INTERIM REPORT OF THE

Council on Information Management

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

Senate Document No. 23

COMMONWEALTH OF VIRGINIA
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1989

INTERIM REPORT

TO

THE HONORABLE GERALD L. BALILES
GOVERNOR OF VIRGINIA

THE HONORABLE HUNTER B. ANDREWS
CHAIRMAN, SENATE FINANCE COMMITTEE

THE HONORABLE DOROTHY S. MCDIARMID
CHAIR, HOUSE APPROPRIATIONS COMMITTEE

SUBMITTED BY THE
COUNCIL ON INFORMATION MANAGEMENT

IN ACCORDANCE WITH
ITEM 85 OF CHAPTER 800,
THE 1988-90 APPROPRIATION ACT

FEBRUARY 1, 1989

COMMONWEALTH of VIRGINIA

COUNCIL ON INFORMATION MANAGEMENT

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The Honorable Gerald L. Baliles
Governor
State Capitol
Richmond, Virginia

February 1, 1989

The Honorable Hunter B. Andrews
Chairman
Senate Finance Committee

The Honorable Dorothy S. McDiarmid
Chair
House Appropriations Committee

Dear Madam and Gentlemen:

On behalf of the Council on Information Management I am pleased to provide you with the interim report of the Council as called for by Item 85 of Chapter 800, the 1988-90 Appropriation Act. Since its formation in August, 1988 the Council and its committees have met six times to gather information and review the current status of information technology resource management in the Commonwealth. In carrying out its responsibilities the Council has received the active assistance of advisory committees representing the perspectives of agencies and institutions of higher education across State government, and has been the beneficiary of excellent technical support provided by the Department of Information Technology.

This report has two distinct purposes. As directed by the General Assembly, the report provides preliminary information on the information systems operated by the Departments of Accounts, Planning and Budget, Personnel and Training, General Services, and Treasury, and the Virginia Supplemental Retirement System. In its final report due on September 1, 1989 the Council will outline a proposed plan for the coordinated future development of the strategically important information systems housed within these six agencies.

This report also contains background information on the Commonwealth's current information technology resource environment, as well as several information systems management issues and planning concepts which are preliminary in nature but are included for exposure to constructive review and comment. The Council invites such comment which may be sent to the staff offices, Suite 1100, the Washington Building, in Richmond.

In releasing this report for publication, the Council believes that it is important to emphasize that the process for developing a strategic information plan for Virginia is a complex and lengthy one. In particular, the Council finds that the technology issues facing the educational community involve a unique set of challenges for the Commonwealth.

Over the next several months the Council and its Education Advisory Committee will examine the information technology environment in education at all levels in Virginia. The results of this review will be circulated to all institutions of higher education and, through the Department of Education, for comment by appropriate groups representing elementary and secondary education. From this process the Council hopes to issue a description of the role of technology in education and the implications for technology management in State government.

Respectfully submitted:

William E. Landsidle

William E. Landsidle
Director

INTRODUCTION

The Virginia Council on Information Management (CIM) was created through the passage of HB 510 of the 1988 session of the General Assembly. Creation of the Council was proposed by Governor Baliles as a means of providing strategic direction to the development and use of information technology resources in State government. In recommending the creation of CIM, the Governor intended to provide a catalyst for strategic planning and policy development to better manage the Commonwealth's $384 million annual information technology budget.

The need for CIM and the essential elements of the enabling legislation were included in the recommendations issued in 1987 by the Joint Legislative Audit and Review Commission (JLARC). Subsequent studies by the Department of Planning and Budget and the Secretary of Administration refined the JLARC proposals and led to the Governor's legislative initiative. Although the CIM legislation represents Virginia's first attempt to create a permanent, independent planning body for information technology resource management, there has been a recognized need for this function for many years. In its 1987 report the JLARC noted that:

> .."statewide (information technology) planning has consisted of the sporadic development of independent plans by different sources...throughout the past 20 years, it was assumed that the central data processing agency would develop statewide plans. However, a continuous planning process was never established by the central agency. As a result, special committees were created to perform planning and policy development functions. These efforts were also short-lived."

In responding to the JLARC study, the Secretary of Administration also observed that planning continuity was needed.

