.e., the "IT shop." Instead, they are positioned as senior executives with the ability to strategically view and apply IM to the best advantage of the enterprise. CIOs generally report to and partner with their agency heads, forging relationships that ensure high visibility and support for far-reaching IM initiatives. As members of the CEOs' executive teams, these CIOs are well situated to provide advice and direction, integrate IM with the business vision, and take part in high-level decision-making. Active participation in executive processes and committees facilitates the CIOs' ability to build effective executive-level working relationships.

Case Study on Positioning the CIO for Success

In 1996, this manufacturing company instituted a CIO position to help build its IM capability after deciding to split its former internal IM service provider off as an independent business. For years, the manufacturing company had relied on a wholly-owned subsidiary to provide IT products and services. With minimal IT talent left in the company following the split-off, the CIO had to create a new IT leadership staff.

The company used a consultant to search for a CIO to build the in-house IM management capability. Essentially, the company wanted a CIO with IM expertise, strong management skills, and background experience in managing large, centrally managed companies. The current CIO more than met their requirements. He came highly recommended due to his prior success in transforming two other IM companies and his skill in outsourcing, which would be needed to manage the manufacturer's continued reliance on IM contract services. The CIO accepted the position only after obtaining senior executives' commitment to his vision for transforming not just IM, but processes in the entire company.

Senior executives set the CIO up to succeed, not fail. They positioned him as a member of the senior decision-making board, reporting to the Vice Chairman of the company. They gave him the flexibility to bring in managers from the outside and set up a matrix management organization consisting of multiple business sector CIOs aligned with functional CIOs across the company, all reporting to the corporate CIO. They required that any IT initiative include collaboration between a sector CIO and a process-responsible CIO, as illustrated in figure 4 below. Senior executives also made the CIO the final authority on all IT budget, operations, and process management issues. During the period from 1996 through 1999, the CIO has been effective in lowering projected annual IT costs for 1999 by over $450 million, when taking into account both cost avoidance and cost reduction while enhancing the provision of IM services to the company.

Figure 4: Matrix Management Organization in a Leading Organization
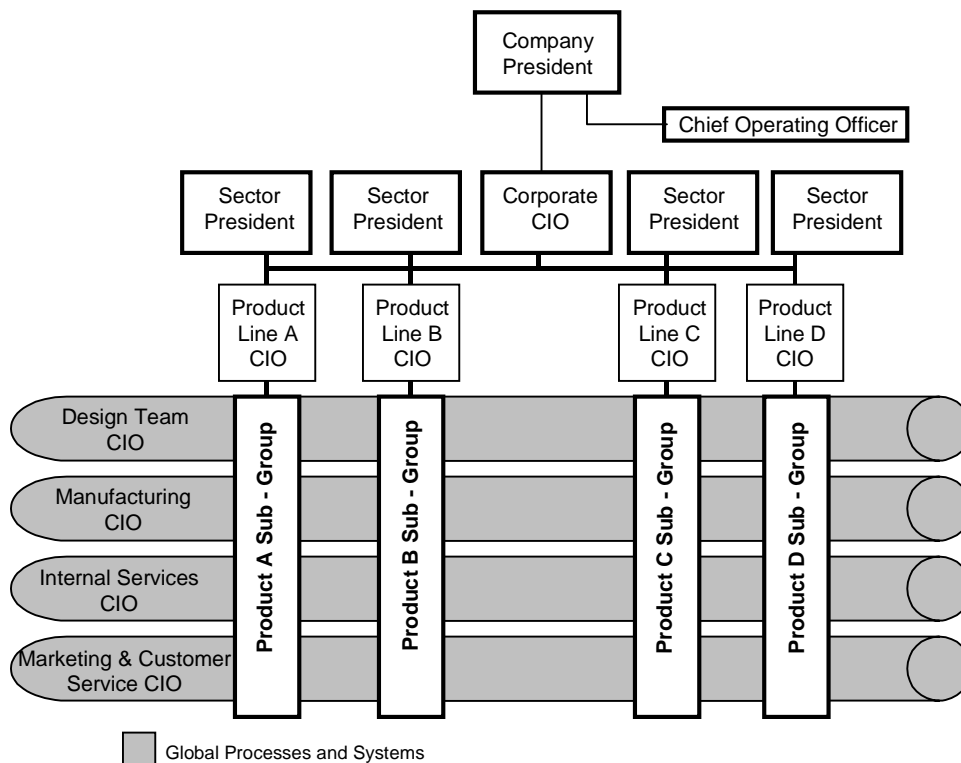
Strategies to Consider

In the absence of a single model for instituting a CIO, senior executives take precautions to ensure that their IM leadership positions are appropriately defined and implemented to meet their unique business needs. The following is an outline of the strategies that senior executives in these organizations use to determine the types of CIOs they need, select individuals to carry out these roles, and position them as effective and influential members of the senior executive decision-making team.

Determine the CIO model by:
- Examining the current environment and identifying what the enterprise expects to accomplish through IM before establishing a CIO position to lead improvements.
- Making the CIO type (i.e., business strategist, marketing specialist, policy and oversight manager, operations specialist, etc.) consistent with the enterprise's mission, history, current environment, culture, and change readiness.

Define clear roles and accountabilities for the CIO by:
- Delineating CIO roles and responsibilities vis-à-vis those of other senior managers.
- Ensuring that the CIO has the authority needed to be effective.
- Documenting CIO roles, responsibilities, and accountabilities to help manage expectations and performance.
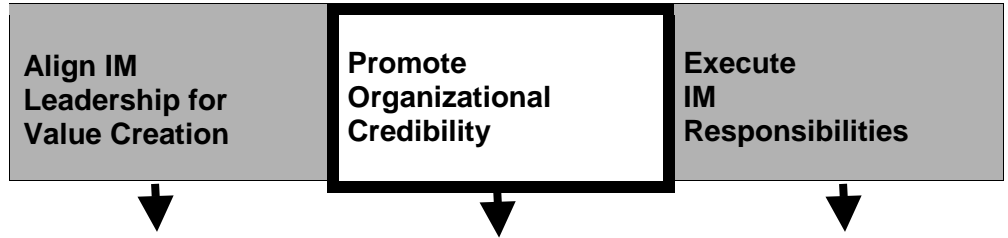
Select a CIO with the right skills set by:
- Choosing a CIO with IM expertise and the potential to help in business transformation, consistent with the CIO model selected.
- Ensuring that the individual also has the leadership and communications skills and other proficiencies needed to effectively carry out the CIO position.
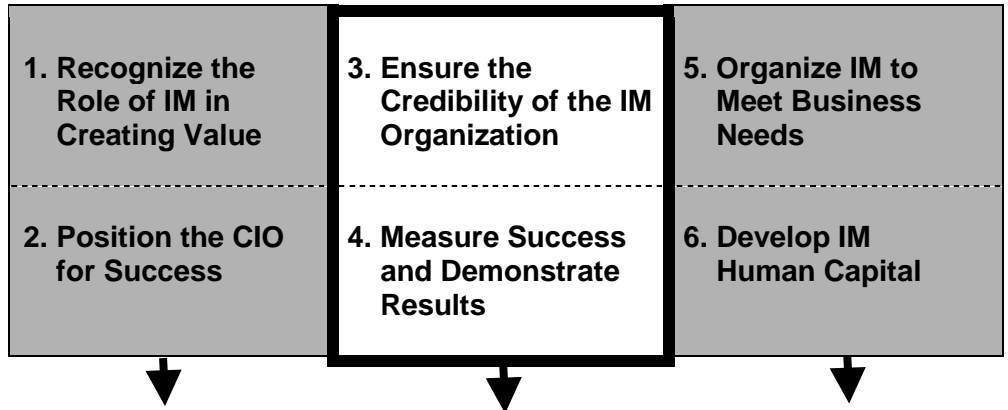
Make the CIO a business partner by:
- Having the CIO report to and partner with senior executive management.
- Giving the CIO the opportunity to work with other senior executives to discuss and decide among alternative IM products and strategies for meeting business needs.
- Including the CIO in strategy discussions at the highest levels so the CIO can lead the enterprise in using IM to corporate advantage rather than merely responding to client requests.
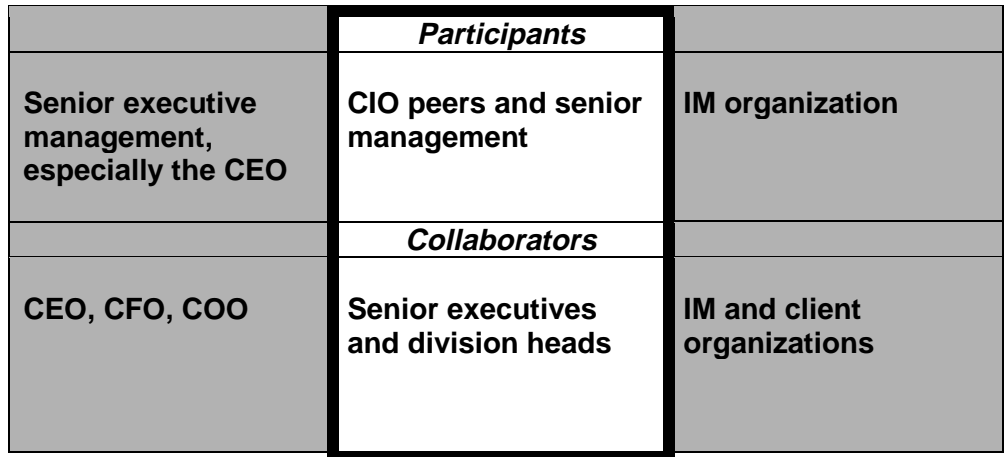
**Critical
Success Factors**

Align IM Leadership for Value Creation	Promote Organizational Credibility	Execute IM Responsibilities

Principles

1. Recognize the Role of IM in Creating Value	3. Ensure the Credibility of the IM Organization	5. Organize IM to Meet Business Needs
2. Position the CIO for Success	4. Measure Success and Demonstrate Results	6. Develop IM Human Capital

**Organizational
Focus**

	Participants	
Senior executive management, especially the CEO	CIO peers and senior management	IM organization
	Collaborators	
CEO, CFO, COO	Senior executives and division heads	IM and client organizations

Critical Success Factor:

Promote Organizational Credibility

The second critical success factor focuses on the CIO's ability to establish the IM organization as a central player in the enterprise. The legitimacy of the CIO and the IM organization must be developed for the CEO's message of IM's central role to be accepted and for the IM organization to become a full participant in formulating the corporate strategy.

