

**A Plan for
Corporate Information Management
for the
Department of Defense**

**Forwarded by the
Executive Level Group for
Defense Corporate Information Management**

September 11, 1990

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Foreword

This draft represents the first eight sections of a Plan for Corporate Information Management for the Department of Defense. The Executive Level Group for Defense Corporate Information Management is assisting the Department in the development of this plan. This draft has portions yet to be completed and existing sections may be reassessed. It is intended to be a living plan that will be updated and refined as needed, even after its initial completion and submission to the Deputy Secretary of Defense.

The Preface contains a model of corporate information management. It describes the elements involved in corporate information management and their relationships. An understanding of this model is important to understanding of the plan itself.

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Preface

A Model for DoD Corporate Information Management

Introduction

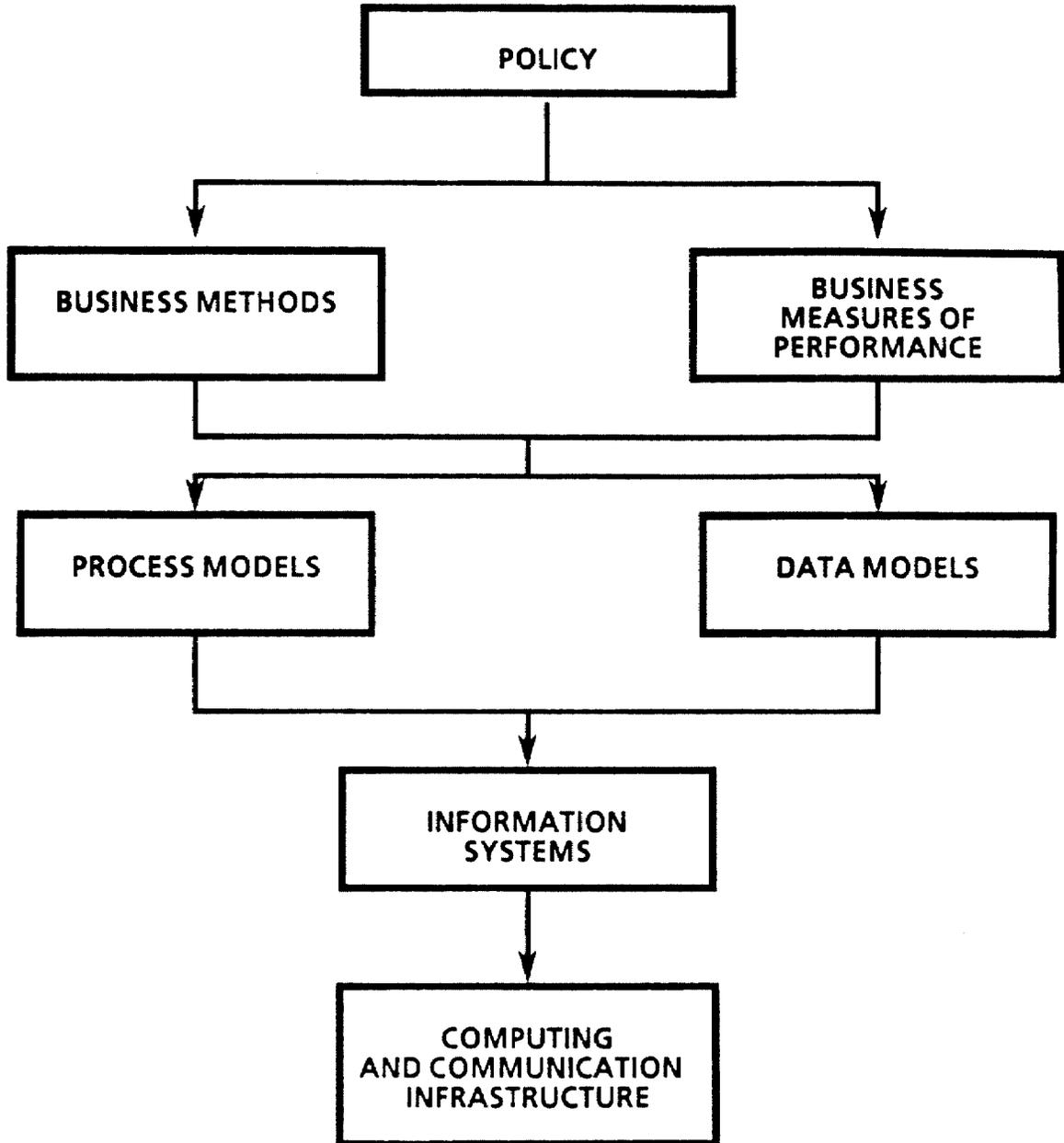
Adam Smith, the Scottish economist, wrote "The Wealth of Nations" before the Industrial Revolution was fully under way. He identified three resources that must be managed by every organization: capital, material, and labor (people). The Industrial Revolution with its ever increasing demand for information is propelling another continuing revolution built upon computing and communication technology. Now information is becoming recognized as a fourth resource. Just as capital, material, and people need to be managed in order to achieve effectiveness and efficiency, so does information.

