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Executive Guide

Improving Mission Performance Through Strategic Information Management and Technology

Learning From Leading Organizations

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"Our information technologies and our knowledge economy give us the opportunity to do things we never dreamed possible 50 years ago. But to seize this opportunity, we must pick up the wreckage of our industrial era institutions and rebuild."

David Osborne and Ted Gaebler, Reinventing Government (New York: Addison-Wesley Publishing Company, Inc., 1992)

Preface

Making government more effective and efficient is a national issue. But getting it to work better and cost less will be impossible if federal agencies cannot learn to manage with modern practices the information age demands. Today's information systems offer the government unprecedented opportunities to provide higher quality services tailored to the public's changing needs, delivered more effectively, faster, and at lower cost. Moreover, they can enhance the quality and accessibility of important knowledge and information, both for the public and for federal managers.

Unfortunately, federal agencies have not kept pace with evolving management practices and skills necessary to (1) precisely define critical information needs, and (2) select, apply, and control changing information technologies. The result, in many cases, has been wasted resources, a frustrated public unable to get quality service, and a government ill-prepared to measure and manage its affairs in an acceptable, businesslike manner. Despite spending more than $200 billion on information management and systems in the last 12 years, the government has too little evidence of meaningful returns. The consequences--poor service quality, high costs, low productivity, unnecessary risks, and unexploited opportunities for improvement--cannot continue in today's environment.

Solutions to this problem are not simple. However, several critical elements necessary to bring about management change are already in place or are being considered--from the Chief Financial Officers Act (to reinforce financial accountability), to the Government Performance and Results Act (to emphasize results-oriented management), to the National Performance Review (a variety of initiatives to modernize federal operations), to the Paperwork Reduction Act (to improve federal information management). Additional legislative and regulatory changes may well be required. Yet, federal executives need not wait to take aggressive actions to improve how they manage information to affect performance.

Fortunately, solutions to seemingly intractable, complex information management problems do exist. This report focuses on what agencies can do now to improve performance by using new approaches to managing information and their related technologies. It is the first step of many toward defining what federal executives must do to modernize their operations. It summarizes 11 fundamental practices that led to performance improvements, both short- and long-term, in leading private and public organizations. Our case studies of these organizations provide evidence that these practices make it possible to do far more with less--including significant service quality improvements, cost savings, and productivity gains. The issue before federal executives and policymakers, then, is not whether to change federal information management practices, but exactly what to change and how to do it.

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The Federal Information Management Problem

Within the past decade, the public has grown accustomed to the benefits of using information technology to improve the cost, quality, and timeliness of product and service delivery. Americans now expect to solve a problem with one telephone call, obtain customer service 24 hours a day, withdraw cash from automated teller machines around the country, and get products delivered almost anywhere overnight. Consequently, at a time when almost anyone can get eyeglasses in about an hour, veterans cannot fathom why they must wait 6 weeks to obtain them. Similarly, the general public cannot understand why it takes weeks, instead of days, to process an income tax refund or months to determine eligibility for social security disability benefits.

Federal agencies spent at least $25 billion on information systems[1] in 1993, and more than $200 billion over the last 12 years. Despite this huge expenditure, it is unclear what the public has received for its money. At the same time, critical information assets are frequently inaccurate, inaccessible, or nonexistent. Efforts across the government to improve mission performance and reduce costs are still too often limited by the lack of information or the poor use of information technology.

There is a striking resemblance between the problems currently experienced in the federal government and those initially faced by the leading organizations we studied. Yet, while leaders have emerged in the private sector and the states, few federal agencies have learned how to manage information and information technology to achieve consistent results. Our transition reports in 1988 and 1992 underscored how agencies lack critical information needed to analyze programmatic issues, control costs, and measure results.[2] In our reports to Congress in the last 10 years, we have documented numerous examples of federal systems failures, such as

- the outlay of millions of dollars of unauthorized student loans because of poor information tracking,
- over $1 billion of mistaken Medicare payments,
- the release of highly sensitive computer data on informants for federal law enforcement agencies through mismanagement of security, and

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[1]Information systems are a discrete set of information resources and processes, automated or manual, organized for the collection, processing, maintenance, use, sharing, or dissemination of information.

[2]Information Management and Technology Issues (GAO/OCG-93-5TR, December 1992), Information Technology Issues (GAO/OCG-89-6TR, November 1988).

- inadequate financial data on agencies' basic operations that makes responsible financial management and auditing using accepted accounting standards extremely difficult.

Business as Usual Is Not Enough for the Federal Government to Succeed

Given both the risks of the status quo and the potential for improvement, business as usual is simply no longer a tenable option for federal executives. The administration's dramatic goals, ranging from setting customer service standards for all federal agencies to making targeted improvements in major areas, cannot be achieved without successful information management. For example, improvements from reengineering with the aid of information technology account for over 40 percent of the estimated savings projected by the National Performance Review over the next 5 years.

Strategic information management (i.e., managing information and information technology to maximize improvements in mission performance) will also be a crucial initiative for all federal agencies as they move to implement the Government Performance and Results Act, which is focused on results-oriented management. With it, improved management information and restructured work processes can gradually reduce costs and increase service levels. Without it, many agencies will find their efforts to move to results-oriented management hindered by their inability to develop vital data and useful information systems that support performance measurement and substantive mission improvements.

Without action by federal executives, the gap between public expectations and agency performance will continue to expand. Program risks will continue and unique opportunities for improvement will remain unexploited. Many low-value, high-risk information systems projects will continue to be developed unimpeded and undermanaged as leaders blindly respond to crises by purchasing more technology. Most federal managers will continue to operate without the financial and management information they need to truly improve mission performance. Moreover, many federal employees will struggle unsuccessfully, under increasing workloads, to do their jobs better as they are hampered with information systems that simply add on another automated layer of bureaucracy. Given these risks, sustained Congressional attention is vital to reinforce the link between accountability for returns on information-related investments and the satisfaction of real public needs.

Learning From Leading Organizations

Rather than continuing to analyze the causes of failure, we decided to learn how leading organizations, private or public, consistently apply information technology to improve mission performance. We performed case studies of the information management practices of senior management teams in 10 leading organizations. The five private sector and five state government organizations we examined have been recognized by peers and independent researchers for their progress in managing information to improve service quality, reduce costs, and increase workforce productivity and effectiveness. In addition, we selectively

chose nine federal agencies to assess the applicability of outside practices and to improve our understanding of how federal organizations compare against private and state organizations.

Leading Organization Case Studies

Private sector	State government
American Airlines	California
Kodak	Florida
Royal Bank of Canada	Minnesota
United Services Automobile Association (USAA)	Oregon
Xerox	Texas

Federal Government Case Studies

Army Corps of Engineers	Veterans Affairs
Coast Guard	Commerce
Environmental Protection Agency	Federal Trade Commission
Housing and Urban Development	Social Security Administration
Soil Conservation Service	

Data were collected through interviews and documentary analysis, not direct observation. We consulted with experts in the information technology field and federal senior information management professionals. To ensure the quality of our case study methods, we used a consultant with expertise in researching public sector information management issues and experienced with case study methodologies. We also gave over 60 briefings to federal agency management teams--including officials from the Office of Management and Budget and the General Services Administration--to discuss the applicability of our results to the federal environment. (A more detailed description of our scope and methodology can be found at the end of the report.)

The senior leadership of the successful organizations we studied took information management very seriously. Increasingly asked to do more with less, they have learned to focus carefully on the stream of dollars invested in information technology and critical information resources and knowledge assets. New ways of managing information and information technology have become either a critical path or a stumbling block to nearly every significant level of performance improvement. When applied well, information technology can yield dramatic successes. This is well known. Frequently underestimated, however, is the fact that when neglected, it can produce painful failures and actually inhibit

improvement efforts. Three factors stood out in our conversations with leading executives about the importance of strategic information management:

- **Size and neglect**: Information technology and information assets are typically substantial, poorly understood, and under-controlled areas of capital investment and expenditure that are growing, not shrinking.

- **Risk**: Large, complex information systems projects have an inherently high risk of failure, delay, or overspending.

- **Benefits and leverage**: In most organizations, information and information technology influences the quality, cost, and speed of nearly every major function and the decision-making, productivity, and even morale of employees.