Both principles in this critical success factor pertain to the demonstration of the IM organization as an entity that can complete critical projects successfully and contributes to the well-being of the enterprise. This effort is largely the responsibility of the CIO, and the focus is lateral and downward. The CIO must create an environment in which the ability of the IM organization to contribute to the success of the enterprise is recognized. Success, to be appreciated, has to be demonstrable and measurable. If the CIO is not able to demonstrate that he or she deserves the support of the CEO and makes a valuable contribution to the corporate mission, the CIO will not be effective as a full participant in the corporate decision-making process.

Principle III: Ensure the Credibility of the IM Organization

"While placement of the CIO position at a high level within the organization may carry some weight, the CIO generally must earn credibility by making things happen."

> **Key Characteristics**
> - The CIO has a legitimate and influential role in leading top managers to apply IM to meet business objectives
> - The CIO has the commitment of line management and its cooperation and trust in carrying out IM projects and initiatives
> - The CIO accomplishes quick, high-impact, and visible IM successes in balance with longer term strategies
> - The CIO learns from and partners with successful leaders in the external IM community

Instituting a CIO position consistent with organizational needs and finding a capable leader to fill the job are no guarantee of CIO success. Rather, the burden of ensuring IM effectiveness shifts from senior executives to the CIO and his or her supporting organization. Given the relative newness of the position vis-a-vis the rest of the business, the CIO is faced with having to gain the attention and respect of managers at all levels across the organization and build the support and cooperation needed to effectively execute the IM leadership role. The following is a discussion of the strategies that CIOs in leading organizations use to legitimize their roles and successfully collaborate with their business counterparts to guide IM solutions to meet mission needs.

Key Characteristics

CIOs in leading organizations recognize that providing effective IM leadership and vision is a principal means of building credibility for their CIO positions. CIOs do this in a number of ways. Foremost, they do not manage IM in a vacuum, but rather make sure that the IM program is well integrated with what senior executives want to accomplish. CIOs work with their executive peers to jointly produce an IM vision--educating senior managers on the strategic value of IM, providing advice and direction, and setting expectations of what can be achieved. CIOs express this vision in business rather than technical terms, and in such a manner as to generate enthusiasm, buy-in, and motivation for managers to strive together towards achievement of common goals. Further, CIOs participate on executive committees and boards that provide forums for promoting and building consensus for IM strategies and solutions. We found this to be true for each of the case study organizations that we visited. Having achieved senior management interest and backing, the CIOs can leverage this support as needed to help ensure cooperation for carrying out IM and business change initiatives across the enterprise.

Effective CIOs, and their supporting organizations, do not set out to force their IM ideas and solutions on their business counterparts. Instead, they seek to bridge the gap between technology and the business by networking informally, forming alliances, and building friendships that help ensure support for IM. CIO organizations then work *with* rather than *for* the businesses, getting them involved in IM projects and driving ownership and accountability to line management and not the IM shop. For example, in one case study,

the state legislature placed the CIO organization in charge of managing the planning, funding, and implementation of a project to develop a single telecommunications network to serve the state's entire education community. Rather than a technical challenge, the project has been a huge coordination effort, requiring that the CIO organization overcome rivalries and achieve the commitment and cooperation of traditionally autonomous education sectors.

CIOs retain the support of their business colleagues by following through on commitments to effectively lead business transformation projects, provide needed IM products and services, and train and educate the user community. Through it all, CIOs strive to maintain open communications and build trust. They do so by being accessible to the businesses, listening to user feedback, and focusing on user needs.

CIOs recognize that balancing short term IM successes with longer term business change initiatives is key to keeping their business customers satisfied. In the initial months of tenure, CIOs set out to understand their enterprises' needs and tackle tough issues (i.e., runaway projects and crisis situations such as Year 2000 management) that demand immediate attention or could pose immediate obstacles to IM success. In the short term, they also focus on building relationships, addressing business imperatives (i.e., process streamlining and consolidations), and demonstrating success by promptly providing high-impact products and services (i.e., commercial off-the-shelf software and desktop equipment) that allow them to achieve positive and visible accomplishments fairly quickly. CIOs recognize that showing interim results concurrent with more protracted efforts such as multiyear systems developments, "big-ticket" infrastructure projects, or business process reengineering can have significant positive impact on CIO credibility. As one case study CIO pointed out, if a short term, high-impact project fails, the time and money spent on it are generally manageable.

Often, CIOs outline "plans of attack" or roadmaps to help guide them in effectively implementing their short- and long term IM strategies. Documenting their courses of action helps them manage schedules and expectations and provides baselines against which to assess progress and performance. These CIOs are careful not to get caught in the cycle of continual planning, but take steps to ensure effective progression from planning to implementation. They return to their plans iteratively, updating them as progress is made and business needs evolve.

Finally, CIOs in leading organizations recognize that there is too much going on in IM for them to absorb IM issues all alone. Rather than allowing their technology ideas and programs to stagnate, they keep abreast of changes in the fast-paced IM environment that might be applied to enhance IM capability and improve mission performance in their own organizations. They do so by avid reading, working with vendors, and following market directions. CIOs also benchmark, partner with, or seek advice from successful IM peers and competitors on initiatives that provide opportunities for exchanging ideas, sharing capability and expertise, and achieving mutual benefits in the larger IM community. For example, one state CIO with whom we met said that he values the guidance received from a CIO advisory board of private industry representatives, convened by the state

governor to facilitate IM learning from business organizations. This CIO also partners with a major IT corporation on a project to acquire standard desktop equipment for all agencies under the governor's purview. Participation in key councils, advisory groups, and government, trade, or professional associations such as the Industry Advisory Council or the National Association of State Information Resource Executives, is also useful for exchanging ideas, sharing information, and identifying new ways to meet common IM challenges.

Case Study on Ensuring the Credibility of the CIO Organization

This state's Justice Network (JNET) illustrates how implementation of many of the practices discussed in this section has enhanced the credibility of the CIO and his supporting organization. JNET is a highly successful project started by the CIO organization enabling agencies to jointly develop a single, secure, web-based system to support administration of criminal justice across the state. The project responds to the governor's priority for consolidated agency projects, thereby assuring high-level support for CIO efforts. The CIO organization conceived the idea for JNET after receiving multiple requests from criminal justice agencies for funding to develop redundant systems. The organization identified the joint project as a good opportunity to save on costs, share information, and reduce redundancy and errors by making it possible to enter new offender information only once as subjects proceed through the criminal justice process. Historically, the state's justice agencies have been highly autonomous and distrustful of outsiders. Prior efforts to get the agencies to work together failed. IT managers recognize that success with the current initiative goes a long way in increasing CIO credibility with the state agencies.

The CIO organization launched JNET by bringing together stakeholders from across the state in a series of meetings over the course of 2 months to establish a vision for a shared system that would also meet individual justice agency information needs. Under executive order, a senior-level leadership committee, including the CIO, is responsible for establishing JNET policy, direction, and standards and for authorizing the release of JNET funds. A steering committee consisting of justice agency representatives works with IM professionals and consultants to refine project details. Their biweekly meetings provide a good opportunity for the CIO organization to build relationships with the state agencies and for agency representatives to get acquainted and learn about one another's operations and data resources. With central responsibility for controlling contracts and funding drawn from the agencies' budgets, the CIO organization is credited with being the "glue" that holds JNET together. A JNET office, established to administer the project on a day-to-day basis, also reports directly to the CIO.

Under CIO guidance, JNET has been planned as a multiphased, multiyear development effort with interim products and results. The CIO organization has helped agencies successfully complete a pilot phase to prototype initial JNET content and applications, also demonstrating the CIO organization's ability to help deliver on commitments. Three additional phases involve testing the system's basic data-sharing function and adding new capabilities such as data importing, on-line processing, and document management. Initially, the justice agencies thought JNET was a bad idea; agency representatives had little optimism and just went through the motions of working together. They posed such resistance that at one point, the CIO had the Lieutenant Governor make a surprise visit to a steering committee meeting to oversee project progress, demonstrate senior management support, and ensure agency cooperation toward meeting common objectives. Once the agencies saw the operational prototype and the project's potential, they realized that their individual sacrifices had paid off.

Today, JNET continues to grow in scope and popularity. Along with it, CIO credibility has increased. The CIO organization is currently working with several counties to help link them with JNET. Next steps include instituting JNET at the local level and ultimately partnering with other states to construct a nationwide justice network. JNET's success has served to legitimize and increase the value of the CIO function to its business counterparts. Now, other agencies, including the Departments of Health and Public Welfare, also want to work with the CIO organization on similar cross-functional IM initiatives.

Strategies to Consider

While senior executives are responsible for creating the environments and positions likely to ensure CIO success, it is the responsibility of the CIOs themselves to make that success a reality. Regardless of all the promising skills, strategies, and technologies they may bring to bear, no CIO can be effective without first building credibility with business executives, IT professionals, and user communities alike to ensure commitment and support for their IM leadership and initiatives. The following practices, commonly used by CIOs in leading organizations to build credibility, can also be considered and applied by CIOs in federal departments and agencies to better legitimize their positions and help ensure success in their individual business/cultural environments.