Most U.S. government agencies and corporations viewed information management as the automation of existing business methods in order to reduce costs. With this narrow view, little effort was made to improve the methods themselves. Results were disappointing: new technology applied to old methods did not produce the benefits expected.

Forward-looking organizations took a path which put primary emphasis on continuously improved business methods. Computing and communication technology played a subordinate role, and only now is being applied to the superior business methods that have evolved.

All organizations have access to the same computing and communication technology. Benefits and competitive advantage accrue to those who apply that technology to improved ways of doing business. Computing and communication technology also makes possible new business methods which are not otherwise practicable. This wider view of information management is incorporated in the model that follows.

**CORPORATE
INFORMATION MANAGEMENT
MODEL**



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The Corporate Information Management Model

The following sections describe the elements of the Corporate Information Management model and explain their relationships.

Policy

Management of information begins with policy. Policies are the guiding principles and operating fundamentals that determine the direction the organization shall take. Policy is announced in memoranda, regulations and directives. These are supplemented by the beliefs and values of the organization and its members. Policies represent a choice among alternatives, and they frame the business methods and performance measures to be employed by the organization.

Business Methods

Business methods are the formal way in which business is conducted. They represent a selected and defined approach to executing the operation of a business or government agency. Two different business methods for DoD inventory management are described below.

"Inventory of spare and repair parts will be managed by individual item."

"Inventory of spare and repair parts will be managed in the context of the weapon system they support."

It is essential that business methods be continuously reexamined and redefined in order to effect improved operations. The end goal is simpler, integrated methods for organizations to adopt.

Computing and communication technology enables the implementation of business methods that would not otherwise be affordable or even possible. Properly applied, this technology allows implementation of new solutions to old problems. On the other hand, improperly applied technology can restrict the application and integration of new methods.

Measures of Performance

Measures of business and mission performance must also be defined. They provide the framework for evaluating effectiveness and efficiency of an organization's business methods and the resulting operations. These measures permit comparative evaluation and provide insight to the strengths and weaknesses of operations. In the private sector, such criteria as return on investment, return on sales, inventory turn rates and other basic measures are commonly used measures. The

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government needs to define measures appropriate to its non-profit environment which would include cost, responsiveness of service, and quality of service. Measures should be regularly reexamined and refined. Some will be abandoned in favor of new measures that better direct and motivate the private corporation or government agency towards its objectives.

Process models

Process models document business methods by graphically describing the tasks performed and their sequence. They are used to describe present methods and are essential to continuously evolving improved methods. Process models reveal better ways of doing business and are valuable as training aids.

In the case of a private sector manufacturing firm, a process model is needed for each of the three primary corporate functions: preproduction, production, and sales and marketing, and one for management of resources. Appropriate process models will be necessary in the government that are consistent with the fundamental missions of the agency or organization. Formal methodologies for developing process models are available.

Data models

While process models represent the activities of a business method, data models represent the data necessary to execute the business method. Data models formally define the terms (data) used in a business method. These terms and their relationships, once defined, comprise a business language, and like natural languages, are to be captured in a dictionary. Together the data models and dictionary comprise a corporate information standard.

In the absence of an information standard, data definitions will vary among systems, and, therefore, data must be translated between systems. Translation gives rise to misunderstanding and errors, particularly where computers are employed; computers have no tolerance for inexactness, no ability to compensate or interpret. Therefore, an information standard is essential if data are to be shared among organizations and the systems through which data flow are to be common.

Information systems

Business methods and performance measures are implemented through information systems. New methods require new information systems. For example, a policy of direct shipment from supplier to user changes the major supply and distribution activities and work cannot be performed without new information systems for stock control and warehousing.