> "The need for a cohesive strategy for developing and sharing this (information technology) valuable resource among agencies is one which has long been recognized, but never adequately addressed, notwithstanding the multiple studies, recommendations and agency reorganizations which have so frequently rearranged Virginia's management of information technology."

Since the 1950's when Virginia State government began to use data processing technology there have been numerous efforts by consultants, advisory committees and blue ribbon panels intended to provide strategic direction for information technology use. For example, during one period of rapid growth in technology use

(1967-1975) there were 16 different attempts to develop a framework for information systems planning in State government, or an average of about one new initiative every six months. The period 1975-1984 was marked by prolonged and often contentious efforts to consolidate data processing services into one central service bureau. Since 1984 the Department of Information Technology (DIT) has worked to provide efficient service delivery to its many customers within State government. At the same time, major universities and a number of agencies have installed and operate their own computer systems, including increasingly sophisticated telecommunications networks.

Today, Virginia State government seeks to use information system technology to maintain its leadership among the states. In its 1987 study JLARC found a high degree of user satisfaction with technology services provided by DIT:

- 87 percent rated computer services as satisfactory
- 83 percent were satisfied with telecommunications
- 72 percent rated development services as satisfactory
- 68 percent of agencies subject to procurement controls believed procurements were timely.

Although user satisfaction is relatively high, there seems to be general agreement among the agencies and institutions of State government that improvements are needed in the planning and management of existing and future resources. In particular, management of information resources across agency boundaries, i.e.,the sharing of databases, networks and facilities, is a high priority objective of information managers throughout State government.

In summary, the Commonwealth is well placed to make significant improvements in its management of the information resources available within the State system. However, as a recent report from the National Governor's Association noted, changes will be needed in the way decision-makers think about information.

> "While advances in computers and communication technologies have opened up important opportunities for improving the productivity of state government, these technologies also have created the potential for splintering the information management activities of state government and creating increased information redundancy, confusion, and inefficiency. Information resource management has emerged as a way of thinking about the principles, policies, and objectives that should guide information management activities in state government.
>
> Critical to this approach is the idea that information is a resource.. Information possesses a basic value, as does money, labor or capital goods. It has identifiable and measurable characteristics

such as the method and cost of acquisition, purpose for which used, and different forms and media by which it is collected, handled, and processed. Moreover, the costs and benefits of information can be identified at each phase of the information life cycle. Finally, information can be used and deployed in a wide variety of ways according to the tradeoffs in the grades, types, and costs of information required for various kinds of organizational decision-making.

The Council on Information Management

The CIM is established in Sections 2.1-563.28 through 2.1-563.35 of the Code of Virginia. The statute gives the CIM specific duties in five broad areas--planning, resource management, guidance, oversight and administration (Figure 1). Exercise of the CIM's statutory powers will result in the issuance of several different documents of significance to information technology managers.

A State plan and published planning process for information technology resource management. The plan will cover a four year timeframe, be updated annually and submitted to the Governor for review.

A standard format and approach for information management plans to be completed by each agency and institution and submitted to CIM for approval.

Policies, standards and guidelines issued as needed to implement the State plan.

An inventory of information technology resources in the State.

Budget priority recommendations provided to DPB on information technology resource budget requests.

Administrative procedures for regulating the approval of procurements, whether procured by DIT or directly by agencies and institutions.

The CIM is actively supported by two advisory committees established in law. Each committee is a nine member body appointed by the Governor to annual terms. One committee represents the interests of State agencies, the legislature and the judiciary. The other committee includes representatives of elementary, secondary and higher education. These committees are to advise the CIM on the development of policies, standards and guidelines and, as such, are the principal means of providing review and comment on proposed CIM actions. Beyond this, however, the CIM is committed to a full and complete disclosure of all plans, policies, standards and guidelines before final adoption as a matter of administrative practice. The CIM is supported by a seven person staff,including individuals with extensive experience in the various aspects of information technology management.