Provide IM leadership and vision by:
- Ensuring that the IM vision encompasses senior management priorities.
- Educating top managers on the value of IM in helping to accomplish mission objectives.
- Articulating the vision in business terms to facilitate line management understanding and achievement of buy-in.
- Using senior management discussion and decision-making forums as opportunities to build consensus for IM programs and initiatives.

Establish effective working relationships by:
- Networking informally and forming alliances with other senior managers to help defuse potential opposition and build commitment to new IM directions.
- Getting managers from the business side of the enterprise involved and accountable for IM projects.
- Fulfilling commitments to provide effective IM goods and services.
- Establishing open communications and feedback mechanisms, such as surveys and questionnaires, as a way to build trust.

Balance quick IM successes with long term impact by:
- Setting priorities and distinguishing between short term, high-impact initiatives and longer term objectives that require more vested interest.
- Outlining a plan or strategy for accomplishing these priorities in an efficient and effective manner.

Leverage external IM expertise by:
- Keeping abreast of technological change and incorporating new products and strategies in the enterprise's IM program as appropriate.
- Forming partnerships and building off of the success and expertise of external CIO peers.
- Networking and participating in IM forums in the larger community to debate and identify ways to address common IM issues and concerns.

Principle IV: Measure Success and Demonstrate Results

"Measurement determines what one pays attention to. The things that are measured become relevant; the things that are omitted are out of sight and mind."

> **Key Characteristics**
> - IM managers engage both their internal and external partners and customers when defining measures
> - Managers at all levels ensure that technical measures are balanced with business measures
> - Managers continually work at establishing active feedback between performance measurement and business processes

In many organizations the value of IM is considered intangible--difficult to measure and mired in terms of "soft dollars" or "strategic assets." For this reason, in the past, few organizations embarked on programs to measure the effectiveness of IM systems. However, it has become increasingly evident that without a measurement process where results can be demonstrated, not only is IM at a disadvantage when competing for scarce resources, but also when making its case in support of efficiency and effectiveness initiatives. For the IM organization to be viewed as part of the business, a structured measurement process needs to be in place to measure IM success and demonstrate results to the organization. This section discusses the approaches that leading organizations use to measure performance and results.

Key Characteristics

While there is no standardized approach to performance measurement, leading organizations strive to understand and measure what drives and affects their businesses and how to best evaluate results. These organizations have generally struggled with identifying and adopting measures to assess the value of IM, but have been able to put some measures in place to help demonstrate performance. They use IM measures for a variety of purposes. The measures are a vehicle for communicating with senior management and stakeholders on the areas the organization deems important. IM measures also serve as vital management and decision-making tools, providing information that can be used to make improvements in business outcomes and service delivery.

Managers told us that the IM measures that capture the most attention from senior management are simple ones--or at least simple in terms of how they are expressed. In a number of instances, the organizations we visited used uncomplicated terms to communicate measures, but the underlying concepts were quite involved and required a good understanding of IM and business fundamentals. These organizations collapsed a lot of information into a form that effectively communicated the success or failure of IM activities and, in the case of the latter, expanded on the issues and supplied additional information. For example, one international organization, which is involved in several product lines, measures its performance in line with the following IM organizational business priorities,

- Maximize performance (i.e., improve service and reduce IM costs).
- Improve business processes (i.e., IM projects and E-commerce).
- Increase team contributions.
- Create a leading edge electronic communications process.

Even though these measures seem simple, there is a considerable amount of time, effort, and data involved in amassing and assessing the results tied to these business priorities.

To establish joint ownership for performance management, organizations strive to construct measures jointly with their stakeholders, customers, managers, and IM staff. They work together to achieve a common understanding of goals, metrics, and anticipated outcomes that are easy to understand but are aimed at adding value. Managers told us that performance measurement systems work best when combined with established measures that reflect customer/stakeholder needs and the activities of employees that are directly involved in IM. The IM organization's responsibility does not end with the establishment of measures, nor does the IM organization have sole responsibility for technological success. As a practical matter, those responsible for judging the success of IM programs and their supporting functions should agree on the measures used and become involved in monitoring the outcomes.

Although approaches vary, leading organizations develop IT performance measures with a focus toward improving not only internal IT performance but also external relationships with technology users and the overall business. Organizations balance various technical measures to ensure that IT products and services are deployed in the most effective and efficient ways and lead to desired business results. They focus on monitoring short- and long term IT measures that directly affect business activities and produce real business value. This means that IT activities must be directly related to company relationships with customers, clients, and suppliers and also affect business results, such as direct costs or market share.

Leading organizations use performance measures that focus on business outcomes such as customer satisfaction levels, service levels, and in some instances, total requests satisfied. For example, one state agency commissioner requires that his departments develop tactical plans for all areas, not just IT. All executives participate in the planning process. The performance measures are broken down to meaningful levels as a way of holding the "IT shop" and other departments accountable for the services they provide. IT goals and objectives are incorporated into the plans and IT performance outcomes are provided to the commissioner and his executive staff on a quarterly basis. This exercise has served to build credibility and help demonstrate the value that IT adds to the organization. The existence of performance measures has also made a difference in how agencies behave because the documentation they provide serves to make them accountable.

To properly collect and analyze information, leading organizations develop measurement systems that provide insight into their IT service delivery and business processes. The establishment of an information feedback system allows organizations to link activities

and functions to business initiatives and management goals. This feedback, in turn, leads to increased IT productivity and organizational effectiveness. One state we visited established an information services board to develop statewide policy standards and to monitor IM projects as part of its portfolio management process. The board, however, has increasingly become more involved in monitoring and making recommendations on troubled IT projects. The following are some of the lessons learned from the board's project reviews:

- the board needs to get involved early in monitoring and overseeing projects before considerable funds are spent on the projects;
- long term, high-cost projects are no longer sustainable because the sponsors tend to be unable to sustain long term support;
- projects are best managed in a limited commitment, phased approach; and
- projects should quickly demonstrate results.

Once planning and decision-making structures are in place and performance results can be used as part of the decision-making process, organizations are in a better position to ensure that goals and objectives clearly link and align with IT performance measures. Leading organizations also assess the readiness of their organizations to use IT measures and their receptiveness to data collection, measurement, and analysis. Furthermore, they nurture a philosophy that is positive towards performance management and measurement, and they view measures as a way to focus on business value and customer satisfaction.

In summary, managers at the organizations we studied cautioned that IT performance measurement is in its infancy and measurement techniques are still evolving, partly due to changes in technology. Most of the organizations we visited are continually looking for ways to improve their IT measurement systems as a means of supporting achievement of organizational goals.

Case Study on Measuring Success and Demonstrating Results

To measure the its IM initiatives, this state instituted an IM performance measurement process (illustrated in figure 6) that is driven by the **State's Information Technology Strategic Plan**. The plan sets forth the goals and strategies needed to support the state's entities in developing IT plans, using IM resources, and in defining IT performance measures. The plan also aligns very closely with the **State's Strategic Plan** that sets forth four broad goals for the use of IT within the state: (1) improve service delivery, (2) make information more accessible, (3) use IT to respond more quickly, and (4) invest in people, tools, and methods. The IT Strategic Plan also incorporates **Stakeholder Involvement** by including perspectives by state agency executives, legislators, educators, and other stakeholders on the use of the state's IT resources. Also included in the plan is information from the state's **Biennial IT Performance Report**. This report evaluates the state's progress toward meeting the last biennium's IT Strategic Plan goals and includes a summary of **Strategic and Operational Performance Measures**. These measures, in part, are the result of the state's previous IT Strategic Plan and are meant to measure how well IT resources are being used to achieve the state's overall strategic goals and operational (technical) objectives. These results are published in the State's Biennial IT Performance Report, as mentioned earlier, and are used to benchmark the state's IM services. The state legislature also uses this information to allocate future IM funding.

Figure 5:   Performance Measurement Framework
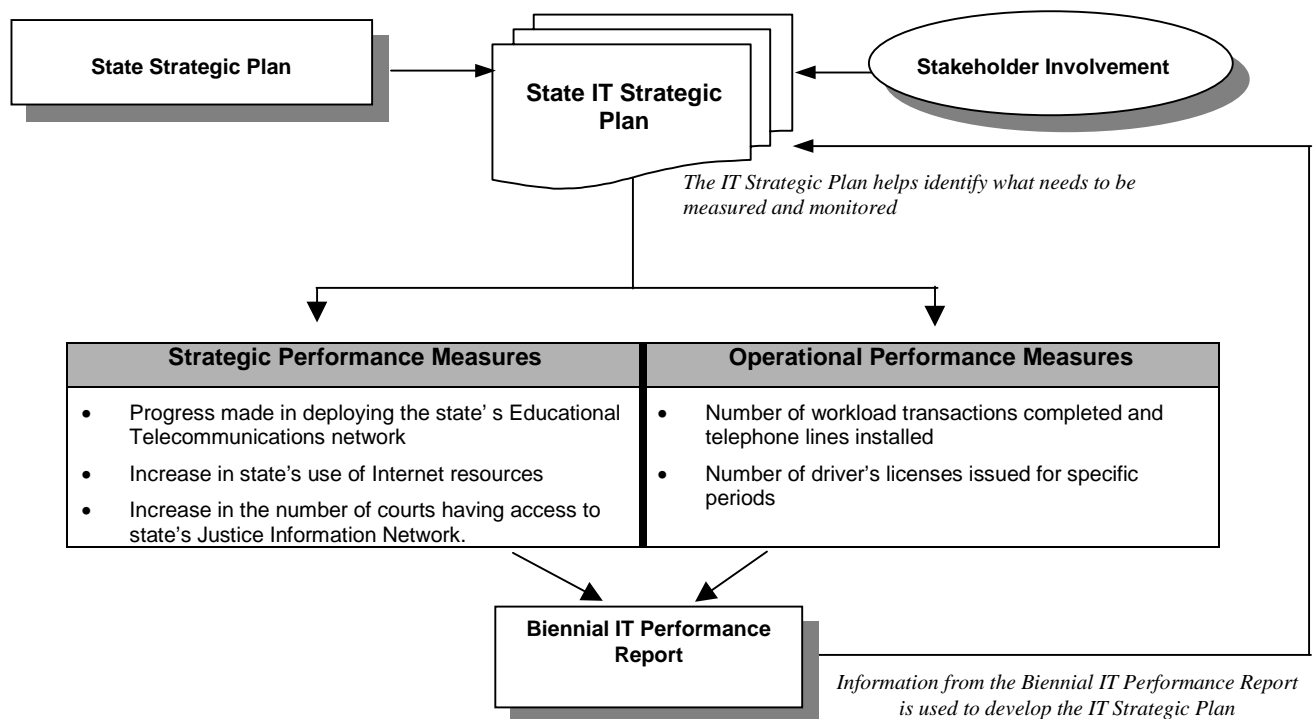
Strategies to Consider

Performance measurement is a critical step to ensuring results and success from any project, but especially from IM initiatives whose value is often considered difficult to capture. While performance measurement is still evolving in principle and in practice, leading organizations have pinpointed a number of strategies that have proven useful in gauging the impact and benefits of their IT investments. These strategies are discussed below.