Process and data models must be built before development of an information system begins. Applied in that sequence, these models facilitate integration and commonization of systems. Since they formally define a business method in a sufficiently rigorous manner to permit correct implementation, they also help simplify system design, cutting development and operating costs. Together, process and data models provide the how and what, respectively, of an information system.

Common business methods are implemented through common information systems. A system is common when used by more than one organization; otherwise, a system is unique. Common process models and common data models are a prerequisite of common information systems. If the processes used by organizations vary, or the data definitions and relationships are not identical, their information systems cannot be common; nor can data be exchanged without translation.

Infrastructure

Information systems support operational transaction processing--such as payroll and personnel--and provide information needed to support management decisions. Information systems are largely computer based. The computing and communications infrastructure upon which they stand includes modules such as:

- information/data processing centers,
- office automation, and
- communication networks.

Core facilities, notably information/data processing centers and communication networks, are managed and operated by information system organizations. End user resources, which include personal computers and workstations, are generally operated by the users.

Infrastructure is constantly undergoing change as new computing and communication technology becomes available. However, investment in leading edge technology of itself does not guarantee a return.

Executing the Corporate Information Management model from the top down can lead to dramatic improvement in business effectiveness and efficiency of an organization whether private sector or government. Driving this model from the bottom up, that is, beginning with change to the computing and communication infrastructure, re-automates old ways of doing business and potentially institutionalizes ineffective and inefficient ways of doing business.

The Corporate Information Management model has implications for teamwork as well as technology. Knowledge of the business

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Strategies

There are eight strategies for achieving the goals:

1. Develop process models that document new and existing DoD business methods.
2. Develop data standards with emphasis on data modeling.
3. Develop and implement a set of cost effective, common information systems based upon process models and data standards.
4. Develop and implement a communications and computing infrastructure upon the principles of open systems architecture and systems transparency, to include but not be limited to:
 - Operating systems
 - Database management
 - Data interchange
 - Network/communications services
 - User interfaces
5. Manage expenditures for information, regardless of the technology that is applied.
6. Institute life-cycle management methodology that addresses process models, data models, updated system development and acquisition methodologies, and educate the user and technical communities on its use.
7. Establish measures of information management effectiveness and efficiency.
8. Educate Department personnel in the concepts of corporate information management and the plans to apply it.

must be combined with knowledge of computing and communications.
This requires that users and technical support groups
collaborate at every stage of execution.

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Planning Structure and Content

The plan which follows represents a summary master plan for Corporate Information Management. It is expected that supporting plans will be necessary for each functional area and organizational element in the Department. These plans should have the following content:

- Mission
- Scope
- Guiding principles
- Vision of the future
- Situation analysis
- Objectives
- Goals
- Strategies
- Programs
- Organization structure
- Resources
- Implementation issues

Mission

The mission of _____ is to cause information to be managed across the DoD as a resource that contributes significantly to the shaping and achievement of objectives of the DoD.

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Scope

The scope of DoD Information Management involves both information requirements at all levels of authority and information, whether used to conduct transactions or support decisions.

Information management includes business process models, data models, information systems, and the computing and communications infrastructure.

The scope of this plan shall initially be restricted to business oriented functions. Specifically this includes the business functions involved in managing personnel, materiel, and financial resources. Command and control is not included in the initial scope; but subject to reassessment. Embedded weapon systems are also initially excluded.

Determination of policy is outside the scope of this plan.

Guiding Principles

1. Information will be managed through centralized control and decentralized execution.
2. Simplification by elimination and integration is to be preferred to automation whether developing new or enhancing existing information systems.
3. Proposed and existing business methods will be subject routinely to cost-benefit analysis which includes benchmarking against the best public and private sector achievement.
4. New business methods will be proven or validated before implementation.
5. Information systems performing the same function must be common unless specific analysis determines they should be unique.
6. Functional management will be held accountable for all benefits and all directly controllable costs of developing and operating their information systems.
7. Information systems will be developed and enhanced according to a Department-wide methodology and accomplished in a compressed time-frame in order to minimize the cost of development and achieve early realization of benefits.
8. Information systems will be developed and enhanced in the context of process models that document business methods.
9. The computing and communications infrastructure will be transparent to the information systems that rely upon it.
10. Common definitions and standards for data will exist DoD-wide.
11. Wherever practicable, information services will be acquired through competitive bidding considering internal and external sources.
12. Data will be entered only once.
13. Access to information will be facilitated, and/or controlled and limited, as required. Information will also be safeguarded against unintentional or unauthorized alteration, destruction, or disclosure.
14. The presentation between the user and system shall be friendly and consistent.