Among other factors, strategic information management makes a difference by

- enhancing decision-making at all levels by providing better quality, more relevant, and more timely data and information, delivered to the right people at the right time;

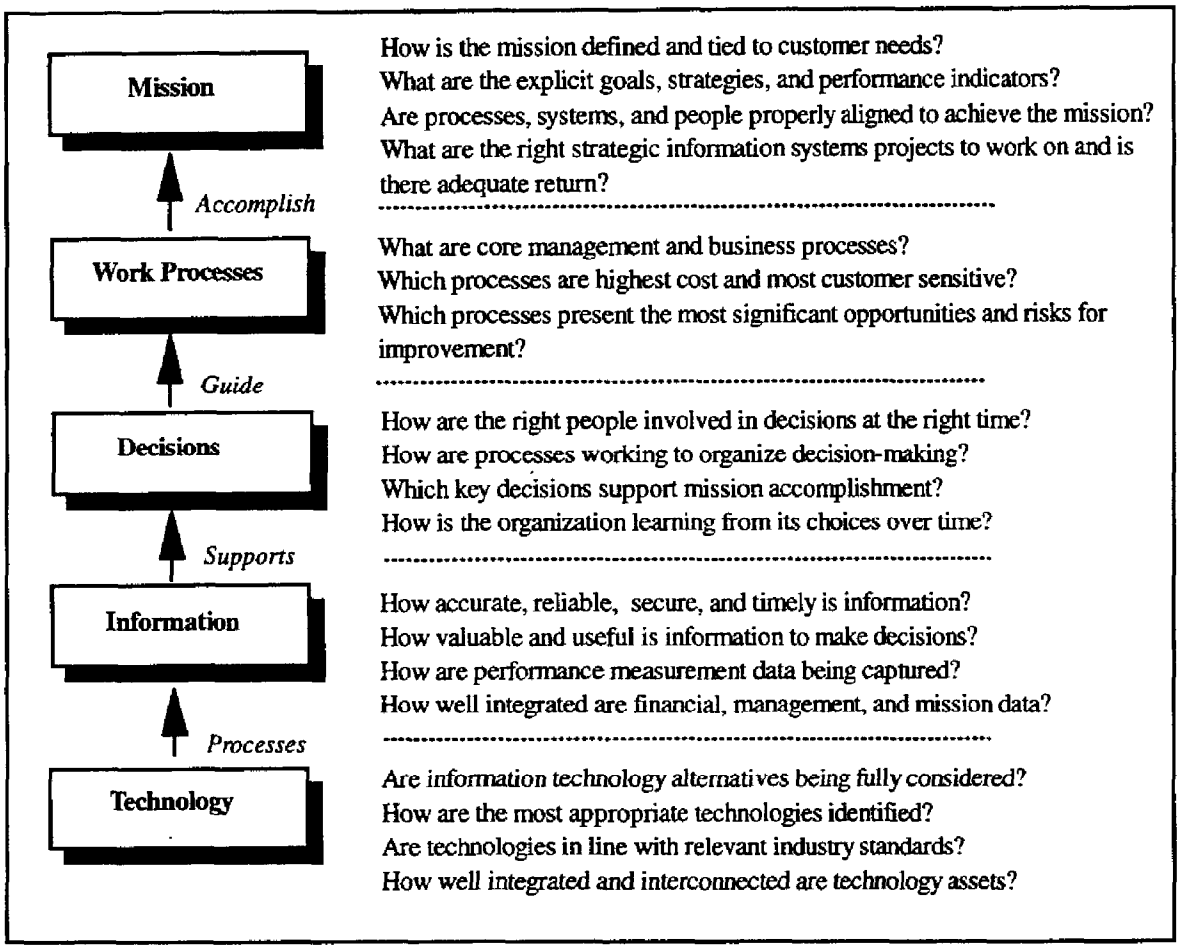
- driving the simplification and automation of processes, tasks, and transactions to increase speed, lower costs, and improve productivity and quality; and

- improving the integration of employees and customers by connecting them in new ways over large geographic areas and organizational boundaries.

Strategic Information Management: Fundamental Practices

Strategic information management is one critical, integrated part of any general management framework. Similar to the way modern organizations have gradually become dependent on information technologies, it has become an indispensable lens through which to view most vital general management decisions. Strategic information management typically involves defining a mission based on customer segments and needs; establishing core processes that accomplish the mission; understanding the key decisions that guide mission delivery processes; supporting those decisions with the right information available to the right people at the right time; and using technology to collect, process, and disseminate information in ways that improve the delivery of products, goods, and services to customers. The following diagram illustrates critical issues senior executives are faced with in each of these areas.

Strategic Information Management Issues



We found that senior managers in leading organizations used a consistent set of practices to improve mission performance through strategic information management. Each organization applied them in different management contexts. However, our analysis suggests a strong association between their consistent, effective use and successful performance outcomes.

The practices worked because, over time, they institutionalized new ways of doing business that are required to capture the value of information and information technology. They are also most effective when implemented together as mutually reinforcing activities, rather than as ad hoc efforts.

We have grouped the fundamental practices according to three key functions critical to building a modern information management infrastructure: (1) *deciding* to work differently, (2) *directing* resources toward high-value uses, and (3) *supporting* improvement with the right skills, roles, and responsibilities. Beginning on page 13, we briefly discuss the 11 practices within the confines of these functions. In addition, we present examples from our case studies that best illustrate how an organization selectively used the practices to achieve meaningful results that were in many cases quantifiable. We also suggest some initial actions for federal executives to consider in applying the practices to their organization.

"To start managing our information and information technology differently, we had to make a complete transformation . . . that started with a consensus that there was a problem and that both the business and the information management side were part of it."

-- a Chief Information Officer

Decide to Change:	Initiate, mandate, and facilitate major changes in information management to improve performance

Many federal agencies have an approach to information management characterized by (1) a short-term focus that emphasizes the status quo, (2) line management that is not engaged in, accountable for, or knowledgeable of information management issues, and (3) a largely paper-oriented planning process that is tied to existing ways of doing business.

In contrast, senior management in the leading organizations we studied made a personal commitment to improve by (1) recognizing the need to fundamentally change information management, (2) creating line management ownership to incorporate information management into business planning, and (3) taking specific actions to maintain momentum over time. Such action resulted in a serious, motivated, sustainable improvement effort that had a wide impact throughout the entire organization.

Decide to Change	Direct Change	Support Change
1 Recognize and communicate the urgency to change information management practices	4 Anchor strategic planning in customer needs and mission goals	9 Establish customer/supplier relationships between line and information management professionals
2 Get line management involved and create ownership	5 Measure the performance of key mission delivery processes	10 Position a Chief Information Officer as a senior management partner
3 Take action and maintain momentum	6 Focus on process improvement in the context of an architecture	11 Upgrade skills and knowledge of line and information management professionals
	7 Manage information systems projects as investments	
	8 Integrate the planning, budgeting, and evaluation processes	

Practice 1 Recognize and communicate the urgency to change information management practices

"When I arrived here, I couldn't believe anyone could responsibly run a multibillion dollar operation with such poor management information." -- Head of a state agency

Specific Attributes

- ✓ Assess mission performance and the contribution made by information and technology assets
- ✓ Clearly understand how information management is critical to solving performance problems and exploiting opportunities
- ✓ Communicate specific mission-related performance problems and make the business case for changing the current information management approach

Without senior executives recognizing the value of improving information management, meaningful change is slow and sometimes nearly impossible. Significantly increasing the rate of change requires new techniques, new processes, and new ways of doing business. Given the competing demands on senior managers, building a sustainable level of commitment to and involvement in a process improvement program requires a thorough understanding and recognition of information technology's critical role.

In recognizing and communicating the need to improve, successful organizations assess specific mission-related performance problems; clarify the linkage to information management; and emphasize the need for a priority solution that integrates mission and information technology decision-making organizationwide. Almost universally, they also aggressively study, or benchmark themselves against, other leading organizations both to challenge accepted habits and to set appropriate targets for change.

Senior executives usually decide to change for one reason--strong pressure to cut costs or increase service quality. As such, they are forced to assess ways of achieving cost reductions or service improvements, including improving mission benefits captured from information systems investments. Many find their information systems are both a large, uncontrolled area of expenditure and a neglected tool. Once the decision to change this situation is made, top management typically communicates goals for improvement with a clear, concise vision or principle statement that describes how information technology will be used to improve mission performance.

Case Study: Recognizing the Need to Improve and Exercising Leadership to Make It Happen

Driven by budget constraints and public demands to stop ignoring a several hundred-million dollar information technology (IT) budget, one chief executive took strong action to scrutinize information management operations. By doing so, the executive showed how critical information technology improvements were to solving performance problems. He also consistently communicated to the senior management team that business as usual would not suffice. These actions (1) illustrated the severity of the problems facing the organization, (2) emphasized a visible, fact-based case for information management's role in improving mission performance, and (3) modeled the behavior expected of senior managers in getting to the root causes of problems in their respective areas of responsibility.