Engage internal and external stakeholders in defining and managing IT performance by:
- Ensuring that mission delivery and IT performance measures are integral to strategic management and decision-making processes.
- Establishing internal and external customer groups to periodically review, validate, and accept IT performance measures.

Ensure that processes are in place to balance business and technical measures by:
- Developing specific technical performance measures for IT products and services and balancing them with business-driven measures.
- Demonstrating that the performance measurement data generated are reliable and useful.
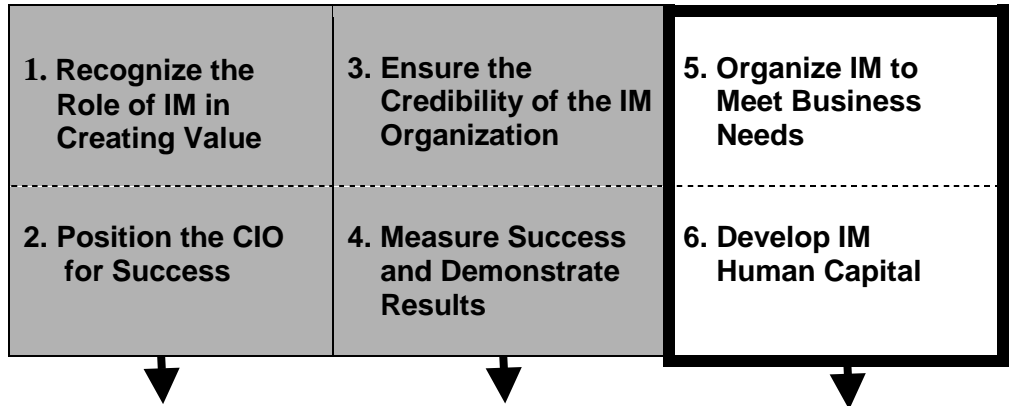
Establish an effective data collection and performance feedback process by:
- Developing well-designed performance data collection methods.
- Establishing a limited set of outcome-based performance measures that link to mission outputs and outcomes.
- Utilizing concise, understandable performance reporting tools and techniques and conducting performance measurement reviews, as needed.
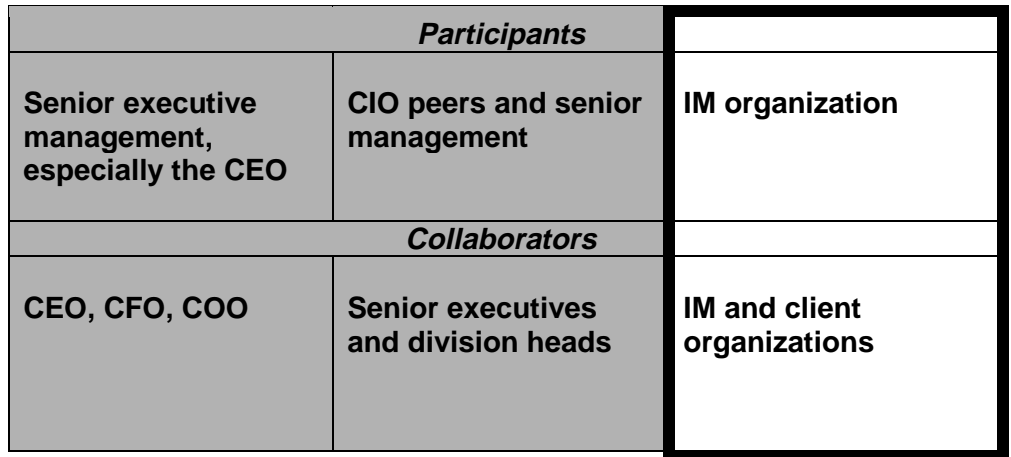
**Critical
Success Factors**

Align IM Leadership for Value Creation	Promote Organizational Credibility	Execute IM Responsibilities

↓ ↓ ↓

Principles

1. Recognize the Role of IM in Creating Value	3. Ensure the Credibility of the IM Organization	5. Organize IM to Meet Business Needs
2. Position the CIO for Success	4. Measure Success and Demonstrate Results	6. Develop IM Human Capital

↓ ↓ ↓

**Organizational
Focus**

Participants		
Senior executive management, especially the CEO	CIO peers and senior management	IM organization
Collaborators		
CEO, CFO, COO	Senior executives and division heads	IM and client organizations

Critical Success Factor:

Execute IM Responsibilities

The CIO and IM organization are ultimately responsible for successfully executing their role in the enterprise's mission. How central this role is to the strategic plans of the enterprise will depend on each of the first two critical success factors, but support from the top and all efforts to build credibility will be futile unless the IM organization is run effectively. If the IM organization is not able to execute its responsibilities, and if it is not able to play the critical role for which it has been developed, the corporation will learn to work around it, or it will be replaced.

There are many aspects to successfully organizing and running an IM organization. However, this critical success factor, as well as the underlying principles, focuses on the elements that leading organizations believe are most central to the CIO's responsibility. Determination of the IM organization structure must fall to the CIO, as he or she is the senior executive of that unit. Aligning the IM organization with the needs of the enterprise is critical to the satisfaction of those needs. Communicating enterprise requirements to IM staff and making appropriate decisions to meet the needs of the enterprise are the responsibility of the CIO. As the IM organization's representative in strategic decision-making forums, the CIO must be the translator of those strategies into IM organization initiatives.

Along with technology, human capital is the central resource the CIO has to execute his or her responsibilities. While the CIO can vet technology decisions, it is likely that staff develop most of the investment proposals. Human capital plans, on the other hand, are seen as particularly the responsibility of the CIO. In the current IT environment, technology has become a commodity in many ways. The human capital involved in applying that technology to achieve the mission of the enterprise is a resource that requires the CIO's attention. The hiring, retention, and training of IM personnel is seen by leading organizations as a fundamental principle of good CIO practice.

Principle V: Organize IM to Meet Business Needs

"While the CIO is important, it is the operating environment for the entire organization that will make it successful."

> **Key Characteristics**
> - The IM organization has a clear understanding of its responsibilities in meeting business needs
> - The extent of decentralization of IM resources and decision-making is driven by business needs
> - The structure of the IM organization is flexible enough to adapt to changing business needs
> - Outsourcing decisions are made based on business requirements and the IM organization's human capital strategy
> - The IM organization executes its IM responsibilities reliably and efficiently

Developing an IM organization is an ongoing process that demands a clear understanding of the organization's responsibility for helping meet business needs. This responsibility, along with parent business processes, market trends, internal legacy structures, and available IM skills drives decisions as to the structure of the IM organization and how the organization is aligned with the rest of the enterprise. Ultimately, the CEO controls the assignment of IM functions to the CIO, the IM organization, and other organizational units. Once these decisions are made, the IM organization must provide effective, responsive support through efficient allocation of resources and the day-to-day execution of its responsibilities. This principle examines the practices that leading organizations commonly use in establishing IM organizations to effectively meet their mission needs.
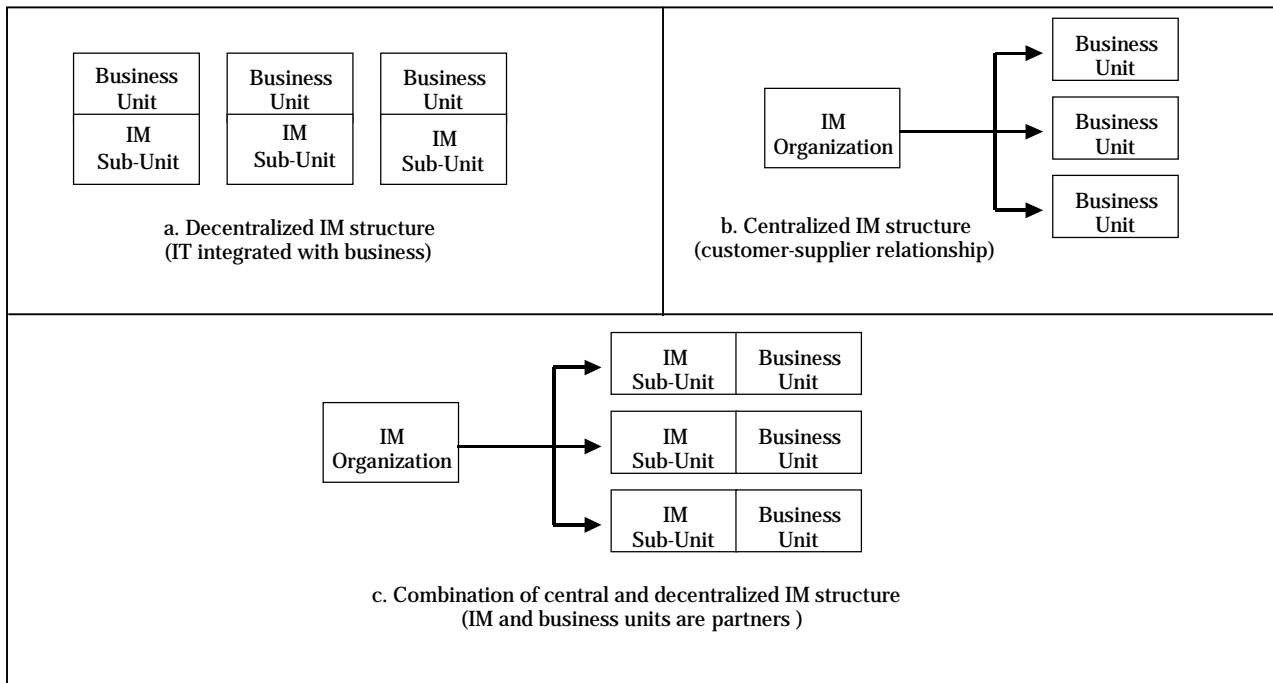
Key Characteristics