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Objectives

The mission of the Department of Defense is clear and significant. A coherent and strong information management program is required to accomplish that mission. Every action that is taken with respect to information management should be weighed against the broad DoD objectives and information management should serve those objectives. From a corporate or business standpoint, the Executive Level Group views five major constituents which the DoD information management program should serve; they are as follows:

AMERICAN PEOPLE: Provide an effective, global defense against threats to the United States through ready and able forces.

U.S. ALLIES: Increase the effectiveness of defense capabilities through collaboration and joint efforts.

U.S. CONGRESS: Utilize available resources efficiently and in a manner that ensures mission readiness and effectiveness.

SUPPLIERS: Provide a cooperative environment that ensures acquisitions are efficient and competitive, with reasonable return.

EMPLOYEES: Provide a safe, enabling work environment with opportunities for professional enrichment and growth.

(This section will be updated when the supporting programs for implementation of this plan's strategies are developed.)

Vision of the Future - The Department of Defense in the Year 2000

1. The Department has been downsized to reflect reduced East-West threats and fewer available resources. New threats involve more varied problems, greater volatility, and more diverse locations. Even with smaller overall numbers, military readiness and effectiveness is very high because forces are more self-contained, flexible, mobile and responsive. The Department has developed the capability to plan and employ needed forces, often in concert with U.S. allies, in a more rapid, precise and effective manner.
2. Defense expenditures continue to decline in proportion to the GNP. The Defense burden on the U.S. economy is now at its lowest point in recent history. At the same time, the Department has substantially increased the productivity and effectiveness of its business and support activities. The resources freed up through improved business operations have permitted the Department to maintain a fully effective military mission capability and devote a greater percentage of its reduced budget to mission needs.
3. The acquisition cycle has been shortened significantly, compressing the time to field new weapon systems. Parallel improvements have been made in the acquisition of other DoD systems and support materiel. A streamlined and simplified acquisition process has been put in place to solve the problems identified by the 1989 Defense Management Report and other efforts.

A new generation of weapon systems has contributed significantly to the high level of military readiness and effectiveness. These new weapon systems employ a high proportion of commercial technology and have been designed and acquired so that technological currency can be maintained throughout weapon systems life-cycle. Lower priority weapons capabilities are being obtained by combinations of life cycle extensions, upgrades or new tactics.

4. Planning and resource allocation within the Department has been strengthened by achieving a common, more integrated Planning, Programming, Budgeting, and Execution System. It permits consistent, mission-oriented output analyses to support decisions throughout all four phases. A new generation of accounting systems provides the necessary information to link execution with prior phases. Consistency and clarity of resource allocation decisions have been improved.

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5. Simplification of business methods has helped to establish a more flexible organization for the Department, which is now able to adapt more rapidly to changes in mission emphasis, resources, or size. Responsiveness to policy and performance of operational level activities has been improved, reinforcing the longstanding DoD management approach of centralized policy and decentralized execution.
6. The Department has streamlined business operations and realigned functional organizations around them to enhance quality and responsiveness. Organizational redundancy and layering have been reduced. Operating expenses are declining more rapidly than is the overall DoD budget.
7. Direct control ("ownership") of support resources is no longer considered essential to achieving responsive, cost-effective results from support functions. Clarified responsibility and accountability ensures effectiveness and efficiency of support organizations. The Department's flexibility in applying or redirecting its varied resources is enhanced.
8. Business functions are now evaluated against a suitable set of performance measures. Benchmarking against the best private and public sector achievement is routine and is stimulating fresh ideas. Simplification of methods and availability of consistent data provide the basis for improved evaluation. As a result, the Department's ability to identify and correct problems that inhibit effectiveness and efficiency is improved significantly.
9. A more select and skilled workforce of military and civilian personnel has resulted from selective recruitment, and training and development programs. Increased focus on individual needs and professional development has broadened responsibility and improved job satisfaction for both military and civilian personnel. Restructuring and enlarging employee duties have assisted DoD's downsizing through increased productivity, supported organizational change, and improved job satisfaction.