Council on Information Management
Statutory Powers and Duties

	Resources Planning	Management	Guidance	Oversight	Administration
Accept grants					•
Approve all Information Technology Resource Plans	•			•	
Develop a comprehensive, statewide, four-year planning process	•				
Develop an approval process to ensure that all information technology procurements conform with the statewide Information Technology Resource Plan and the Information Technology Resource Plans of the agencies and institutions		•		•	
Direct the compilation and maintenance of an inventory of all information technology resources	•	•		•	
Direct the development and promulgation of policies, standards, and guidelines for managing information technology resources in the Commonwealth			•		
Disapprove procurements that do not conform to the Information Technology Resource Plans				•	
Make and enter into all contracts and agreements					•
Monitor implementation of Information Technology Resource Plans				•	
Monitor trends and advances in information technology	•		•	•	
Plan for the acquisition, management, and use of information technology	•	•			
Prescribe regulations			•		•
Promote coordinated planning	•		•		
Promote practical acquisition of information technology resources	•		•		
Promote the effective development of information technology resources	•		•		
Promote the efficient use of information technology resources	•		•		
Provide information and guidelines for the development of Information Technology Resource Plans and budget requests	•	•	•		
Recommend budget request priorities to the Department of Planning and Budget		•			
Require the submission of Information Technology Resource Plans to the Council	•				
Review agency and institution budget requests		•		•	

Figure 1

Other State's Experience

Most states have some organization which is responsible for strategic information systems planning, and 30 states report that they have a statewide information systems plan in place. However, these documents vary greatly in comprehensiveness, detail and implementation procedures. About a dozen states use the independent council structure adopted by Virginia. Others states incorporate strategic planning within a central service bureau. Several states house information systems planning in the Governor's office or as a separate cabinet-level function.

Information is the most valuable resource in the United States today, accounting for over one-half of total U.S. employment, personal earnings and gross national product. In the NGA report referenced earlier, it was noted that an estimated 90 percent of state government employees operate in an "information intensive" environment, i.e. their jobs involve daily interaction with information systems. These employees update and maintain computer files, answer inquiries, conduct research and use information technology to issue documents ranging from driver licenses and tax forms to road maps and birth certificates. The NGA stressed that states should seek to maximize the quality, use and value of information as a strategic objective of government.

The NGA goes on to outline seven components or "building blocks" found in all states which must be coordinated to manage information resources effectively.

- Data processing, including mainframe, departmental and micro computers, data storage devices, peripheral equipment such as printers and terminals, and associated software.

- Telecommunications, including the transmission of voice, data and video information by all types of equipment.

- Paperwork and records management, including but not limited to policies governing archival storage, retention and disposal, privacy protection, audit requirements and the legality of electronically stored documents.

- Library and technical information services.

- Office systems including electronic mail, word processing, duplicating, printing and the movement and storage of correspondence and other office material.

- Public information services used within government and for external distribution.

- Research, statistical information and decision support services, which include the ability to generate timely, and reliable information to support elected officials and managers, and to provide acceptable levels of public accountability.

The NGA report and planning documents from other states were reviewed by CIM staff and provide a useful framework for examining information resource management issues. Virginia today faces a set of complex technology questions similar to those found in other states. Although no one state experience is directly applicable to Virginia, numerous overlapping issues were found during the literature search which will be of value in the development of the Commonwealth's approach to strategic information systems planning.

Legislative Study Mandate

The 1988-90 Appropriations Act directed that the CIM conduct a study of the information systems operated by six agencies of State government--The Departments of Accounts, Treasury, Personnel and Training, Planning and Budget, and General Services, and the Virginia Supplemental Retirement System. The study is to include four specific questions. These are the duplicate submission of data, opportunities for integration, opportunities for operational improvement, and how best to plan for coordinating the future development of agency systems.

This document is the interim report called for in the Act. The final report of the CIM is due by September 1, 1989.

Over the last five months the CIM and its staff have focused research efforts on the development of a list of strategic issues of interest to agencies and educational institutions. A list of agency issues has been developed and is included in this report because of their crosscutting nature, i.e. they have a bearing on both the current study mandate and the CIM's broader strategic planning objectives. The Educational Advisory Committee is assisting the CIM in developing a separate list of information management issues of priority interest to educational institutions.

Also included in this report is a preliminary overview of the information systems planning process, as well as initial profiles of the information systems operated by the six agencies specified in the study mandate.

EDUCATIONAL INSTITUTIONS
INFORMATION MANAGEMENT ISSUES

The Educational Advisory Committee is actively working with the Council to develop a list of information management issues. These issues will include items of interest to both agencies and educational institutions, as well as issues which are unique to higher, elementary and secondary education. This process was not complete as of the date of this interim report.