In 1989 line managers in a large private sector company increasingly complained that new software applications did not meet their needs, were delivered late, did not work as intended, or cost much more than they expected. These problems kept them from effectively developing new lower cost products for a highly competitive, but evolving marketplace.

The division president, recognizing the impact of these problems, took several steps to more precisely define and address the issues. First, the division conducted an extensive internal analysis of its performance problems and the role of information management. The results were revealing--less than a small fraction of the expected benefits used to justify information systems projects were actually being realized. Moreover, line managers clearly viewed these problems as the sole responsibility of the IT shop. Second, the division used an outside consulting group to conduct an independent analysis of the information management organization and benchmark its performance against counterparts in comparable organizations. Again, the facts were overpowering--compared to an industry standard, the division took twice as long and consumed four times the resources to build, test, and deliver information systems. Third, to develop and implement corrective actions, the division president, working with the Chief Information Officer, fostered partnerships between line managers and the information management professionals that focused on building information systems with measurable mission benefits.

By the end of 1992, the division saw a marked improvement in measurable returns from its information system investments. These returns rose from $2 million to $20 million per year, while applications development savings and productivity improvements increased steadily ($5 million in the first year), and more flexible, effective use of staff resources was possible (some 100 people moved from maintaining existing computer applications to strategic, reengineering development and support).

How to Get Started

To assess and make the business case for change, senior executives should

- initiate a thorough review of (1) current performance, (2) information systems spending, (3) projected versus realized results, and (4) major information management problems; and

- benchmark information management practices against leading organizations--preferably chosen according to objective data or recognized criteria.

Practice 2 Get line management involved and create ownership

"Without top management commitment, you might as well not start." -- Program official

Specific Attributes	
✓	Hold line management accountable for the mission impact of information management
✓	Get line managers meaningfully involved in critical information management decisions

Line ownership and accountability starts with the chief executive. In every one of the successful organizations we studied, chief executives played a strong leadership role in strategic information management. Once the need to change is established, executives soon realize that getting line managers to work differently means putting them in charge of the change process. Consequently, they move to set clear expectations and reinforce responsibility for information management decisions and results with line executives who deal directly with the customer. Where mission goals require work process innovation and information systems that cut across program or functional lines, accountability must also be aligned with the decision-making authority necessary to raise issues above existing stovepipes.

Increasing line executives' accountability and involvement works because it immediately focuses information management decision-making and systems development activities on measurable mission outcomes of strategic importance. In successful organizations, such a focus ensures more realistic benefits projections, greater attention to improving performance, and more extensive and intensive line actions to realize benefits throughout the life of a project. Without such accountability, it is too easy for the line organization to delegate decision-making irresponsibly, accept project delays, or fail to discern the loss of projected benefits.

Because the term of office of political appointees is limited, they should work with a committed cadre of senior executives to provide management continuity and agency ownership of major information management and technology projects. A good example is IRS' tax system modernization strategic plan which is now being initiated. It was developed over the years by IRS commissioners working closely with the top career executives, and will take years to implement.

Case Study: Putting Line Management in Charge Creates Necessary Ownership

Creating line management ownership for driving information management decisions and project implementation stops the "pushing a string" problem that results from information technology departments trying too hard to run the business. In one organization, line managers, who could best judge customer needs, took a direct role in defining product characteristics, process design specifications, and information system requirements. As such, every stage of system construction focused on the goals of decreasing costs, improving service levels, and increasing customer responsiveness.

In the early 1980s, a private sector organization was confronted with information systems that could not keep pace with business growth. The only way to change the existing cumbersome processes--responsible for long customer waits and unacceptable error and rework rates--was to improve the ability to rapidly process and move large amounts of information. Although the CEO fully recognized the central importance of information management, the difficulty was that the company's IT unit was unable to work with the business units. IT managers usually gave senior line managers excuses why certain solutions could or should not be developed based on cost and existing capabilities.

This frustrating situation forced a fragmentation of information systems development efforts throughout the organization. Everyone built their own systems because they could not agree on what should be built together. To break the deadlock, the CEO gave a senior line official responsibility for a major officewide information systems project to develop a "paperless" process. While knowing nothing about information systems, the line official ensured that divisions drove all the major project decisions. He forced these divisions to justify individual projects on net benefits. Information management professionals were made responsible for supporting implementation of this critical effort by functioning as investment counselors and product/service providers. Moreover, throughout the project life cycle, corporate leadership reinforced the new line ownership and facilitated the process of ironing out the wrinkles in the new way of doing business.

When the systems and new processes went on-line, the pay-off sunk in. A customer process that used to involve 55 people and 55 procedural steps was reduced to one person, one phone call, and one step. Improved information management reduced data redundancies, improved communications so that staff throughout the organization could be reorganized around the new process, sped the delivery of data and information to both internal and external customers, and increased data quality. For example, documentation on new service contracts sent out to customers went from 14 days down to 3 days.

How to Get Started

To increase line management accountability for the mission impact of information management decisions, senior executives should

- establish an organizationwide information management steering committee chaired by the chief executive and led by senior line management, and
- identify executive-level sponsors for each major information systems project.

Practice 3 Take action and maintain momentum

"The single-most important thing we did was fully educate our line managers about where information technology could add value in their operations." -- a Chief Information Officer

Specific Attributes

- ✓ Act short term: exploit or create windows of opportunity to signal or reinforce an improvement initiative
- ✓ Think long term: clearly set direction, goals, and milestones for an information management program
- ✓ Pick and place internal champions to shepherd day-to-day improvement actions
- ✓ Establish incentives tied to successful resolution of performance problems identified by top management

A willingness to take action and maintain momentum is the difference between lip service and real improvement. Recognizing a problem and creating ownership are only the first steps toward action. Because of the barriers that exist to improving information management, leading organizations give considerable attention to initiating the change process and ensuring that it maintains momentum.

Perhaps the most important starting point is educating line management. Unless all line executives begin to understand how information management can make a difference in their performance, only marginal change will occur. Carefully picked and placed champions also create daily pressure to change by removing bottlenecks and resolving thorny operational issues that can easily stall an improvement initiative, particularly in public sector organizations. Finally, incentives become the tangible representation of the organization's level of interest in changing. Once performance evaluations include information management issues, previously embedded behavior frequently begins to improve. Education, champions, and incentives all work because they address the root causes that inhibit change--ignorance, lack of focus, and lack of interest. Without addressing these root causes, even improvement efforts that get a good start tend to fade quickly.

Agency secretaries and deputies lacking background and experience with information systems projects need to educate themselves about how such projects can and should be used as a lever to achieve performance improvement. Only with such an education are they likely to make information management a key part of their strategic business plans and recognize the importance of identifying and encouraging department and program champions to help them succeed. They are also more likely to monitor and stay involved in the projects, which in turn helps key agency personnel know that the projects are top priority and that they will be suitably recognized and rewarded for their contribution to success.

Case Study: Taking Action by Educating Line Management on the Mission Value of Information Technology

In this case study, investments in line management education moved managers from a posture of discomfort and ignorance to a new level of comfort and awareness about the opportunities and risks of using information technology. This helped to pinpoint the most relevant technology issues and spurred new relationships and a common language that eventually helped put the management team on a new learning curve. The fate of line and information management executives was tightly linked by establishing incentives that were tied to successful resolution of performance problems.

This organization began its information management improvement program by concentrating on educating line managers. Previously, most managers had little understanding of what information technology was, how it could help or hurt them in their business, and even who to go to for help and assistance in developing information systems solutions. It was relatively easy for simple projects with a "back office" orientation to get off the ground as compared to mission-critical projects because it was much harder for line management to articulate their needs.

Senior executives were specifically picked and placed by the CIO and the head of human resources as internal champions to shepherd day-to-day improvement efforts. The CIO and several line managers jointly decided that the likely cause of the organization's failure to use information technology effectively stemmed from poor communication and education among line managers and information professionals. As a result, technology either did not get used or systems projects failed at unacceptable rates.

Management training and education was started that centered on integrating information management and mission functions. Formal meetings and seminars were used to set the direction, goals, and milestones for an information management improvement program. The CEO and senior line managers also had 5-day seminars, off-site, to focus on information management training and planning. The organization also initiated a program to provide senior managers with hands-on experience in the information management organization. Managers were rotated for a set time, lasting up to several years, in order to learn what information management had to offer and so information professionals could learn from the executives' business experience. The result: line managers became motivated, knowledgeable leaders in developing new applications of information technology to the business. For example, new integrated customer data files were created that gave field representatives important information about the relative profitability of key customer segments and allowed them to focus their energies and priorities on better meeting the needs of these groups.