It is the duty of a CIO to manage expectations and help ensure that all members of an IM organization have a clear understanding of their responsibilities. In leading organizations, evolving business processes play a key role in determining how these IM responsibilities are structured and adapted to meet changing needs. We found that leading organizations quickly reallocate and make IM resources available on a routine, sometimes daily or hourly, basis to address changes in business processes. External factors, such as market trends, changing technology, and available skills as well as internal legacy structures and corporate ventures also influence how an IM organization is formed, aligned, and adjusted to help support the rest of an enterprise. For example, one organization that we studied had experienced two mergers that required the company to quickly integrate the new businesses and restructure to meet growing business needs. Human resources systems were consolidated and new corporate structures were quickly defined to ensure continued support to the enlarged customer base. The company remains prepared to restructure to meet ever-changing business requirements.

In lieu of establishing either completely centralized or decentralized IM organizations, leading organizations manage their IM resources through a combination of centralized

and decentralized IM structures. In this hybrid structure, the CEO assigns central control to a corporate CIO and supporting IM organization, while delegating specific authority to each of the business units for managing its own unique IM requirements. The corporate CIO and supporting IM organization centrally formulate policies and standards for all IM-related activities. They also centrally manage architectures and a core set of infrastructure components to provide common IM services to the entire corporation. The corporate CIO works with CIOs or other IM managers in each of the business units to ensure efficient, reliable, and interoperable technology for the entire corporation. The following figure illustrates traditional centralized and decentralized organizational structures, in comparison with the hybrid combination of these structures that is used by leading organizations today.

Figure 6: <u>Comparison of Decentralized, Centralized, and Hybrid IM Structures</u>

a. Decentralized IM structure
(IT integrated with business)

b. Centralized IM structure
(customer-supplier relationship)

c. Combination of central and decentralized IM structure
(IM and business units are partners)

Leading organizations decide, as part of a sourcing strategy, whether to make up their IM structures with in-house staff or external providers. An organization's sourcing strategy is part of a larger human capital development strategy, which is discussed in principle VI. The shortage of skilled IM workers in the current market environment is often a major reason for leading organizations to outsource. The CIO and decision-making authorities decide what type of work is appropriate to outsource and what type of work is best performed internally. Typically, leading organizations cultivate long term skills such as contract management, project management, and security management while outsourcing short term skills such as application development. For example, one state capital that we visited is home to over 600 software companies. IM skills are in short supply. More and more, CIOs are looking for alternatives to in-house software development and management. It makes sense for the state to outsource tactical functions such as help

desks or mainframe management. On the other hand, there are responsibilities such as IT planning and oversight that must remain in-house. As the state contracts out a lot, it is also essential that it have good contract management expertise.

Along with effective allocation of available resources, leading organizations execute their IM responsibilities reliably and efficiently. Technology is highly integrated with the business processes in these organizations because technology is viewed as an enabler for the business, not just a tool. The organizations make IM investment decisions based on business case analyses and return-on-investment projections. Consistent with a fundamental strategic IM approach, the organizations also focus on continuous process improvement. They provide reliable IM capabilities on a daily basis, but also look to the future by pursuing new IM initiatives that show how technology can improve the business of tomorrow. For example, one state CIO that we interviewed said that his role was to identify enterprisewide and strategic initiatives to improve state information management. One initiative involved establishing strategic direction, guidelines, and standards for instituting electronic commerce in the state government. Electronic commerce was to be used for such activities as renewing licenses and paying taxes.

Leading organizations simplify projects by producing incremental deliverables that quickly show success and demonstrate the impact of effective CIO management while still focusing on long term objectives. As discussed in principle III, carrying out successful IM projects is expected in leading organizations and adds to the credibility of the CIO and the IM organization.

Case Study on Organizing IM to Meet Business Needs

Implementing a combination of centralized and decentralized IM management enables leading organizations to effectively support their business operations. One leading organization implements a combination of centralized and decentralized IT and structures to best meet the needs of its three diverse lines of business—an international services division, an international industry division, and a retail division. The organization uses a centralized IT infrastructure with decentralized development efforts to provide efficiency and security for its corporate customers. Efficiency is the number one priority of the organization in terms of dollars spent as well as technology performance.

The organization has CIOs in each of its three business units. Each business unit makes IT investment decisions based on business requirements and the technology available to support those requirements. For example, desktop platforms and software vary between business units depending on the unique needs of each business area. The work in the business units is all performed in-house and is not outsourced as the business expertise is considered a core competency. The business CIOs work together to determine how IT can be used to reach customers across business lines. The international services and international industry divisions have some common requirements based on the international nature of the two divisions. The international industry division and the retail division have common requirements based on the specific industry. The CIOs of these divisions work together, leveraging opportunities for shared IT products and services so that each unit can invest fewer dollars to accommodate common needs.

The corporate IT organization's role is to aggregate needs across business units and provide solutions that can be integrated to serve the entire corporation. Common components of each business area include data centers, human resources, payroll, a financial architecture, and a common desktop environment. Standard processes and tools, such as contingency planning, interdependency identification, protocols, and risk management are used to coordinate multiple business areas. These standard utilities evolved through two corporate mergers and are now institutionalized across the corporation. The mergers required that the organization quickly adopt new organizational structures and address new business requirements. The standard processes and policies developed, applied, and improved as a result of the mergers provide this organization with the flexibility it needs to adapt to future changes in responsibility.

This organization is constantly looking to improve its IT investment processes. All technology investments are justified using business case analyses. The decision-making process for establishing business cases recently evolved to include competitive needs. Competitive needs were not considered when this organization initially postponed electronic commerce initiatives due to low return-on-investment projections. The organization fell behind the competition in providing this service and the delay may have cost it customers. As a result, competitive needs are now considered part of the decision-making process.

Strategies to Consider

An effective IM organization is a dynamic structure, responding not only to business, mission, and cultural requirements, but also to rapidly changing technologies, elusive skills, and competing resources in the external market environment. Leading organizations recognize the myriad forces driving their IM capabilities. The following is an outline of the strategies that these organizations consider and use in deciding how to effectively structure, source, and execute their technology management operations.

Create a clear understanding of responsibilities within the organization by:

- Articulating a common description of responsibilities to all levels of the IM organization.
- Assigning responsibilities to parts of the organization based on skills and organizational structure.

Use a combination of centralized and decentralized organizational structures by:

- Centrally formulating policy and standards for all IM-related activities, and providing common IM services through a centrally managed infrastructure.
- Delegating authority to the business units to manage individual IM requirements.

Create an adaptable organizational structure by:

- Redeploying internal resources to quickly address changing business and customer requirements.

Select appropriate sourcing strategies by:

- Considering outsourcing to address the shortage of skilled IM workers in the current market environment.
- Keeping core competencies in-house and outsourcing noncore responsibilities.

Execute the IM responsibilities efficiently by:

- Providing reliable and efficient IM services and products.
- Making IM investment decisions based on business case analyses and return-on-investment.
- Producing incremental deliverables to demonstrate results while still focusing on long term objectives.

Principle VI: Develop IM Human Capital

"Providing good benefits packages and building core competencies are other ways of attracting, stimulating, and retaining IM workers--especially among today's 'self-preservation-minded generation-Xers.'"

<table>
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Key Characteristics
- The IM organization identifies the skills necessary to effectively implement IT in line with business needs
- The IM organization develops innovative ways to attract and retain talent
- The IM organization provides training, tools, and methods for skilled IM professionals to perform their duties

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As is true for the other principles, the business requirements of an enterprise drive decisions related to the specific types of resources needed to implement technology successfully. External market forces and internal legacies influence the types of skills available to an IM organization. Given these realities, the IM organization must provide an effective, responsive IM workforce to help accomplish missions and goals. This principle discusses the strategies that leading organizations use to assess their skills bases and attract, recruit, and retain IM professionals.

Key Characteristics

Leading organizations develop human capital strategies to assess their skills bases and recruit and retain staff who can effectively implement technology to meet business needs. The following figure provides an overview of the strategy that leading organizations use to secure IM human capital.