STATE AGENCY
INFORMATION MANAGEMENT ISSUES

The following issues have been identified by executive branch agencies as priority items to be addressed by the Council on Information Management. The issue list was developed by CIM staff and reviewed by Agency Advisory Committee members and senior managers in executive branch agencies of State government. A number of additions and changes were suggested during the review process, and these suggestions are included in the list of priority issues.

Data Sharing. Today the Commonwealth lacks any form of strategic data administration function within State government. Individual agencies ,and sometimes divisions within agencies, define their data separately. As a result, data consistency is lost, and opportunities for consolidated data entry, storage, transmission and protection of vital data are limited. When data must be shared between agencies, expensive conversion programs are often required. Of particular concern is the fact that State agencies are actively engaged in numerous projects to install and use sophisticated database management software, without benefit of strategic guidelines to ensure future compatibility of the various systems. Millions of dollars will be spent on these systems which are intended to support agency needs into the 21st century. However, these same decisions, without benefit of planning, could preempt any practical opportunity for development of a consolidated Commonwealth database during the 1990's.

Telecommunications. The Commonwealth made significant strides in consolidating voice communications in 1985 when DIT assumed responsibility for the SCATS and CENTREX systems. Additional progress was made through the recent decision to lease high volume trunk lines from a private carrier. Inefficient duplication continues to be a problem with data communication circuits, however. In particular, agencies with field offices routinely lease separate lower volume circuits to serve the same geographic areas of the State, when consolidation could reduce overall costs.

Perhaps of greatest concern is the perceived absence of a centralized engineering support function for telecommunications. Telecommunications technology is both complex and subject to rapidly changing environmental conditions. There is not a clearly defined locus of responsibility for managing this change in State government, without which Virginia is inadequately equipped to deal with the multiple vendors and several national and international bodies attempting to establish new standards to open communication channels between various hardware and software systems.

Finally, the expanded use of satellite communications and the installation by agencies and institutions of communications systems capable of carrying voice, data and video signals in support of administrative, research and educational programs in Virginia has raised new technological questions about the statutory

responsibilities of several public bodies, including the Virginia Public Telecommunications Board. Clarifying these roles may require amendments to existing law.

Technology Research. Today the state lacks a central clearinghouse for information systems technology research. Individual agencies conduct their own research and technical evaluations as needed within the cababilities of in-house staff. Alternatively, agencies may contract with DIT, other agencies, universities or private consultants for technical assistance. The benefit of this research generally stays within the developing agency, despite the likelyhood that the same or similar problems exist elsewhere in State government. Moreover, the State's universities routinely conduct high quality research which could be of great value to executive agencies if a clearinghouse were available.

Budget Planning. Agencies asked about information resource management issues repeatedly cited the current budget development process as a major point of concern. Planning for, designing and implementing major information system enhancements will generally require several years to accomplish. Securing and maintaining budget support for these projects across several budget cycles is a concern of agency managers. Conversely, under current procedures large information system acquisitions can escape critical review if they are funded within the level funding targets. Major system investments could be made despite incomplete or inconsistent disclosure of the costs and benefits and poorly documented plans and timetables for their implementation. Effectively integrating information system planning with the budget process appears to be a major issue area for the CIM.

Training. Agencies require technical training for employees which ranges from basic instruction on the use of personal computer software to complex instruction on system installation and maintenance. Training is available from DIT, the Center for Office Development of J Sargent Reynolds, other community colleges, universities and the private sector including technology vendors. The availability and quality of training open to State employees drew mixed comments from agencies. There is a need for a better inventory of training options available and a systematic quality control function. Coordinating training requirements, particularly for costly vendor-sponsored training, could reduce overall costs by making better use of the volume purchasing power of the Commonwealth.

Decision Support Systems. Decision support systems are subsets of information systems which provide selected access to the database for use by senior management in analyzing options and making decisions. These systems can be highly structured with preprogrammed information made available to the executive each day, or user-friendly systems which facilitate access by managers who have been trained in the use of query commands. DIT has attempted in the past to promote, without sucess, such a system for use by the Governor, Legislature, Cabinet and agency management. Failure

on the part of the Commonwealth to develop this capacity reduces the information base available to support policy, program and budget decisions.