How to Get Started

To initiate an improvement program and maintain its momentum, senior executives should

- educate senior line management through a combination of conferences, training, co-location and rotation programs at all levels, and joint visits with information management professionals to organizations that use technology well; and
- identify an informed, committed opinion-leader to be a champion in supporting information management improvement.

"Institutionalizing organizationwide decision-making processes and an architecture is the key to all of our information system development efforts . . . and our primary measure of success is impact on the bottom line."

-- a Chief Information Officer

Direct Change: Establish an outcome-oriented, integrated strategic information management process

Once an organization has made a serious commitment to change its management of information and technology, it is paramount that an outcome-oriented, integrated strategic information management process be institutionalized. Our case study analyses indicate that organizations that achieve substantially higher levels of performance (1) make external customer needs and mission goals a central driver of all organizational improvement efforts, (2) make serious efforts to objectively measure performance, (3) focus on process improvement, (4) tightly control information technology investments, and (5) integrate the planning, budgeting, and performance assessment processes.

Conversely, for most federal agencies, strategic management is a well-orchestrated paper chase responding to personal agendas and short-term crises, rather than an integrated, institutionalized process that focuses on producing results for the public. Most agencies also live with loose, undisciplined, and opaque processes for selecting and controlling investments, and these investment results are rarely evaluated against projected benefits. More often than not, information management decisions are made in response to crises, without first examining how to simplify and redesign embedded, complex mission processes. In short, the emphasis lies on conforming to existing processes--which are rarely reevaluated--rather than focusing on results.

Decide to Change	**Direct Change**	Support Change
1 Recognize and communicate the urgency to change information management practices	**4 Anchor strategic planning in customer needs and mission goals**	9 Establish customer/supplier relationships between line and information management professionals
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	7 Manage information systems projects as investments	
	8 Integrate the planning, budgeting, and evaluation processes	

Practice 4 Anchor strategic planning in customer needs and mission goals

"Today, 69 percent of our transactions are handled by computer. By doing this, we freed up the routine workload on our staff to the point where they have been able to provide innovative services, which have improved our product offerings to the customer." -- a Chief Information Officer

Specific Attributes

- ✓ Match external and internal customer group needs with specific products and services
- ✓ Link customer group needs to specific mission problems and assess corresponding opportunities
- ✓ Focus strategic planning on highest priority customer needs and mission goals
- ✓ Set explicit mission goals tailoring products and services to the needs of key customer groups

At the leading organizations we examined, strategic business and information system plans are almost always tightly linked and predicated on satisfying explicit, high-priority customer needs. This emphasis on customer needs helps an organization understand the source, nature, and priority of demands on its resources. Successful information systems are not only defined as the ones delivered on time and within budget, but as ones that also produce meaningful improvements in cost, quality, or timeliness of service.

Without a customer focus, an organization risks missing its real needs and ignoring what matters to key stakeholders. With it, corresponding mission goals can be more easily developed to satisfy each demand, and the needs of customer groups can be prioritized and matched with specific products or services. For example, all veterans' health benefits may not be managed the same way; elderly veterans with special, often high-cost, health care needs might form a specific customer group. This avoids treating all customers the same way when they have unique subsets of needs and corresponding services.

Following a customer-driven approach, in turn, provides accurate, detailed descriptions of requirements and specifications, which are needed to drive the design and development of supporting information systems. This allows the organization to set mission performance goals for improving service delivery or product responsiveness, costs, or quality--based on customer needs. Reengineering and information systems projects can also be targeted and designed to improve specific performance areas. In successful organizations we examined, management made it clear that major systems proposals that were not based on business plans would not be approved.

Case Study: Using Key Customer Needs to Guide Business Plans That Match Up With Information Systems Support

Faced with acute complaints about poor service quality and complex procedures, a state revenue collection agency decided to use their external customer--the taxpayer--as the focus for rethinking and redesigning its services. This required new ways of managing information in which a taxpayer profile, not the tax account itself, became the focus of data management. As a result, taxpayer concerns, questions, and special problems could be handled with a new level of attention and timeliness.

Taxpayer evaluations of a state revenue collection agency indicated dissatisfaction with the complex forms and procedures and poor service offered by agency personnel. The agency developed a prototype business plan revolving around two questions: "What are we trying to achieve?" and "What do our customers expect of us?" Customer focus groups--including individual taxpayers, small businesses, and large corporations--were then used to supplement the plan and reengineer the state's revenue collection process. As part of this reengineering, information systems were redesigned to produce and maintain customer profiles to assist agency officials in handling questions, problems, and special situations for each taxpayer.

The payoff from this change in business practices and information system improvements became apparent during serious flooding that ravaged the state in 1993. Many individuals and businesses were unable to pay state taxes because records had been lost or destroyed. Rather than aggravating the situation by penalizing individuals and companies for late tax fees, the agency used profile information in its systems to develop personalized solutions. As a result, time and resources were diverted from pointless enforcement actions and taxpayer response was positive. In addition, these data had a multiplier effect for business activities conducted by other state agencies. State relief agencies could more efficiently handle relief functions required by flood legislation, and budget forecasters could better predict state revenue shortfalls for the coming year.

How to Get Started

To begin linking information systems more closely to customer needs and mission goals, senior executives should

- choose at least one major mission area to specifically define customer groups and needs (i.e., those identified through mandated customer surveys) and integrate with strategic business and information plans, and
- choose at least one major information system initiative and determine if its key requirements will meet both external and internal customer needs.

Practice 5 Measure the performance of key mission delivery processes

"Performance measures define the management information you need to make decisions and to determine what is success and failure." -- a Chief Information Officer

Specific Attributes

- ✓ Focus performance measures on gauging service to key external customers within individual customer groups
- ✓ Embed performance measures in key management processes--including planning, budgeting, investment selection, and performance evaluation--to influence decision-making and support continuous improvement
- ✓ Use internal and external benchmarks to help assess relative performance
- ✓ Tailor performance measures to gauge the mission value of information management (e.g., clearly show whether information systems projects make a difference)

Successful organizations rely heavily upon performance measures to operationalize mission goals and objectives, quantify problems, evaluate alternatives, allocate resources, track progress, and learn from mistakes. Performance measures also measure whether information systems projects are really making a difference. Good measures define the information needed to perform a mission well and allow organizations to learn objectively and consistently over time. As noted in the passage of the Government Performance and Results Act, without performance measures, managers often have great difficulty getting results from information systems because they cannot define their needs precisely.

The standard measurement practices we were shown focus on benefits, costs, and risks. In most cases, this includes program outcomes, resource consumption, and the elapsed time (i.e., cycle time) of specific work processes, activities, or transactions. Once the right measures are chosen, they act as a common focus for management to target problem areas, highlight successes, and generally increase the rate of performance improvement through enhanced learning. Business plans identify measurable outcomes and outputs expected from major information systems projects. By focusing on the effects these investments have on operations, performance measures help identify and track their true effect. While the measures have value as stand-alone indicators, they are typically used together to present a more complete picture of the impact on quality, resource usage, and cycle time.

Case Study: Instituting a Performance Measurement Program Improves Information Systems' Contribution to Mission Outcomes

Faced with a budget crisis imposed by their legislature, one senior management team used performance measures to rethink information systems priorities, better direct investments to achieve mission goals, and address legislative concerns. Their comprehensive program focused on (1) specific agency-level and information management goals and processes, (2) workshops to develop quantifiable performance indicators, (3) benchmarking, and (4) integrating performance measures into the planning, budgeting, and evaluation processes. Its primary value has been to enhance organizational learning.

This large agency had especially high production costs, sloppy management decision-making on resource allocation, and bureaucratic "stovepipes" that made setting organizationwide priorities next to impossible. Consequently, improvement efforts--especially those involving information systems--had little effect. The cost of comparable private sector service offerings continued to drop while this agency's rose. Finally, the state legislature simply refused to fund further spending increases.

Few performance measures even existed. Those that did were disputed, had little accurate data to back them up, usually failed to focus on customer needs, were not used consistently by senior managers to make decisions, and did not measure the contribution of information systems. Over a 3-year period, starting in 1990, senior management instituted a comprehensive performance measurement program to drive organizational change. Quantifiable performance indicators were first developed to match agency objectives with statewide goals and to gauge service to key external customer groups. Then, the information management department developed its own performance indicators to align with each of the agency-level goals. Workshops were conducted with teams throughout the organization. Performance measures, once developed, were integrated into management reporting, strategic and information planning, and budgeting and resource allocation efforts, as well as in criteria for selecting, controlling, and evaluating information systems investments. The organization also used both internal and external benchmarks to help assess relative performance.