Vision of the Future - DoD Information Management in the Year 2000

1. The management of information is central to the Department's strategy of simplifying business methods and operations. Information management is recognized as a business and force multiplier. It has reduced non-value added work, improved productivity, and enabled consolidation of like functions and organizations. This has enabled an effective military mission capability to be maintained within a smaller defense budget.

Allocation of resources and the ability to effect change is improved through the more integrated Planning, Programming, Budgeting and Execution System.

2. Business methods across the Department have been documented and opportunities to simplify business activities identified. Functional managers are challenging and changing old ways of doing business.

Process models are being used to document and continuously improve business methods. This activity provides the foundation for the development of new and enhancement of existing information systems.

3. The Department's measures of business performance have sharpened focus upon quality, costs, productivity, and time-based performance. These measures allow benchmarking against the best comparable achievement in the public and private sectors, and are helpful in justifying investment in new business information systems. Capture of performance data is integrated into system design.
4. Data standards have been set and implemented across the Department's major business, support, and mission areas. A data modeling initiative has resulted in standardized data descriptions and attributes for all alphanumeric, geometric and symbolic data. Data dictionaries provide the reference and discipline for data bases that are the foundation for clear, concise and consistent data. Access, sharing, and reconciliation of information is dramatically improved.

5. Most data are being entered into information systems without being handwritten or typed. Electronic data capture systems, embedded in weapon systems and business activities, are often the source. The availability of data standards and a communications network necessary for data sharing permits data to be entered only once. As a result, costs are reduced, errors avoided, and the currency of data improved.

6. Electronic data interchange and funds transfer are now in place, speeding financial transactions and the exchange of technical and management information. There is less reliance on paper documents and traditional mail. Transactions between the Department and its suppliers and among DoD Components are handled more quickly and accurately; clerical and other costs are reduced, everyone is better informed.

Electronic and voice mail are in everyday use by most employees. Videoconferencing has become economically preferable and widely used.

7. With barriers to data exchange disappearing, business methods are more readily integrated and improved. Information systems, implementing these business methods, are more compatible with each other, less complex, and therefore more easily developed and changed.

A new generation of transaction systems that incorporate the simplified business methods and standardized data have been introduced or are nearing completion. These systems tangibly impact quality, costs, and response times for the business operations they support. They are recognized as essential to reducing overhead and maintaining effective operations in a downsized DoD.

A coordinated portfolio of decision support systems that draw upon standard operating data are used as tools of planning and analysis. Through their use, there has been a reduction in middle management responsible for decision support. Decision making is accelerated.

Information systems are easier to use than in the past. System ergonomics, which addresses the interaction between people and machines, is much improved, increasing user acceptance and satisfaction and reducing the need for special training.

8. Common information systems, embodying common business methods, are in wide use. Examples include payroll, supply, personnel, and financial management. Common information systems have simplified many business operations, and have provided organizational flexibility. Continuous improvement is more easily effected. Management control is strengthened through the uniform implementation of policy.

9. An updated and expanded life-cycle management methodology is applied across the Department for development or enhancement of information systems. The methodology describes management policies, decision points, responsibilities and activities to be followed. Business method definition, process modeling and data modeling are integrated into the methodology. The guiding principles for information management are included as exit criteria of the milestone process. Development costs and times are reduced by following this methodology.

Guides have been developed for both the user and technical communities that provide a "how to" approach for meeting the requirements of the methodology. Users understand their responsibilities more clearly and can perform them more efficiently.

10. Functional managers have assumed direct responsibility for the funding, costs, and achievement of benefits for the information systems upon which they depend. Information management is no longer delegated to the technical support community. Both the users and the technical support community are pleased with this relationship.

Each system development and major enhancement is a joint undertaking by the user and technical support communities, which team together. A program manager is established to lead the development and enhancement effort.

Each information system in use is the responsibility of an operations manager who controls all change. As a result, common systems remain common and costs of enhancement and operation are contained.

As younger, computer-literate employees enter managerial ranks, the trend for functional managers to assume ever greater responsibility for all aspects of information management accelerates. It is a trend propelled by the ready availability of convenient, easy-to-master computer power, and the recognition that information systems are best developed by people who are close to and understand the business itself.