Figure 7: Strategy for Securing Human Capital in Leading Organizations
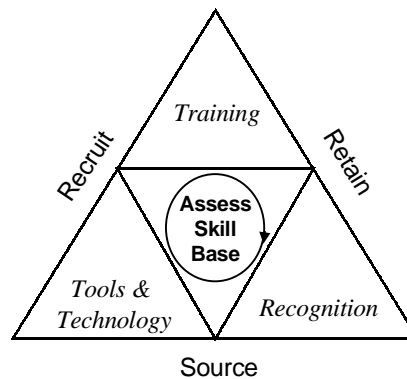
Leading organizations assess their IM skills on an ongoing basis to determine what expertise is needed to meet current responsibilities and support future initiatives. They can evaluate the skills of their employees using methods provided by entities such as the Carnegie Mellon University's Software Engineering Institute and the Information Technology Association of America. Needed skills are compared with existing capabilities in the organization to determine gaps in the IM skills base. For example, the state university at one of our case study locations had conducted a study revealing

continuing gaps in the state's ability to recruit and retain IM workers vis-à-vis industry. In response to the governor's initiative to expand the state's IM workforce, proposals were made for a program to recruit and fund college and university students willing to study technology management as a prelude to becoming part of the state government's labor force. Strengthening the skills and capabilities of IM professionals through training and innovative hiring practices is part of a formula for building IM capabilities.

Leading organizations sometimes use surveys that compare missing capabilities with market availability to determine what skills to acquire through hired professionals. When professionals with the necessary skills cannot be hired, these organizations supplement the existing workforce with external IM resources. More specifically, they cultivate IM expertise in their internal workforces, while outsourcing skills that are available from multiple sources at lower costs. Leading organizations may even choose to replace labor with technology when they cannot hire the skilled IM professionals they need. Core IM management functions include project management, security management, and contract management practices that can apply to a variety of projects. The various staffing and sourcing strategies provide leading organizations with dynamic workforces that can quickly carry out these functions to meet changing business needs.

Studies forecast an ever-increasing shortage of IM professionals, presenting a great challenge for both industry and the federal government. Organizations are finding it difficult to retain staff when their competitors can always offer higher salaries. For example, one state government CIO organization that we studied experiences a 22 percent turnover in IM professionals each year. Despite having higher technology wages than any other state in the country, the state remains at a disadvantage in competing with industry and must rely on alternative strategies and incentives to attract and retain skilled workers.

While benefits, recognition, and challenging responsibilities are also useful in securing staff, leading organizations identify training as a major nonsalary incentive for attracting and retaining skilled IM professionals. Leading organizations dedicate an increasing percentage of their IM budgets to training. Sometimes such funds are devoted to retraining existing nontechnical personnel to supply them with IM expertise. For example, one industry case study organization sponsors a 3-month course to retrain about 2,000 legacy employees in project management skills. The company also offers a range of formal classroom training, less formal workshops, and informal mentoring programs. Given the change management environment for IT in this company, staff always want and need to be in a learning mode. Similarly, another industry CIO told us that he provides IT training through a program that pays new employees 50 percent of their salaries while they attend school. Upon completion of training, the employees each earn 75 percent of their salary during an initial performance evaluation period, and full salary at the end of the period.

While managers in leading organizations are accountable for creating opportunities for their employees' training, individual staff are responsible for taking advantage of the opportunities. In general, leading organizations provide training as part of a changing

high-tech work environment that includes state-of-the-art tools and methods for skilled IM workers to perform their jobs to the best of their ability.

We identified additional strategies that leading organizations use to enhance their IM workforces. Specifically, these organizations bring in employees with desirable skills from across the enterprise to work in conjunction with IM professionals, thereby maximizing the capability of their technical resources. These employees make up cross-functional teams that provide an appropriate mix of business expertise and IM skills to accomplish the various tasks of a project. Working together, the members reflect the interests of not just IM, but the user community and the project's stakeholders, and provide a holistic blend of technical, project management, value management, budget, finance, and procurement skills and capabilities to meet mission needs.

Case Study on Developing IM Human Capital

Using a variety of staffing and sourcing strategies provides leading organizations with dynamic workforces that can quickly meet changing business needs. One leading company's CIO said that recruiting IM workers with special skills in areas like data networks and systems administration is extremely competitive. To be successful in recruiting, his organization has devised different offer packages to attract employees. A package might include accelerated salary schedules or stock options. Once hired, the company sends these employees back to college for IT training and invests in them. This CIO acknowledges, however, that his company does not spend enough on training. Currently, approximately 1 percent of the IM operating budget is devoted to training.

This organization also provides training to new employees through a program that pays 50 percent of the employee's salary while he or she attends school. Upon completion of training, the employee enters a performance evaluation period during which time the employee earns 75 percent of his or her salary. After successfully completing the performance evaluation period, the employee then begins earning a full salary.

The organization increased its salary base to compete with other companies in retaining and attracting talented IM workers. Besides salaries, company managers view a good working environment and awards and recognition as essential for retaining employees. Recently, the CIO took over 400 employees and guests to a five-star hotel for an evening out to celebrate the group's accomplishments. When senior managers appreciate business accomplishments, they are willing to spend funds for staff recognition. This CIO admits that his IM workers are constantly asked to work long hours and undergo a lot of stress though they get little in return for the amount of work they do.

This CIO believes that money is not the only motivator for IM staff. He feels that an important element to managing staff is finding ways to recognize individuals and say "thank you." When the thank you comes from inside the organization, it goes a long way. The CIO uses different means to show his appreciation. For instance, his staff publishes a monthly appreciation newsletter through the Intranet. The CIO believes there is big payoff in these types of activities and the costs are minimal, if any. The CIO also views time off as a good incentive bonus because it does not cost the company very much. Other incentives his group has undertaken include taking staff out for lunch or handing out $100 American Express checks. In today's environment, organizations have to be creative. One of the managers created a thank you toolkit to show her appreciation to her staff. The CIO states, "If you don't have a lot of money to spend, you have to ask yourself what are the little things you can do to show your appreciation."

Strategies to Consider

Given the increasing shortage of IM professionals in the current market environment, securing an effective, responsive technology management workforce is a challenging task for both business and government organizations alike. Leading organizations have identified the following strategies that help in assessing their IM skills and recruiting, retaining, and utilizing talent to meet their business needs. These organizations consider and apply the various strategies as appropriate within the organizational, financial, and cultural parameters of their individual business and government enterprises.

Assess the skills base by:
- Determining expertise needed to perform IM responsibilities.
- Identifying gaps between skills available and skills needed.

Identify innovative ways to attract talent by:
- Providing good benefits packages.
- Building core competencies.

Provide training, tools, and methods to help retain IM expertise, including:
- Directing an increasing percentage of the budget to fund training.
- Evaluating staff to make sure they are achieving the desired technical skills.
- Holding managers accountable for providing training opportunities for their staffs.
- Providing a high-tech environment of tools and methodologies for skilled IM professionals.

Employ alternative methods and sources for supplying IM talent, including:
- Outsourcing and supplementing the existing workforce with external expertise.
- Bringing in employees with desirable skills from across the enterprise to work with and help maximize the capability of IM professionals.
- Replacing labor with technology.

Using This Guide

The principles and practices we developed based on our interviews with private sector and state CIOs have enabled us to develop a framework to guide federal CIO organizations. In our discussions with about half of the CIOs of major federal departments and agencies and five CIOs of small federal agencies, we found that federal CIOs generally agree with CIOs of leading IM organizations on the fundamental principles of CIO management. At the same time, we found that the practices used by federal CIOs tend to differ from those used by leading organizations. We did not study the reasons for these deviations specifically, though they likely result from the context in which federal CIOs operate. Both operational and structural aspects of the CIO's environment can vary significantly in the federal sector versus the private sector.

Rather than dwell on differences, there is much common ground between public and private CIO organizations on which to build efforts for improvement. The specific key conditions and strategies described in this guide can be used as suggestions for federal CIOs to apply or adapt to their environments, where appropriate. More generally, the key conditions and strategies can be thought of as addressing specific aspects of the six primary principles, which CIOs from all sectors agree are critical to the successful execution of their responsibilities and realization of the potential benefits of IM investments. Taken as areas of focus, these aspects may be evaluated by federal CIO organizations and tackled using techniques suited to their situations. Recognition of the differences described above, as well as others, should influence the application of advice provided in this guide. But the advice of CIOs of leading organizations should remain relevant regardless of the specifics of the situation.

The ideas presented in this guide may also provide the foundation for further discussion within the federal CIO community. Many federal CIOs, in the normal course of their own efforts, have already begun working along the lines of the advice provided in this guide. These CIOs have gained valuable insights into applying the practices of leading organizations to the federal sector. The CIO Council, or other organizations of federal CIOs, can create an opportunity for sharing these experiences, using the principles described in this guide as an organizing framework. The challenge of understanding how the federal context influences the effectiveness of the principle may be best met with support from managers who work in the same context.

In addition, the specific key conditions and strategies described in this guide will provide insight to federal CIOs and GAO when considering areas of future study. For example, specific principles may be investigated more deeply and strategies for implementing a principle, such as developing IM human capital, may be proposed in more detail. Or those aspects of the federal CIO environment that constrain the federal CIOs' flexibility and hinder their ability to perform effectively may be examined more closely, and specific strategies to cope with those aspects may be proposed. Understanding how CIOs of leading organizations approach their work and acknowledging those aspects of the federal CIO environment that limit the federal CIOs' ability to implement similar

strategies may prompt congressional and executive board discussions about the need for future legislation and policy changes.

A few dimensions in which the federal and private sector can differ are described below. These examples largely stem from the nature of the public sector in which federal CIOs operate. Many of these examples were mentioned by federal CIOs interviewed for this guide. However, the extent to which the differences create additional constraints on the CIOs depends on how the CIOs and agency leadership respond to them.