The effort has enhanced the quality of decision-making and priority-setting, improved service quality, and better directed information systems investments. A greater than 150 percent return is expected on information systems projects. As of January 1994, they were already reaping some of these savings. Low-value projects had been eliminated or refocused, existing ones were more sharply targeted on improving mission performance, and new ideas had been generated about how to use information systems more productively.

How to Get Started

To assess the mission value of information management, senior executives should

- identify outcome-based measures of accomplishment for a major mission area and benchmark performance against a comparable organization, public or private; and
- charter senior management teams to develop measures that specifically assess (1) the contribution of information systems investments to mission performance and (2) the performance of the internal information management organization.

Practice 6 Focus on process improvement in the context of an architecture

"If it [a work process] runs like a mess, then using information technology just gives you an automated mess." -- Senior line manager

Specific Attributes

- ✓ Establish and manage a comprehensive architecture that (1) ensures the appropriate integration of mission-critical information systems through common standards and (2) emphasizes local control and flexibility in adapting to new processes and technologies
- ✓ Distinguish large-scale improvement efforts from others by concentrating on order-of-magnitude improvements in cost, quality, or timeliness
- ✓ Focus strategic resources, at the right time, on a limited number of large-scale process improvement efforts
- ✓ Target efforts at core mission delivery processes--defined as those that, because of their cost and/or importance to customers, have a unique potential for return on investment
- ✓ Use a combination of controlled development and rapid prototyping to minimize risk and maximize benefits

Accomplishing order-of-magnitude improvements in performance nearly always requires streamlining or redesigning critical work processes. Consequently, information systems initiatives must be focused on process improvement and guided by an organizational architecture.[3] Information systems projects that do not consider business process redesign typically fail or reach only a fraction of their potential. Those that ignore technology usually leave significant opportunities on the table. Using business process reengineering to drive information systems initiatives can lead to order-of-magnitude customer satisfaction and/or cost savings, rather than the marginal efficiency gains normally associated with initiatives that use technology to do the same work, the same way, only faster.

On the other hand, if several process improvement efforts using information systems are pursued in an uncoordinated fashion, chaos, incompatibility, and fragmentation can result. Similarly, rapidly evolving new technologies (e.g., networks or imaging) that have organizationwide impact need to be integrated into redesigned work processes systematically (i.e., architectural management). To maximize the benefits of process improvements across an entire enterprise and reduce risks, certain shared standards and rules for processes, data, and

[3]Architectures explicitly define common standards and rules for both data and technology, as well as mapping key processes and information flows. For additional information refer to Strategic Information Planning: Framework for Designing and Developing System Architectures (GAO/IMTEC-92-51, June 1992).

machines (i.e., organizational architectures) are vital.

Case Study: Reengineering Work Processes to Improve Customer Service and Reduce Costs

One organization tried reengineering as a fresh approach to meet its market share goals and alleviate persistent complaints about complexity and sluggishness of customer service. They focused on three organizationwide "stretch" goals: (1) reducing customer cycle time by 80 percent, (2) cutting overhead in half, and (3) tripling real sales per employee. Redesign of information systems and data integration reduced the cost and complexity of a core customer service process by eliminating redundancy and making information access easier.

Prior to the reengineering effort, the company's approach to customer service involved experts from its line operations dealing directly with customers to provide a personal level of assistance in resolving a problem. As the company's products grew more varied and specialized, customers often had to talk with several experts--as many as 16--before getting to the right one. Over 70 different computer systems supported the customer service process. While the quality of solutions to customer problems was very high, they took too long to deliver. By 1990 this problem threatened the company's ability to retain its established customer base and caused delays in the receipt of payments for products sold.

The organization used a reengineering project in an attempt to radically improve productivity. The object was to simplify business processes, not make them more elegant. Information management and technology played a large role in the reengineering effort. For example, a highly integrated systems environment enabled various project teams to simplify the number of tasks they needed to perform to achieve a mission goal or serve the customer.

As a result, the division has seen both quick benefits and longer-term performance improvements. In one example, the division consolidated its dealer price catalogue to the point where it was able to produce the catalogue in less than half the time at 10 percent of its former cost, while reducing the number of organizations and documents involved by 60 percent. In addition, the division reduced the number of information systems supporting customer service activities from over 70 to 1. Furthermore, in less than one year, customer service representatives were handling inquiries without any referral at all--single point problem resolution. The new process reduced the number of customer billing disputes as well, which in turn reduced the amount of accounts receivable over 30 days old by 90 percent.

How to Get Started

To begin focusing strategic resources on process innovation in the context of an architecture, senior executives should

- task a senior management team to lead a high-level process analysis of the organization and identify and sponsor a major process improvement opportunity; and
- appoint both a business and an information architect--reporting to the information management steering committee--to facilitate the design and maintenance of an organizational architecture (e.g., work processes, information flows, and technology).

Practice 7 Manage information systems projects as investments

"Without these [investment] controls, we would probably not be able to bring in any project at all."
-- a Chief Information Officer

Specific Attributes

- ✓ Link information systems decisions tightly to program budget decisions and focus them on mission improvement
- ✓ Establish a high-level investment review board that fully involves senior program and information managers to help in key decisions through a project's life cycle
- ✓ Use a disciplined process--based on explicit decision criteria and quantifiable measures assessing mission benefits, risk, and cost--to select, control, and evaluate information systems projects using post-implementation reviews
- ✓ Make information systems projects as narrow in scope and brief in duration as possible to reduce risk and increase probability of success
- ✓ Balance the proportion of maintenance expenditure versus strategic investment

Successful organizations manage information systems projects primarily as investments, rather than expenses. As information management capability increases, projects are viewed more as mission improvement projects and less as information technology efforts. Senior management teams become personally involved in project selection, control, and evaluation. The basis of decision-making is an explicit set of criteria assessing the mission benefits, risks, and cost of each project. Quantitative and qualitative cost, benefit, and risk analyses--typically modeling sensitivities of project outcomes to various risk factors--underpin the criteria.

The investment focus systematically reduces inherent risks while maximizing benefits of complex projects. It does so by concentrating top management's attention on assessing and managing risk and regulating the tradeoffs between continued funding of existing operations and developing new performance capabilities. These tradeoffs, as well as conflicts between competing programs, surface during annual budget decision-making. With a disciplined process, organizations can identify early, and avoid, investments in projects with low potential to provide mission benefits. They can help make explicit links between project outcomes and program needs in complex and often ambiguous budget debates. Line accountability for improved performance is also reinforced. This typically means larger successes, fewer failures, and more significant information systems contributions to organizational goals.

Conversely, without a centralized process to select, control, and evaluate information systems projects as investments, organizations confront a number of difficult problems--significant unmanaged risk, unexamined low-value or redundant projects that consume scarce resources, mismatches between systems maintenance and strategic priorities for improving mission

performance, design flaws that can unexpectedly increase complexity, and outsourcing decisions that put the organization at risk.

Case Study: Using a Disciplined Investment Process Helps Capture Benefits

After experiencing unacceptable information systems project failure rates, slow progress, and disappointing results, one organization designed a disciplined decision-making process to focus management on increasing the quality and impact of investments. Project proposals and selections became more careful; cost, benefit and risk analyses and projections were more realistic; and managers worked harder to ensure that initiatives delivered on their promise.

The organization was developing systems that were not aligned with line management direction. An outside consultant, hired to analyze this situation, reported that the organization was spending far too much money on information systems that were not helping the company. Not only were scarce budgetary resources being wasted or underutilized, but low-value projects were actually causing harm by automating isolated functions or decision-making processes that were either unnecessary or highly inefficient. More important, but less tangible, was the opportunity cost of spending too much on old systems and investing too little in the future. The organization found these problems were due, in large part, to the development of information systems that had little or no measurable economic justification.

To solve this problem, senior line managers' responsibility and accountability for information management was structured within an organized decision-making and tracking process for information systems investments. The organization used a "portfolio investment process"--based on explicit decision criteria assessing costs, benefits, and risks--to select, control, and evaluate information systems projects. Having this structure helped ensure that a true mission benefit was identified for each project and that it was retained as a project focus until completion. One goal of the process was to balance the proportion of maintenance expenditures versus strategic investment.

Over time, the company has consciously reduced the proportion of funding spent on supporting systems that are near the end of their useful life cycle. A portion of the money saved from maintaining these legacy systems is then added to the strategic systems budget. In 3 years, the organization has seen a nearly 14-fold increase in the return on investment from information systems projects. Such a turnaround was possible because line managers and information professionals were more visibly accountable for project delivery, rigorous results reporting, and post-implementation reviews. Consequently, they are more careful in what they promise for a proposed information system and in measuring what a system actually achieves.