Vision of the Future -

DoD Information Technology in the Year 2000

1. Computers are now at least a hundred times more powerful than in 1990. Data transmission speeds and reliability are keeping pace with increased computer efficiency. The DoD's enormous range of computing needs is taking advantage of these technologies in improving effectiveness and efficiency of its business, mission and weapons systems. There are few cases where the available commercial technology does not meet the Department's needs.

2. The DoD is operating a computer and communications infrastructure that is transparent to the information systems that stand upon it. The overall architecture is open in order to accommodate a wide variety of centralized and distributed technologies and products.

DoD is transitioning to a computing and communications environment in which most applications processing occurs locally and corporate databases are primarily controlled centrally.

3. In emphasizing a heterogeneous, open systems architecture, the DoD has focused on standards critical to portability and interoperability across the DoD and with allies. An open systems environment has permitted information systems to be developed, operated, maintained, and enhanced independently of technology or vendor.

The Department assumed a leadership role in the development of open systems standards, working in concert with national and international standards bodies. This has resulted in standards with a consensus of support from industry and our military allies in the following major areas:

- Operating systems
- Database management
- Data interchange
 - Graphics
 - Product data
 - Document processing
- Network/communications services
- User interfaces
- Programming services

DoD computer and communications security requirements have also been integrated into these standards.

4. A digital communications infrastructure, built upon Open Systems Interconnection (OSI) standards, is fully operational. A long-haul network has been implemented which provides integrated digital communications services. Local area networks are being integrated with the long-haul digital communications network, providing end to end interoperability. Wideband communications permit integrated voice, data, and video services. In combination these provide interconnection flexibility, fast response times, and lowered costs. Necessary security capabilities have been incorporated into the network.
5. The time to develop and deploy information systems has been compressed and life-cycle costs reduced through special attention to software. These improvements have been achieved through a coordinated set of initiatives that emphasize increased reuse of software, reliance upon commercial software, use of standard high order languages, and improved software development methodologies.
6. Standards for graphically oriented windowing have rendered user interfaces simple, intuitive, and consistent. This combination has reduced training costs and improved productivity of users and technical support personnel. Voice recognition allows hands-free interactions, advancing some business and mission applications.
7. Data modeling tools and methodologies have matured to permit rapid generation and manipulation of data bases. Data bases are shared DoD-wide in the context of operational and security considerations. Data base management software facilitates assembly of data both for transactional processing and decision support.
8. Open architecture and transparency of infrastructure has led to hardware being acquired as a commodity that serves applications. In order for the DoD to better avail itself of cost effective technology, acquisition times have been shortened, enabling the cost and performance benefits of new information technology to be realized fully. Open system standards expedite the acquisition process and compress the time to migrate information systems to new platforms. The result is improved operational support and increased competition consistent with Congressional and administrative regulations.

In view of the continued rapid advance of technology, leasing of hardware is often seen as a more cost effective alternative to purchasing.

Economic analyses in support of acquisitions are more in keeping with industry practice.

9. Expenditures for information systems and supporting technology, including development, operations, and maintenance, constitute the same percentage of the DoD's total budget as a decade earlier.
10. Independent analysis reveals that DoD is using information technology effectively and efficiently, comparing favorably with use by the public and private sectors. DoD is recognized as a leader in the application of information technology.

DoD Situation Analysis

1. The Department is reassessing its military posture, structure, programs, and resources to deal with changing global conditions. These include the unprecedented pace and magnitude of political developments in Eastern Europe and the Soviet Union which portend a lowered threat from the Warsaw Pact and changing, more unpredictable threats to peace.
2. Significant reductions in Defense spending are planned, starting with the reductions included in the President's FY 1991 Budget. Current Department planning calls for a 2% yearly real decline in expenditures for the foreseeable future and expectations are that DOD expenditures, relative to the GNP, will be reduced to the lowest level in 40 years. Additionally, planning is underway to effect a downsizing of the Department in response to the changing threat as well as Congressional and public expectations that Defense expenditures decline.
3. The process for acquiring new weapon and other systems is long, cumbersome and complex. Important first steps have been taken to implement the framework for streamlining and clarifying the acquisition process. For example, a direct line of authority from the Program Manager to the Program Executive Officer and Service Acquisition Executive has been established. The Defense Acquisition Board's exit criteria are more clearly defined and its decision process expedited. However, much remains to be done to achieve fully the policy goals of lowered costs, improved performance, and reduced acquisition times.