- Senior executive management in the federal sector can differ significantly from the private sector. The agency head is a political appointee who often is more focused on policy issues than on the internal management and operations. This can deny the CIO the "CEO" support that is so critical for the successful integration of IM into the business or mission functions.
- The budget process used for information projects can create for the federal CIO particular challenges that are not found in the private sector. Certain information projects may be mandated or legislated, so the CIO does not have the flexibility to decide whether or not to pursue them. This ties up resources that might otherwise have been expended differently. In fact, mandated projects often must be funded by money that had been planned for other projects. Further, the annual budget cycle of the federal government creates a great deal of uncertainty in the level of funds available year-to-year and creates challenges for long term investment strategies. In addition, IM funds are often contained within the appropriations for a specific program, making them less visible. As a result, the CIO may not have control or direct oversight over much of the IM funding within the agency.
- Personnel decisions in the federal sector are often constrained due to work rules or organizational factors. Current IM job descriptions do not match the occupations recognized in the IM industry today. Training funds are often limited due to larger budget considerations. Office of Personnel Management has also found IM salaries in the federal government to be lower than in the private sector.
- The federal CIO may direct an organizational structure where duties that would typically be a CIO's responsibility in the private sector are not under his or her direction at all. For example, some federal CIOs are in charge of large policy and oversight functions with little operational responsibility. While this may be an appropriate model, it is critical that any model be matched with the overall needs of the agency in mind.
- The range of responsibilities, as defined by legislation, that accrue to the CIO are very broad in the federal sector, including areas like records management and Freedom of Information Act requirements, for which there is little parallel in the private sector. While federal CIOs often may not have operational responsibility for the full range of responsibilities in the legislation, they and their agencies are still subject to oversight by the Congress in many of these areas.

Though the environment faced by a CIO in the federal sector clearly differs from that faced by CIOs in other contexts, the principles that form the basis for this guide remain relevant. The underlying principles were observed consistently in our sample of leading

organizations and were cited as being critical to the success of their CIOs. Federal sector CIOs can learn from the successes of these leading organizations and can apply the principles as appropriate in their own organizations. In addition, agency heads and other senior leaders in the federal government can gain an understanding of their role in executing the critical success factors that must be addressed as CIOs work to meet the letter and intent of the Clinger-Cohen Act and related legislation.

Appendix I

Federal IM Reform Legislation

Federal Financial Management Improvement Act of 1996 Public Law 104-208 –
Requires that agency financial management systems comply with federal financial
management system requirements, applicable federal accounting standards, and
the *U.S. Government Standard General Ledger* (SGL) in order to provide
uniform, reliable, and more useful financial information. The act requires that
auditors for each of the 24 departments and agencies named in the CFO Act
report, as part of their annual audits of the agencies' financial statements, whether
the agencies' financial management systems comply substantially with federal
financial management systems requirements, applicable federal accounting
standards, and SGL at the transaction level. The act also requires that GAO report
on its implementation annually.

Clinger-Cohen Act of 1996, Public Law 104-106 – Is intended to improve the
productivity, efficiency, and effectiveness of federal programs through the
improved acquisition, use, and disposal of IT resources. Among other provisions,
the law (1) encourages federal agencies to evaluate and adopt best management
and acquisition practices used by both private and public sector organizations, (2)
requires agencies to base decisions about IT investments on quantitative and
qualitative factors associated with the costs, benefits, and risks of those
investments and to use performance data to demonstrate how well the IT
expenditures support improvements to agency programs, through measurements
such as reduced costs, improved employee productivity, and higher customer
satisfaction, and (3) requires executive agencies to appoint CIOs to carry out the
IT management provisions of the act and the broader information resources
management requirements of the Paperwork Reduction Act. The Clinger-Cohen
Act also streamlines the IT acquisition process by eliminating the General
Services Administration's central acquisition authority, placing procurement
responsibility directly with federal agencies, and encouraging the adoption of
smaller, modular IT acquisition projects.

Paperwork Reduction Act (PRA) of 1995, Public Law 104-13 – PRA applied life cycle
management principles to information management and focused on reducing the
government's information collection burden. To this end, PRA designated senior
information resources manager positions in the major departments and agencies
with responsibility for a wide range of functions. PRA also created the Office of
Information and Regulatory Affairs within the Office of Management and Budget
(OMB) to provide central oversight of information management activities across
the federal government.

Government Management Reform Act of 1994, Public Law 103-356 – Expands the
requirement for a fully audited financial statement under the CFO Act to 24
agencies and components of federal entities designated by the Office of

Management and Budget. The act requires the Treasury Department to produce a consolidated financial statement for the federal government, which GAO is to audit annually.

Federal Acquisition Streamlining Act of 1994 (FASA), Public Law 103-355 – Requires agencies to define cost, schedule, and performance goals for federal acquisition programs (to include IT projects) and monitor these programs to ensure that they remain within prescribed tolerances. If a program falls out of tolerance, FASA requires the agency head to review, take necessary actions, and, if necessary, terminate the program.

Government Performance and Results Act (GPRA) of 1993, Public Law 103-62 – Requires agencies to prepare multiyear strategic plans that describe mission goals and the methods for reaching them. The act requires agencies to develop annual performance plans that OMB uses to prepare a federal performance plan that is submitted to the Congress along with the President's annual budget submission. The agency plans must establish measurable goals for program activities and describe the methods by which performance towards those goals will be measured. The act also requires agencies to prepare annual program performance reports to review progress towards annual performance goals

Chief Financial Officers (CFO) Act of 1990, Public Law 101-576 – Provides a framework for improving federal government financial systems. It centralizes within OMB, through the Deputy Director for Management and the Office of Federal Financial Management, the establishment and oversight of federal financial management policies and practices and requires OMB to prepare and submit to Congress a governmentwide 5-year financial management plan. The CFO Act also requires 24 federal agencies to have CFOs and Deputy CFOs and lays out their authorities and functions. Further, the act sets up a series of pilot audits whereby certain agencies are required to prepare agencywide financial statements and subject them to audit by the agencies' inspectors generals.

Computer Security Act of 1987, Public Law 100-235, as amended by Public Law 104-106 – Addresses the importance of ensuring and improving the security and privacy of sensitive information in federal computer systems. The act requires that the National Institute of Standards and Technology develop standards and guidelines for computer systems to control loss and unauthorized modification or disclosure of sensitive information and to prevent computer-related fraud and misuse. The act also requires that all operators of federal computer systems, including both federal agencies and their contractors, establish security plans.

Federal Managers' Financial Integrity Act of 1982, Public Law 97-255 – Requires agencies to establish internal accounting and administrative controls in compliance with standards established by the Comptroller General. The act also requires that OMB establish, in consultation with the Comptroller General,

guidelines that the agencies shall follow in evaluating their systems of internal accounting and administrative controls.

Privacy Act of 1974, Public Law 93-579 – Protects the privacy of individuals identified in information systems maintained by federal agencies by regulating the collection, maintenance, use, and dissemination of information by such agencies.

Freedom of Information Act of 1966, Public Law 89-554 – Established the right of public access to government information by requiring agencies to make information accessible to the public, either through automatic disclosure or upon specific request, subject to specified exemptions.

Appendix II

Objectives, Scope, and Methodology

The objective of our research was to conduct a study of how several leading organizations have implemented their CIO positions and supporting management infrastructures. We were interested in identifying effective CIO management practices used across a variety of organization types and structures. In doing so, we also sought to develop specific case study information on how CIOs have helped improve the effectiveness of their organizations' business operations. We have used this information to develop suggested guidance to assist federal agencies in effectively integrating newly created CIO functions into their respective organizations.

We synthesized a great deal of literature and research on CIO organizations to provide ideas on effective practices in IM. This body of knowledge served as a foundation for designing our project approach. We then conducted case studies at a number of private and public organizations. We have found that case studies provide an abundant source of information describing management practices and the intellectual background that led to the development of those practices. Case studies also provide the flexibility to pursue particularly rich avenues of inquiry as they develop during interviews. Finally, they are also an excellent means of communicating the essence of practices that have worked well by capturing the context as well as the specific practice.

We identified candidate organizations for our study based on awards and recognition from professional organizations and publications in the past several years. We conducted multiday visits to organizations that agreed to participate in our study to learn

- each organization's approach to selecting, positioning, and defining the roles and responsibilities of its CIO;
- techniques for instituting IT policies and standards, managing technical personnel and financial resources, building customer/supplier relationships, and measuring the performance of IT organizations in meeting business needs; and
- strategies for promoting and facilitating business and organizational change through IT.

We visited three private and three public sector organizations recognized as leaders in successfully managing information and technology investments to create value and improve business performance. We selected private organizations across a range of dimensions, including type of business, number of employees, and revenues. All private organizations contacted had received recognition by professional organizations and publications, corporate executives, or independent researchers. Our selection of state organizations was based on recognition by professional publications, state CIOs, and the National Association of State Information Resource Executives (NASIRE). In particular, NASIRE awards recognition to states whose systems have made important contributions to the operations of state governments. The following organizations participated in our study:

- Commonwealth of Pennsylvania,
- State of Texas,
- State of Washington,
- Chase Manhattan Bank,
- General Motors Corporation, and
- J.C. Penney.

We also interviewed the former CIO from the State of California and the current CIO at U.S. West Communications, although we did not conduct comprehensive case studies at these organizations.

We conducted site visits to each participating organization and obtained supporting documentation, illustrations, and examples. During the visits, we interviewed the CIO, members of the senior executive team, IT managers, and other officials in the organization as identified by the host organization, to obtain their individual perspectives on information and technology management issues. Based on the documentation and interviews obtained from our site visits, we compared practices across organizations to identify innovative practices used by individual organizations as well as common practices used across the variety of organizations participating in our study.