Systems Development Quality Control. The State uses a standardized systems development life cycle as a guide to application development projects, and some selected applications such as financial systems required review and approval. In general, however, the methodology and quality control used in major system development projects is the responsibility of the developing agency. Although this promotes user creativity and initative, the State may need to take another look at its life cycle standards, to include incorporation of current concepts of information engineering.

Security and Disaster Recovery. Virginia does not have adequate policies or plans in place to recover effectively from a catastrophic loss of a computer center or telecommunications facility. Moreover, system security concerns have been brought into sharp focus by the recent breaches of several large national data networks. Security and recovery considerations need high priority attention and coordinated action involving DIT and user agencies.

Audit Standards. Auditing computer systems is a function of the Auditor of Public Accounts and the various internal auditors within the agencies. However, this aspect of the audit function is relatively new and may not be well understood by some information system managers. Audit standards and requirements should be incorporated into information resource planning as it is done both for the statewide plan and the individual agency plans required under the CIM statutes.

Procurement. Procurement remains a significant issue for information system managers throughout State government. Timeliness, compatibility and competition must be carefully balanced to promote effective purchasing. Delegation of purchasing authority and the appropriateness of DIT billing rates and methods are also issues which need attention during the planning process.

Distributed Systems. Agencies are seeking a clear statement of State policy governing the distribution and decentralization of computing capacity within State government. Distributed systems include the assignment of some portion of the agencies computing resources, data and management responsibility to subsidiary units such as field offices or regional headquarters. Although resources are distributed, overall control and direction for the information system is retained by the parent organization, and efforts are made to ensure that information flows and databases are fully integrated.

Decentralization, on the other hand, tends to be used in a more generic way when applied to information system management; inferring a greater degree of autonomy and the absence of strong central contol by the parent organization. A number of agencies

operate distributed systems today, but there is a perceived need to formalize the definitions and standards applied to distributed system designs.

Management Participation. Strategic planning requires the support and participation of senior management to be effective. Furthermore, there needs to be effective communication between technical managers and staff and other management personnel in order to promote information systems strategic planning. Although these requirements are generally acknowledged, the mechanisms for accomplishing them are less clearly defined. The Statewide planning process of the CIM will need to develop these mechanisms.

Dual Technology. The Department of Information Technology supports both an IBM and a Unisys mainframe computer system to support its agency customers. Although both systems have operated well in the past, there are significant overhead costs required to maintain two systems, and service billing rates for the Unisys users are higher than IBM users which creates differential budget impacts between agencies. Although consolidation of all agencies in one mainframe environment would be neither simple nor inexpensive, it may be appropriate for this step to be considered.

Table 1

AGENCY RESPONSES TO INFORMATION MANAGEMENT ISSUES SURVEY
(Ranked by Frequency of Priority Listing)

Issue Area	Top Priority	In Top Three Priorities
Data Sharing	5	12
Telecommunications	5	10
Procurement	3	7
Disaster Recovery/Security	4	6
Management Participation	4	6
Technical Research	2	5
Budget Planning/Funding	1	4
Decision Support Systems	1	4
Distributed Policies	0	4
Dual Technology	0	4
Technical Training	1	3
Systems Development Quality Control	0	1

Notes:

Responses were received from 44 of 69 agencies surveyed. Not all respondents elected to prioritize issues or gave all issues equal weight.

Additional issues receiving limited mention were: recruitment, retention and classification of technical staff (one agency), and access to public data networks (one agency).

INFORMATION TECHNOLOGY ENVIRONMENT
AN OVERVIEW

State government in Virginia is a large, complex organization consisting of some 124 agencies and institutions of higher education, employing approximately 101,000 people. The annual budget of the Commonwealth is over $11 billion and would rank Virginia among the Fortune top 50 if the State government were a private corporation. Although total information technology spending in the State is less than five percent of the budget, the capabilities of its information systems are instrumental to the effective operation of State government.

Information Budget. Direct budgeted expenditures for information technology are planned at over $384 million during FY 1989 (Figure 2). These amounts do not include substantial research and grant funding which will be received and used throughout the fiscal year, particularly in institutions of higher education.