How to Get Started

To hold line managers more accountable for project selection, delivery, and rigorous reports reporting, senior executives should

- task a team to develop decision criteria for selecting and evaluating major information systems projects; and
- institutionalize a process to propose, select, develop, and evaluate the results of all information systems investments.

Practice 8 Integrate the planning, budgeting, and evaluation processes

"We've made a lot of mistakes along the way. Our success has only come from an organized process of learning over time." -- a Chief Information Officer

Specific Attributes

- ✓ Put all five elements of the strategic planning cycle in place: long-term strategic and information planning, systems life cycle and project level planning, budget review, performance assessment, and architecture management
- ✓ Require executives and senior management to fully participate in and take responsibility for all major information management project decisions throughout their life cycle
- ✓ Integrate key elements of the strategic planning process by ensuring that outputs of one are used as inputs for the next
- ✓ Use the strategic planning process to manage operations and make key decisions and assessments by top management--especially those involving program budgets and information systems investments

Successful organizations pay close attention to integrating the planning, budgeting, performance measurement, and architectural management processes, so that they never lose sight of critical information systems projects and treat them consistently throughout sometimes disparate management processes.[4] This helps force the linkage of information systems efforts to the mission, provides tight controls during implementation, and allows regular assessment to ensure that benefits accrue.

Our case studies suggest this integration of once-separate processes is the real test of whether an organization's information management approach is truly strategic and thus will be able to improve consistently over time. Without links to planning, budgeting becomes a reactive exercise to priorities of the moment that are not weighed adequately against those of the future. Without links to performance measurement, mistakes are not discovered or are repeated in planning. And without links to budgeting, plans can be mere paper exercises in rationalization. Credible plans and budgets need to identify the long-term benefits of information technology projects, how they will be funded over the years, and how the savings and benefits will be realized over time.

[4]This concept of management process integration also directly underpins the threefold requirement of the Government Performance and Results Act for performance measures, strategic planning, and performance-based budgeting.

Case Study: Forcing Organizational Change and Continuous Learning Through an Integrated Management Process

In one organization, the lack of a business vision--a definition of how the organization would work in the future--and an integrated and institutionalized strategic information management process meant a majority of resources went towards maintaining existing, aging information systems. Fierce short-term budget crises dominated long-term planning, and mistakes were frequently repeated. By focusing on these weaknesses, the organization developed a fact-based approach to funding, a forum for decision-making, and a consistent process that the senior management team used to move from crisis management to strategic management.

In 1991 senior management meetings focused on how the lack of mission-critical improvements was leaving the organization with costs that were too high and customer interactions that were too slow and low in quality. Abnormally high maintenance costs indicated the organization was, in the words of the Chief Information Officer, "building on a swamp." After conducting a self-analysis, the cause of the problem was boiled down to the lack of a business vision and the absence of an integrated and institutionalized strategic information management process that would help manage operations and make key decisions involved in implementing the vision.

To address these issues, the organization formally integrated planning, budgeting, and evaluation by putting five elements in place: long-term strategic and information planning, systems life cycle and project planning, architectural management, budget review, and performance assessment. The five elements were integrated so that outputs from one were used as inputs for the next. For example, outputs of strategic planning (a budget constraint), project planning (strategic project proposals), and architectural management (architectural screening criteria) were all explicit inputs into prioritization and budgeting. Similarly, the outputs of prioritization and budgeting (individual project objectives, performance targets, and implementation plans) were direct inputs into the performance assessment process. This level of integration not only provided continual improvement and balanced and optimized resource allocation each year, but also maximized the rate of learning.

Over a 4-year period, the organization was able to shift approximately a third of information systems personnel to reengineering projects. These new improvements in turn affected mission performance in ways ranging from increased productivity to new levels of customer service.

How to Get Started

To begin integrating all the elements of an integrated strategic planning cycle, senior executives should

- choose one critical mission area, if possible limited in scope, to fully integrate business and information planning, systems planning, budgeting, and performance evaluation; and
- task a senior management team to design and implement an annual information management performance report as an input to strategic planning.

"Information management executives need credibility to participate. We begged to be part of senior management and got it. That was good and bad news. Once you're a part, you have to behave like a senior manager--have the breadth, scope, and risk profile. By pursuing strategic information management, we've defined the skills and career path to get that done."

-- a Chief Information Officer

Support Change: Build organizationwide information management capabilities to address mission needs

Neither a commitment to change or directed activities can succeed without defining and providing the necessary skills and resources. Hence, the goal of the third group of practices is to build a new level of sustainable organizationwide information management capabilities that address mission needs.

For most federal agencies--even those with serious improvement programs in place--pervasive skill gaps and confused roles and responsibilities severely inhibit significant increases in performance. Common problems include (1) a failure to define the roles of program managers in relation to information professionals, (2) the lack of an effective CIO to raise and help resolve information management issues with top management, and (3) an outdated or poorly defined set of skill requirements. These problems weaken an organization's ability to define how new systems support its mission, meet customer needs, or respond more quickly to environmental change.

In contrast, leading organizations facing similar problems defined clear responsibilities for line managers and information management professionals, established a CIO as a senior management partner, and worked to anticipate and define key skills that would be needed. Consequently, their management processes worked fluidly, rates of innovation increased, and conflict was minimized.

Decide to Change	Direct Change	**Support Change**
1 Recognize and communicate the urgency to change information management practices	4 Anchor strategic planning in customer needs and mission goals	**9 Establish customer/supplier relationships between line and information management professionals**
2 Get line management involved and create ownership	5 Measure the performance of key mission delivery processes	**10 Position a Chief Information Officer as a senior management partner**
3 Take action and maintain momentum	6 Focus on process improvement in the context of an architecture	**11 Upgrade skills and knowledge of line and information management professionals**
	7 Manage information systems projects as investments	
	8 Integrate the planning, budgeting, and evaluation processes	

Practice 9 Establish customer/supplier relationships between line and information management professionals

"Our overall success depends on meeting user requirements with cost-effective, quality solutions."
-- a Chief Information Officer

Specific Attributes

- ✓ Make line managers responsible for identifying critical information and performance needs, work requirements, and economic benefits of mission improvement projects
- ✓ Make information management professionals responsible for supporting line managers as investment counselors and product/service providers
- ✓ Clarify roles and responsibilities at the corporate, mission, and project levels--focusing corporate management on reinforcing accountability and facilitating mission success
- ✓ Manage the organizational architecture with a bias towards local control and ownership, but also a strong central counterbalance to maximize cross-cutting systems integration needs
- ✓ Rigorously understand the economics of information management functions as well as product/service needs of line management customers

The best-designed management processes in the world cannot work without defining roles and relationships (i.e., knowing who is going to do what). Establishing customer/supplier relationships internally between line managers and information management support professionals enables the organization to maximize the benefits of new management processes. We found that line management in successful organizations typically behaves as a customer of support professionals or organizational units by asserting control over information system project funding and direction. Key line responsibilities include identifying specific mission goals, the core processes required to accomplish them, key decisions that guide work processes, and the critical information needed to support decision-making.

Information management professionals, then, act as suppliers, working to support efforts to meet a management objective, make a critical decision, or solve a business problem. Supplier functions can include traditional responsibilities for producing and servicing information systems. But they increasingly emphasize investment advisory services and strategic architectural design and management. The new focus is on achieving specific mission goals and objectives, rather than satisfying sometimes unrelated user requirements.

Establishing formal customer/supplier relationships places information-related assets on a par with the other physical and intellectual resources. It also places the information management organization alongside other suppliers as a competitor for the line unit's business. These two effects contribute to organizational learning by creating a constructive tension and interdependency between line and information management organizations.

Case Study: Establishing Clear, Accountable Customer/Supplier Roles Enhances Effectiveness

To combat endemic miscommunication and conflict between the information management and line organizations, clear roles and responsibilities were identified at the project and organizationwide levels. This division of labor focused line managers and information professionals on working together as they grappled with complex strategy and design issues.

Like many federal agencies, one large private sector organization experienced regular difficulties getting projects in on time and on budget. Many systems development efforts required considerable rework. Often, they did not meet real mission needs. This situation not only wasted resources, but also frustrated line managers' efforts to reduce costs and increase quality. Senior management identified the likely cause of this situation as twofold--the lack of a structured systems development process and an unclear division of labor between line managers and information management professionals. To remedy this, clear functions, roles, and responsibilities were identified for both line managers and information management professionals at the project and organizationwide levels.

At the organizationwide level, one of the primary functions was the agreement on general rules for how to develop systems. This was usually accomplished through architectural management, handled by a business architect (data and processes) and a technology architect (software and hardware). Together, their job was to design the organization architecture and assist systems developers in making the right technology choices. They also worked closely with vendors to choose standard technologies for the entire company. In short, they provided the infrastructure (PCs, software, data definitions, etc.) to "separate and integrate" the different layers of the architecture across the organization. The result, over a period of several years, was a finely tuned set of information systems with high levels of interoperability and interconnectivity, low levels of redundancy, and lower maintenance costs.