A variety of weapon systems with a wide range of technological capabilities are used by the Department. Use of commercial products within the systems varies greatly.

4. The potential of the Department's planning and resource allocation process, the Planning, Programming, and Budgeting System, is not yet fully realized. The process employs differing categories and terminology across its four major phases and is oriented toward resource inputs rather than mission-capability outputs. There is little flexibility in redirecting or reallocating resources.

5. Business methods, developed on an ad hoc basis, have been institutionalized in older generation information systems which are not easily evolved. Many aspects of the Department's business functions and activities are cumbersome and inflexible, particularly in light of the pace of changing world events.
6. Large numbers of personnel and financial resources are involved throughout the Department in supporting functions which are fundamentally the same. Examples include payroll, financial management, personnel and logistics. The Department has begun to identify opportunities to reduce costs and improve effectiveness in these areas by restructuring organizations. The recently announced supply depot consolidation is a first step in this effort.
7. The buildup of separate organizations, policies, and procedures has resulted from a bias that responsive support could not be achieved without direct control or "ownership" of the resources performing these functions and from earlier, less constrained budgets. This has impeded improvements to business performance.
8. The Department has not established formal measures to assess performance of its business functions. Cost and performance measures that are used do not effectively assess the quantitative or qualitative aspects of ongoing or planned business operations and infrequently consider impacts on overall operational objectives.
9. The DoD workforce contains a mixture of skills and capabilities. While the workforce is generally capable, a portion of the military and civilian personnel do not have sufficient skills to employ new advanced technology with the flexibility desired. New employees reflect many of the skill deficits that national educational assessments have identified.

Situation Analysis of DoD Information Management

1. Effective control through management of information is not a central focus of most DoD organizations. Information management responsibilities are fragmented within the DoD. Information requirements are usually considered in the context of automated support capabilities. Today's information environment consists of a wide variety of information systems and supporting resources.
2. Business methods are infrequently documented, making it difficult to understand the linkage between improvements in the efficiency or effectiveness of business operations and information systems. Today's information systems inhibit improvements to functional performance because they have institutionalized outdated and cumbersome business or functional methods and are difficult to adapt.
3. Evaluations within the Department focus on development costs and technical performance, rather than contribution to overall efficiency and effectiveness of business operations. Inaccurate, incomplete, and inconsistent auditing and benchmarking data contribute to the difficulty in measuring the contribution of information systems to business cost and performance.
4. Standardization of data across the Department has not yet been achieved, and most data continues to be managed in separate, functional "stove pipes." Several initiatives are underway to address the lack of consistent data definitions which impedes exchange, integration, aggregation, and comparison of data in the Department. The overall DoD data standardization effort recently has been revitalized and given high priority, and programs such as PDES and CALS, are underway to standardize product and technical data across the Department.
5. Data entry in many functional areas remains a labor-intensive activity, subject to many errors and often requiring reentry. Delays, inconsistencies and higher costs are the result. Automatic means to ensure data consistency, detect and correct errors, or assist in the entry process are generally lacking in the DoD.

6. Electronic exchange of documents exists in limited applications within the DoD. Currently, much data exchanged between DoD and its suppliers exists in digital form, but must be converted to hardcopy for use by the Department. Transfer of technical and management information as well as financial transactions are characterized by delays in deliveries, high handling costs, and inefficient processing steps. DoD has recently taken steps to address this problem through increased emphasis on data standardization, the CALS program, and EDI.

7. Many barriers to effective data exchange exist in the Department, impeding integration and improvement of business methods. Information systems mirror these data exchange problems since they are complex and not readily adapted.

Transaction systems have been in use for some period to support the Department's financial, logistics, personnel operations. Built upon older business methods, upgrading has been difficult and software is not flexible. Their potential is not realized.

Decision support capabilities are available in a wide variety of forms and capabilities. Inconsistency, inaccuracy and inaccessibility of data degrade their usefulness.

8. Very few common information systems have been developed within the Department. Existing federal and DoD development policies have encouraged individual, non-integrated systems development efforts. Efforts to standardize systems for certain functions, such as pay and personnel, received strong emphasis in the Reform 88 initiative, but little success was achieved because the efforts focused on technical systems. Thus, in the DoD today, there are 27 payroll systems, which is still a reduction from several years ago. Systems are complex and expensive, retraining costs are high, and organizational flexibility is degraded by "unique" systems.