We subsequently interviewed almost 50 percent of the Federal CIO Council members as a means of comparing federal CIO practices with our case study results and ensuring that practices used in the industry and state organizations also address the IM challenges found in the federal government. We selected a mix of federal organizations to visit, taking into consideration their various mission types (civilian, military, or regulatory), centralized and decentralized structures, and prior GAO study results. Further, we met with a panel of CIOs from five small federal agencies to determine whether the IM practices identified are also applicable across diverse organizational sizes (based on dimensions such as budget, personnel, etc.). These discussions, which are summarized in the section entitled "Current Federal CIO Environment," helped us identify similarities and differences in the CIO management practices of federal versus leading organizations. The discussions have also enabled us to pinpoint areas where federal agencies can benefit from integrating the practices of leading organizations in their respective organizations.

Appendix III

Related GAO Products

Information Security Risk Assessment: Practices of Leading Organizations (GAO/AIMD-00-33, November 1999).

Executive Guide: Creating Value Through World-class Financial Management (GAO/AIMD-99-45, Exposure Draft, August 1999).

Executive Guide: Leading Practices in Capital Decision-Making (GAO/AIMD-99-32, December 1998).

Executive Guide: Information Security Management: Learning From Leading Organizations (GAO/AIMD-98-68, April 1998).

The Results Act: An Evaluator's Guide to Assessing Agency Annual Performance Plans (GAO/GGD-10.1.20, Version 1, April 1998).

Executive Guide: Measuring Performance and Demonstrating Results of Information Technology Investments (GAO/AIMD-98-89, March 1998).

Agencies' Annual Performance Plans Under the Results Act: An Assessment Guide to Facilitate Congressional Decisionmaking (GAO/GGD/AIMD-10.1.18, Version 1, February 1998).

Business Process Reengineering Assessment Guide (GAO/AIMD 10.1.15, Version 3, May 1997).

Agencies' Strategic Plans Under GPRA: Key Questions to Facilitate Congressional Review (GAO/GGD-10.1.16, Version 1, May 1997).

Assessing Risks and Returns: A Guide for Evaluating Federal Agencies' IT Investment Decision-Making (GAO/AIMD-10.1.13, Version 1, February 1997).

Executive Guide: Effectively Implementing the Government Performance and Results Act (GAO/GGD-96-118, June 1996).

Strategic Information Management (SIM) Self-Assessment Toolkit (Exposure Draft, Version 1.0, October 28, 1994).

Executive Guide: Improving Mission Performance Through Strategic Information Management and Technology (GAO/AIMD-94-115, May 1994).

Meeting the Government's Technology Challenge: Results of A GAO Symposium (GAO/IMTEC-90-23, February 1990).

Appendix IV

Selected CIO Resources

Professional Organizations

Association for Federal Information Resources Management: www.affirm.org

Chief Financial Officers Council: www.financenet.gov

Federal Chief Information Officers Council: www.cio.gov

Government Information Technology Services Board: www.gits.gov

Industry Advisory Council: www.iaconline.org

Information Systems Audit and Control Association and Foundation: www.iasca.org

Information Technology Association of America: www.itaa.org

Information Technology Resources Board: www.itrb.gov

International Federation of Accountants: www.ifac.org

National Association of State Information Resource Executives: www.nasire.org

Society for Information Management: www.simnet.org

Publications

Beyond Computing Magazine: www.beyondcomputingmag.com

CIO Magazine: www.cio.com

Federal Computer Week: www.fcw.com

Government Computer News: www.gcn.com

Government Executive Magazine: www.govexec.com

InformationWeek: www.informationweek.com

International Data Group: www.idg.com

Sloan Management Review: www.mitsloan.mit.edu/smr/index.html

Research Organizations

Forrester Research, Inc.: www.forrester.com

Foundation for Performance Measurement: www.fpm.com

Gartner Group: www.gartner.com

GIGA Information Group: www.gigaweb.com

International Data Corporation: www.idc.com

IT Governance Institute: www.itgoverence.org/itgi

META Group Inc.: www.metagroup.com

Yankee Group: www.yankeegroup.com

Federal Resources

Federal Acquisition Regulation: www.ARNet.gov/far/

Critical Infrastructure Assurance Office: www.caio.gov

Federal Computer Incident Response Capability: www.fedcirc.gov

Federal Information Processing Standards: www.itl.nist.gov

General Accounting Office: http://www.gao.gov/

GSA's Policyworks: www.policyworks.gov

IT Policy On-Ramp: www.itpolicy.gsa.gov

National Partnership for Reinventing Government: www.npr.gov

Office of Management and Budget Homepage: www.whitehouse.gov/omb

Other Resources

Chief Information Officer – Treasury Board of Canada: http://www.cio-dpi.gc.ca/home_e.html

Appendix V

Selected Books and Articles

"Best Practices in Improving IT Staff Competencies," GIGA Information Group, December 1998.

Blodgett, Mindy, "The CIO Starter Kit: Ten Tools Every New CIO Needs to Succeed," *CIO Magazine*, May 15, 1999.

Boar, Bernard H., *Practical Steps for Aligning Information Technology with Business Strategies: How to Achieve a Competitive Advantage* (John Wiley & Sons, Inc., New York, New York, 1994).

Boar, Bernard H., *Strategic Thinking for Information Technology* (John Wiley & Sons, Inc., New York, New York, 1996).

Bryson, John M., *Strategic Planning for Public and Nonprofit Organizations: A Guide to Strengthening and Sustaining Organizational Achievement* (Jossey-Bass Publishers, San Francisco, California, 1991).

Camp, Robert C., *Benchmarking: The Search for Industry Best Practices That Lead to Superior Performance* (ASQC Quality Press, Milwaukee, Wisconsin, New York, New York, 1989).

Cortada, James W., *Best Practices in Information Technology* (Prentice Hall PTR, Upper Saddle River, New Jersey, 1998).

Earl, Michael J., and Feeny, David F., "Does the CIO Add Value?" *Informationweek*, May 30, 1994.

Ferris, Nancy, "CIOs on the Go," *Government Executive*, March 1999.

Government Executive Magazine/Price Waterhouse, *The Manager's Edge* (National Journal Group, Washington, D.C., 1998).

Hubbard, Douglas, "The IT Measurement Inversion," *CIO Enterprise*," April 15, 1999.

Mayor, Tracy, "Making a Federal Case of IT," *CIO Magazine*, July 1, 1999.

Morin, Therese; Devansky, Ken; Little, Gard; and Petrun, Craig, *Information Leadership: A Guide for Government Executives* (PricewaterhouseCoopers, LLP, 1999).

Stephens, Charlotte S., *The Nature of Information Technology Managerial Work: The Work Life of Five Chief Information Officers* (Quorum Books, Westport, CT, 1995).

Stuart, Anne, "The CIO Role: The New IS Role Models," *CIO Magazine*, May 15, 1995.

Tapscott, Don and Caston, Art, *Paradigm Shift -- The New Promise of Information Technology* (McGraw-Hill, Inc., New York, NY, 1993).

Dr. Wakin, Edward, "The Multifaceted CIO," *Beyond Computing*, May 1995.

Wang, Charles B., *Techno Vision II: Every Executive's Guide to Understanding and Mastering Technology and the Internet* (McGraw-Hill, Inc., New York, NY, 1997).

Weill, Peter and Broadbent, Marianne, *Leveraging the New Infrastructure: How Market Leaders Capitalize on Information Technology* (Harvard Business School Press, Boston, Massachusetts, 1998).

Woldring, Roelf, "Choosing the Right CIO," *Business Quarterly*, Spring 1996.

Wreden, Nick, "Executive Forum: Proving the Value of Technology," *Beyond Computing*, July/August 1998.

Appendix VI

Selected IM Reports and Guidance

Evaluating Information Technology Investments: A Practical Guide, Version 1.0, Office of Information and Regulatory Affairs, Information Policy and Technology Branch, Office of Management and Budget, November 1, 1995.

Management of Federal Information Resources, Circular No. A-130, Revised, Office of Management and Budget, February 8, 1996.

An Analytical Framework for Capital Planning and Investment Control for Information Technology, U.S. General Services Administration, Office of Policy, Planning and Evaluation, Office of Information Technology, May 1996.

IAC / CIO Task Force Draft Report, Industry Advisory Council, July 9, 1996.

Federal Information Technology, Executive Order on ITMRA, The White House, July 17, 1996.

Funding Information Systems Investments, M-97-02, Office of Management and Budget, October 25, 1996.

Preparation and Submission of Budget Estimates, Circular No. A-11, Revised, Office of Management and Budget, June 23, 1997.

Capital Programming Guide, Version 1.0, Supplement to Office of Management and Budget Circular A-11, Part 3: Planning, Budgeting, and Acquisition of Capital Assets, July 1997.

The Impact of Change: Clinger-Cohen Act Implementation, Laying the Foundation for Year 2000 and Beyond, Eighth Annual ITAA Survey of Federal CIOs, December 1997.

Implementing Capital Planning and Information Technology Investment Processes: An Assessment, Federal CIO Council, Capital Planning and IT Investment Committee, Best Practices Subcommittee, May 29, 1998.

Implementing Best Practices: Strategies at Work, Federal CIO Council, Capital Planning and IT Investment Committee, June 1998.

The Federal Chief Information Officer: Fourth Annual Top Ten Challenges Survey, Association for Federal Information Resources Management, December 1999.

Strategic Plan, Federal CIO Council, Fiscal Year 2000.

Federal IRM Training Roadmap: A Guide for Federal CIOs, (Draft), Federal CIO Council, Education and Training Committee, January 1999.

ROI and the Value Puzzle, Federal CIO Council, Capital Planning and IT Investment Committee, April 1999.

Federal Enterprise Architecture Framework, Version 1.1, Federal CIO Council, September 1999.

Meeting the Federal IT Workforce Challenge, Federal CIO Council, Education and Training Committee, June 1999.

"Major System Acquisitions," Circular No. A-109, Office of Management and Budget, April 5, 1976.

"Best IT Practices in the Federal Government," CIO Council and IAC, October 1997.

Appendix VII

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