At the project level, line and information management units shared responsibility throughout a project's life. As it moved from one phase of development to the next, leadership responsibility shifted to the unit with the greatest interest in the successful completion of that phase. For example, in phase one--requirements--the business unit was responsible for articulating the business case justifying the financial investment and risk, while in phase two--construction--the technology group led the development. Rotating leadership established the roles and responsibilities of each team member at the start of every project phase. This discouraged members from making premature decisions just to keep the project on-schedule and encouraged them to stay actively engaged from beginning to end. The targeted roles also focused members on a critical area where their knowledge and experience could make the greatest contribution. Since the adoption of this project management technique, the organization has found that completed projects more closely match mission needs, require less rework, can be deployed faster across the organization, and cost less to maintain.

How to Get Started

To get line and information managers working together, senior executives should

- institute a regular survey of line management's satisfaction with the information management organization's quality, cost, and responsiveness; and
- require every information systems project team to define line and information management roles throughout the entire project life cycle.

Practice 10 Position a Chief Information Officer as a senior management partner

"The most important factor for a successful CIO is to be able to work as a peer with line management." -- a Chief Information Officer

Specific Attributes

- ✓ Understand the mission and work closely as a peer with top management to help increase awareness, understanding, and skill in identifying and resolving information management issues
- ✓ Catalyze, design, and facilitate implementation of new organizational capabilities by clearly articulating the role of information systems in mission improvement
- ✓ Bridge gaps between top management, line users, and the information management unit by acting as an adviser and architect

Positioning a Chief Information Officer (CIO) as a senior management partner is critical to building an organizationwide information management capability.[5] By creating a customer/supplier relationship at the highest levels, it helps line executives change how information is managed organizationwide. CIO positions have, in some cases, become untenable or controversial largely because they are overemphasized, inappropriately staffed, lack adequate authority, and/or are unable to focus solely on strategic information management issues. A CIO is not a substitute for institutionalized information management processes. Neither is it a panacea for resolving thorny problems that stem from top management disengagement, as is clearly illustrated by federal agency's experiences with Designated Senior Officials for Information Resources Management under the Paperwork Reduction Act. Selection of an effective CIO is critical and difficult. Qualified professionals need a combination of leadership ability, technical skills, business process understanding, and communication skills.

A CIO serves as a bridge between top management, line management and information management support professionals. This includes focusing and advising senior management on high-value issues, decisions, and investments. Equally vital is taking a strong role in working with the line to (1) design and manage an organizationwide architecture and (2) clearly articulate how information management will play a pivotal role in mission improvement. Finally, the CIO is usually accountable for serving line management with low-cost, high-quality information technology products and services. Over time, a successful CIO evolves from serving only as head of the information management unit to becoming a

[5]Determining the balance of decision-making authority between corporate and mission levels on information management issues is a complex issue--one that depends largely on the degree of similarity between missions. Most organizations we studied operated on the presumption that, unless some significant shared corporate benefit was justified, decisions took place at the mission level.

strategic adviser and architect--a vital member of the top management team.

Case Study: A Chief Information Officer Keeps Information Management Issues on the Agenda

Given the difficult task of organizing and motivating senior executives to attack information management issues, a new Chief Information Officer was brought in to help. The position was staffed with an experienced professional with demonstrated prior success who could work as a peer with senior executives. Major goals were to (1) focus day-to-day efforts on improving information management and (2) bridge the gaps between top management, line users, and the information management unit.

Prior to establishing the CIO, the cost of maintaining and enhancing existing systems consumed nearly all of the organization's information technology budget. Consequently, funds were not available for new, mission-critical information applications. Line executives could not see the risk associated with maintaining old systems versus building new ones. They only knew cost was increasing without a corresponding increase in value. Line managers also had trouble managing the tradeoffs between risks and returns. There was no one to focus senior management attention on crucial information management issues on a day-to-day basis and provide them with advice, concepts, services, and tools to resolve them.

A new, experienced CIO drove information management changes by pinpointing and responding to mission needs. She participated as a peer in all senior management decision-making committees, keeping tough, painful issues on the agenda and continuously facilitating their solution. In almost no other position would this person have had the scope of authority necessary to create the wide-scale change in the relationship between line managers and information professionals. Specifically, establishing the CIO led to the creation of customer/supplier relationships in which line executives were accountable for (1) the business case underlying technology investments and (2) ensuring that information systems investments reflected the organization's priorities and were linked closely to its current or emerging mission needs. In contrast, the CIO was accountable for improving the speed, productivity, and quality of the information management organization.

Since line management began working with the CIO, systems maintenance costs have dropped making more funding available for strategic projects. More importantly, the organization has been able to invest in new technologies more closely bound to current and future mission priorities. Another effect has been the transformation of the information management unit from a "back office" data processing organization to a forward-looking developer of mission-critical systems.

How to Get Started

To articulate information management's role in mission improvement, senior executives should

- recruit or promote a qualified professional with a track record of results to serve as a Chief Information Officer, reporting directly to the Secretary; and
- task the Chief Information Officer to participate in a line management effort that identifies major opportunities to use information systems to enhance performance.

Practice 11 Upgrade skills and knowledge of line and information management professionals

"No matter how good our processes are, it's hard to make them work without good people."
-- a Chief Information Officer

Specific Attributes

- ✓ Teach line executives and managers how to identify important information management issues, opportunities, and decisions
- ✓ Ensure that information management professionals acquire line management and leadership skills
- ✓ Identify existing skills, explicitly target future skills, and move systematically to new levels of capability
- ✓ Find the right mix of technology dependent and independent skills

Strengthening the skills and capabilities of line and information management units is the final part of the formula for building strategic information management capabilities. Lasting improvements in information management are impossible without upgrading the knowledge and skills of executives and managers.

First, it ensures that line executives gain a better understanding of information management, while helping information managers to acquire greater knowledge of the line unit's mission, goals, and problems. Second, it brings skills and knowledge up-to-date. In the rapidly evolving world of information technology, remaining current is critical. Organizations that fail to improve themselves continuously become literally trapped in antiquated skill bases, which then become an anchor inhibiting the organization's ability to change. For instance, every year information systems get easier to use and interact with. However, this ease of use is only possible with ever more complex decision logic and data flows. Operating and maintaining these progressively sophisticated systems requires continuously higher skill levels. Similarly, increased levels of complexity also demand more systematic, controlled planning, design, and development.

This fundamental is especially important in the federal government where so much technology acquisition is contracted out. The chance of a breakdown between the agency and contractors is great when the agency does not have competent information management professionals to assist line management in evaluating and supervising contractor performance.

Case Study: Building Capabilities Around a Backbone of World Class Project Management

To address inconsistent and languishing systems development efforts, one organization emphasized project management and system development skills. Systematically building this capability allowed them to consistently increase the complexity of projects they were able to handle, improve timeliness and cost, and increase the range of technologies and scope of potential innovation they could apply to improve business performance.

Initially, this organization's training and professional development programs were, as in many organizations, largely ad hoc. There was a wide range of skills in information systems project management, design, and construction. As a result, the corporation suffered through many typical system development problems, including limited capabilities or a poor match with user needs. Projects got done, but with little assurance as to their quality. Many were late and over budget. Senior management in the organization recognized that business managers and information management professionals needed to improve their capabilities.

A comprehensive training and professional development program was instituted, based on project management--the skills, processes, tools, deliverables, and decisions required to take a project from the idea stage to successful installation and operation. Training and professional development took place both on-the-job and in seminars and classes. It included both line managers and information management professionals. In addition, line managers and information management professionals were often placed on interdisciplinary teams and cross-trained. This allowed them to understand the other's perspective and thus improve coordination in complex systems development efforts.

For example, line managers were trained to understand the risks of a system development effort and to judge how to align systems specifications with user needs and mission objectives. They were also taught how to manage information and make information technology based business decisions. Conversely, information management professionals were taught line management and leadership skills to support the translation of line user requirements into system design specifications. The information management professionals were also trained to understand the mission benefits to be derived from the system being developed.

Through a combination of skill development in project management, as well as investment selection, control, and evaluation, the organization now completes 85 percent of its information system projects on time and on budget. Even more important, says their CIO, systematically building project management and systems construction capability has allowed them to consistently increase the complexity of projects they can handle. This increases the range of technologies and scope of potential innovation that can be applied to improving mission performance.