9. Life-cycle management methodology exists in the DoD for business applications, but is focused on the development of individual information systems. The fundamental concepts linking business methods and information systems through process and data models is not integrated into overall or individual systems planning. No formal guidance is available to functional management describing functional management's responsibilities during the system life-cycle.

10. Accountability for functional, financial, and technical aspects of an information system is generally focused on the program manager. Although improvements have been achieved through time, responsibilities of the user and developer during systems development and operational phases are not fully clarified and remain focused primarily on technical issues rather than functional requirements. Functional proponents tend to take a hands-off approach to systems development after the early mission need/requirements development stage.

Situation Analysis of DoD Information Technology

1. The Department's technology base which originated during the 1950's and early 1960's has evolved into a variety of disparate computing and communications architectures. An enormous variety of computing technology, from laptop computers to supercomputers, is available and is used effectively to support many DoD business, support, and mission areas. At the same time, the varied information technology infrastructure constrains many system developments and enhancements and hinders the insertion of new technology. New system developments can take advantage of leading edge technology, but their effectiveness is limited because of interoperability problems with existing systems.
2. The Department has a multiplicity of unique information system architectures with incompatible hardware, software, and communications networks. This situation has developed, in part, because the Department focused on individual systems developments designed to meet specific user requirements.
3. The Department's numerous information systems are based on a variety of computer language standards, multiple definitions and formats for the same basic data, several communication protocols, and a multiplicity of hardware and operating systems. The lack of uniform standards within the Department has contributed to incompatible data and systems, and has impaired the ability to exchange information among systems or users, port systems to new architectures, interface with allies, or take advantage of commercial products.
4. The majority of the Department's long-haul data communications needs are being met by the Defense Data Network (DDN) and dedicated leased circuits. The growth in distributed processing has resulted in increased dependence on telecommunications to transmit and receive data processing information and increased the burden on the communications infrastructure. Communications protocol standards exist, but the wide variety of vendor-unique implementations complicate communication interoperability within the DoD. Further, many local-area and wide-area networks in place are not integrated with the long-haul networks.

The Department has begun to transition its communications systems to use of the Open Systems Interconnection (OSI) protocols as defined by the Government Open Systems Interconnection Profile (GOSIP) standard. Today, however, communications gateways are frequently required between systems to achieve interoperability or data exchange without human intervention.

5. Much of DoD applications software has been custom designed and developed using a variety of methodologies and languages. This has resulted in standalone systems that are not transportable nor easily integrated with other systems. DoD software development and maintenance costs are high and operational performance varied. The time to develop and deploy new information systems or enhancements to existing systems is long.
6. Information systems are operated with a variety of unique user interfaces. Interactions with systems are not consistent across systems or even within one system. Extensive training is normally required and since each system is unique, training is not transferable. Systems ergonomics are rarely a primary focus of design.
7. DoD has begun to recognize the importance of managing data as part of the system development process. Increasingly, the tremendous opportunities to improve efficiency of software development by focused attention on data is being recognized and implemented. However, data modeling is not a wide-spread or fully understood process and its use is still very limited. Data base management systems are more broadly utilized but skill in their application is not mature.
8. The acquisition process is lengthy, plagued with many delays and constrained by numerous legislative and administrative regulations. This has resulted in increased development costs, stretched implementation, and technology that lags the commercial market. In order to mitigate this situation, some large volume procurements are being made.

Most equipment is purchased, not leased. Economic analyses seldom reflect the rapid change in the price of hardware technology.
9. Expenditures for information systems and supporting technology are approximately 3 percent of the entire DoD budget.

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10. In some areas the DoD uses leading edge information technology, while in others it is tied to obsolete computing and communications capabilities.

Goals

Overall achievement of the visions for the DoD Information Management Plan will require actions throughout the decade in three resource areas: financial, human, and materiel. The four goals for this plan follow.

1. Process models that document new and existing business methods developed by FYxx.
2. Standard data definitions available for the Department's business and mission areas by FYxx.
3. A set of common information systems for each function, built upon standard data and business methods, implemented by FYxx.
4. An open systems computing and communications infrastructure, transparent to the information systems that stand upon it, implemented by FYxx.

Prerequisites for the plan:

1. Business methods will be defined for three resource areas: financial, human, and materiel by FYxx.
2. Performance measures will be set, parallel to documentation of business methods, with initial measures in place by FYxx.