How to Get Started

To upgrade information management capability, senior executives should

- systematically identify information management skill targets and gaps for both line managers and information management professionals, and
- fully integrate skill and knowledge requirements in performance evaluations and promotion criteria.

Results That Can Occur by Implementing the Fundamental Practices

While meaningful short-term benefits can accrue within a year or two, these fundamentals are not quick fixes. They take significant effort and commitment to implement. In the case study organizations, new performance levels were achieved by consistently applying the fundamental practices over time, usually a period of 2 to 5 years. In addition, the practices were usually pursued in the context of other mutually reinforcing management improvement initiatives (e.g., total quality management).

Implementing these practices in the federal environment is not only possible, but is already beginning in several agencies. Though barriers exist--perceived and real--each practice is consistent with existing elements of federal regulations. Moreover, although few federal agencies are applying all 11 practices, we found evidence that each one exists at various degrees of maturity in at least one of our federal case study organizations.

The best examples of the benefits that were achieved by leading private sector organizations are presented below. The private sector firms clearly had the best data on which to base measurable outcomes. Leading states and selected federal agencies tended to have more highly qualitative evidence of impact. We believe similar results are possible throughout the federal government.

Increased Productivity: Productivity benefits allow an organization to cope with rising workloads in an environment of shrinking resources. For example, one organization now handles 158 percent above its 1986 workload, with roughly the same number of staff, while at the same time increasing both quality and customer satisfaction. During this period, the organization's productivity grew at a 5.9 percent annual rate.

Improved Customer Service: Fewer mistakes and faster, easier, and more valuable services narrow the gap between public expectations and federal service delivery. For example, one organization developed a new customer service process, reducing the number of people involved in responding to customer inquiries from as high as 16 to 1 and the number of systems supporting the process from over 70 to 1.

Higher Returns on Information Systems Investments: Investments are made today based on the promise of achieving net benefits in mission performance tomorrow. For example, one organization achieved a 14-fold increase in the benefits returned from information systems initiatives. In 1989 this organization realized just 9 percent of the benefits promised in project funding justifications. In 1992 all of the promised benefits were attained, plus another 33 percent that were unanticipated.

Lower Risks of Failure, Delay, and Overspending: With established, systematic processes, information systems projects can be more predictable, timely, carefully managed, and affordable on a consistent basis. For example, one organization suffered from many projects

that were late, over budget, or had little real impact. Now, it completes 85 percent of its information systems projects on time, within budget, and at acceptable risk levels and has seen examples of improvements in its investment returns.

In the near term, low-value projects can be eliminated or stopped, unnecessary risks can be uncovered and mitigated, existing projects can be given an increased likelihood of success, and productivity improvements in information management operations can be stimulated.

In the long term, the combination of process improvement and technology has the potential to reduce the burden on the public from collecting information for government use, increase access to valuable government information, and reduce the costs while increasing the quality and responsiveness of government services. Selected examples from the National Performance Review include:

- **Reduced costs and increased quality of government services**
  - quicker, easier application for and receipt of government benefits--ranging from social security to veterans' benefits
  - more effective national law enforcement activities
  - more effective and economical health care service delivery
- **Reduced burden on the public**
  - easier, quicker tax filing
  - fewer, simpler forms and requirements for small businesses
- **Increased access to more valuable government information**
  - wide variety of business information on competitiveness and international trade issues
  - quicker and more accurate information on environmental safety risks

Getting Started: Recommended Actions for Senior Executives

To take comprehensive, quick, and practical steps toward improving strategic information management, federal executives should consider doing the following:

- Take a personal leadership role in establishing strategic information management and designate a champion to lead day-to-day improvement efforts
- Make senior managers responsible for effectively implementing a strategic information management improvement program
- Make this new strategic information management program a critical success factor or a goal in the department/agency strategic planning process
- Initiate a strategic information management improvement program within the next 90 days.

Additionally, both congressional leadership and top agency executives should ask and answer the following questions:

- ☐ Are the right strategic information systems and reengineering projects being worked on?
- ☐ Are external and internal customer requirements being satisfied, and is overall productivity and quality improving?
- ☐ What is the risk-adjusted return on information systems investments?
- ☐ Are there performance measures that truly define success for the organization in terms of expected outcomes for customers?
- ☐ Does management information support critical decision-making and reinforce accountability for results?
- ☐ Is management information accurate, timely, secure, usable, and targeted at the right decisionmakers and decision processes?

To assist with these efforts, GAO is developing and testing a toolkit for agencies to use in benchmarking themselves against these 11 practices. The toolkit is expected to provide senior executives with an efficient, fact-based evaluation of how their organizational processes and practices compare to those of leading organizations. For additional information on the toolkit or this report, call Jack Brock at (202) 512-6406 or Christopher Hoenig at (202) 512-6208.

Research Objectives, Scope, and Methodology

The objectives of our research were to (1) identify information management practices used by leading private and public sector organizations with demonstrated success in consistently applying information management and technology solutions to improve mission performance and program delivery outcomes, and (2) share our results with federal executives to help improve overall mission performance.

Scope

Our research focused on information management practices used by senior management teams in five private sector firms and five state government agencies. Our unit of analysis was individual business or mission units (i.e., a business unit within a corporation or an agency within a state). The sample organizations were chosen purposively, not at random or to ensure representation of a larger group. We selected the private sector firms based on (1) recognition by corporate executives and independent researchers for their progress in successfully managing information technology to improve business performance, and (2) discussions with three major business consulting firms doing similar research that also included these organizations. We selected the five state government agencies based on (1) discussions with representatives from the National Association of State Information Resources Executives, and (2) recommendations made by a consultant we used on the project with recognized expertise and research in public sector IRM issues. Because our work often involved data that these organizations regarded as proprietary or sensitive, we agreed not to identify individual organizations in examples cited in our reports or to disclose any data they wished to protect.

To supplement our findings from the private and state organizations, we selected nine federal departments or agencies to include in our research. We chose these organizations judgementally, attempting to consider diversity in organizational size (budget, personnel), mission types (civilian, military, regulatory), and information dependency (collection, use, dissemination). We did not choose these organizations to represent places in the federal government with the "best" information management practices, although many were actively involved in developing information management capabilities. Rather, we used the sample to help confirm how federal organizations compare against some of the leading private firms and state agencies and to help assess whether the practices used by these successful organizations could work in the federal environment.

Methodology

Our research was conducted with an illustrative case study approach using open-ended and focused interviews and documentary analysis, not direct observations. In conducting the case studies, we interviewed senior executives, line managers, and IRM professionals to learn how the organization managed information and technology to deliver quality services/products in an effective, timely, and cost-efficient manner. Interview information was supplemented with

documentary analyses of each organization's existing practices, processes, and reported outcomes.

For quality assurance, we consulted with representatives of an advisory committee comprised of information technology experts from the public and private sector on overall approach, sample selections, research findings, and applicability of the practices in both private and public settings.[6] We also formed an advisory panel of senior federal IRM officials to assist in deciding the scope of our work and to critique our analyses and findings. To ensure the quality of our case study methods, we hired a full-time consultant with expertise in researching public sector IRM issues and using case study methods. Moreover, we convened several focus groups comprised of senior program and IRM officials across the federal government to learn more about their strategic information management activities and approaches, help identify research gaps, and comment on the applicability of the 11 practices to the federal environment. As a final measure, we obtained comments on a draft of this report from each case study organization, members of the executive advisory committee, the advisory panel of senior IRM officials, the Office of Management and Budget, and the General Services Administration. We have incorporated changes where appropriate.

Caveats

It has been little more than two decades since information technology began seriously penetrating private and public workplaces. As a result, the state of information resources management is still relatively immature. It is influenced by wide-ranging factors--managerial, technical, cultural, and political. Stable cause and effect relationships are difficult to define and expert points of view often differ significantly. As an initial step, this report presents a framework that begins to document the state of the practice drawn from our analysis of a relatively small number of case studies. Admittedly, much more work in this area remains to be done. This project is the first in a series of efforts needed to help bring strategic information management in the federal government up to the level of leading organizations.

The 11 fundamental practices should be viewed as a template relevant to any organization. Although we attempted to be as thorough as possible within the scope of our study, we recognize that our results are neither comprehensive or definitive. A number of areas remain that require further research before integrating them into our framework, including outsourcing, technology research and development, and the use of innovative technologies such as networking and imaging. We also recognize that this management template requires customized application to any organization depending on a wide variety of contextual factors (e.g., skill base or current improvement initiatives in place) as well as existing organizational strengths and weaknesses.

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[6]This committee, GAO's Executive Council for Information Management and Technology, was created in 1989 to provide expert managerial and technical advice to GAO on potentially sensitive and controversial information management and technology issues.

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