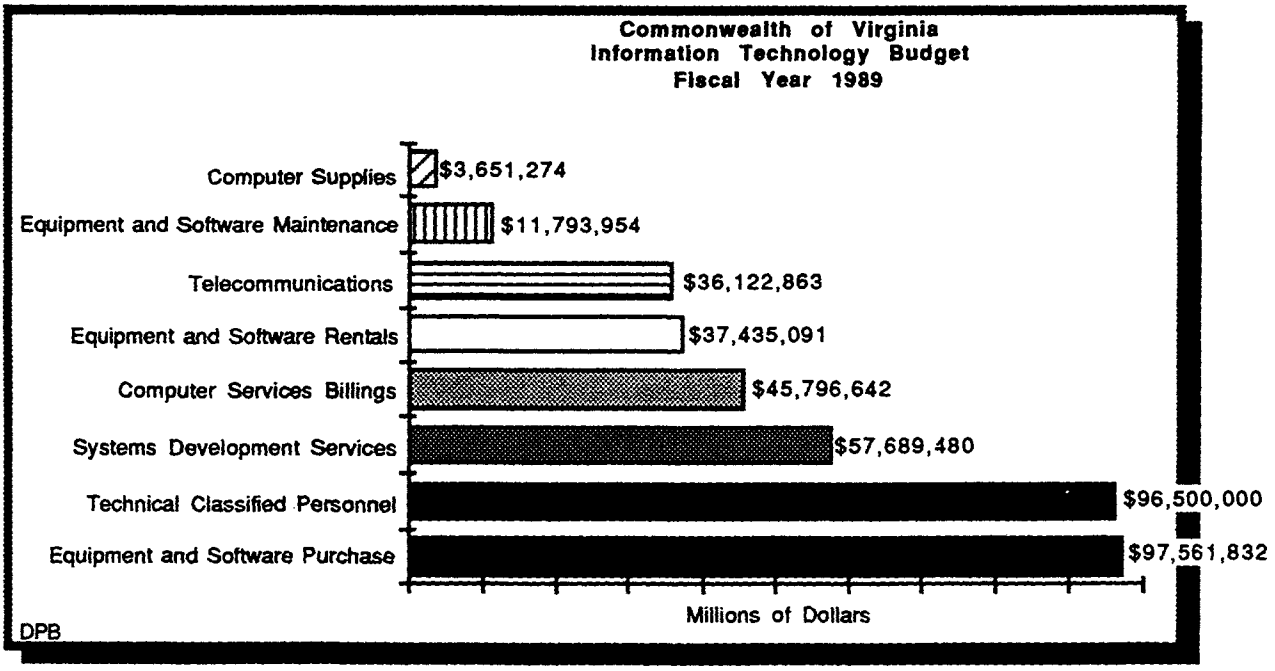


Figure 2

Spending for indirect cost items such as utilities, facility space, and management and nontechnical staff support can only be estimated. One recent study by the Diebold consulting group found that large private sector firms spend an amount equal to 50 percent of their direct information technology costs for related, indirect, activities. If this pattern were considered representative, Virginia could be spending as much as $570 million for information technology during FY 1989.

Table 2 lists the eighteen agencies and institutions with the largest information technology budgets. Again, these are direct budgeted costs and cannot be considered to reflect total spending for information systems support.

Commonwealth of Virginia
Information Services Budget by Agency
Fiscal Year 1989

	Budget	Percent of Total Budget
University of Virginia	$34,022,015	8.9%
Virginia Tech	$30,192,182	7.9%
Department of Transportation	$22,070,200	5.7%
Department of Information Technology	$19,053,772	5.0%
Virginia Commonwealth University	$15,345,134	4.0%
Department of Social Services	$15,143,097	3.9%
Community College System	$11,228,890	2.9%
Department of Motor Vehicles	$11,000,985	2.9%
Department of Medical Assistance Services	$10,134,260	2.6%
State Health Department	$9,880,860	2.6%
Department of Corrections	$8,687,349	2.3%
Old Dominion University	$8,539,759	2.2%
Virginia Employment Commission	$6,326,839	1.6%
Department of State Police	$5,890,663	1.5%
Department of Taxation	$5,592,409	1.5%
State Corporation Commission	$5,458,353	1.4%
Department of Accounts	$5,300,662	1.4%
Department of Mental Health	$5,140,622	1.3%
TOTAL	$229,008,051	59.6%

Table 2

Staffing. As of December, 1988, there were 2,361 classified technical positions assigned to information technology work in State government at a budget cost of approximately $96.5 million annually in salary and fringe benefits (Figure 3).

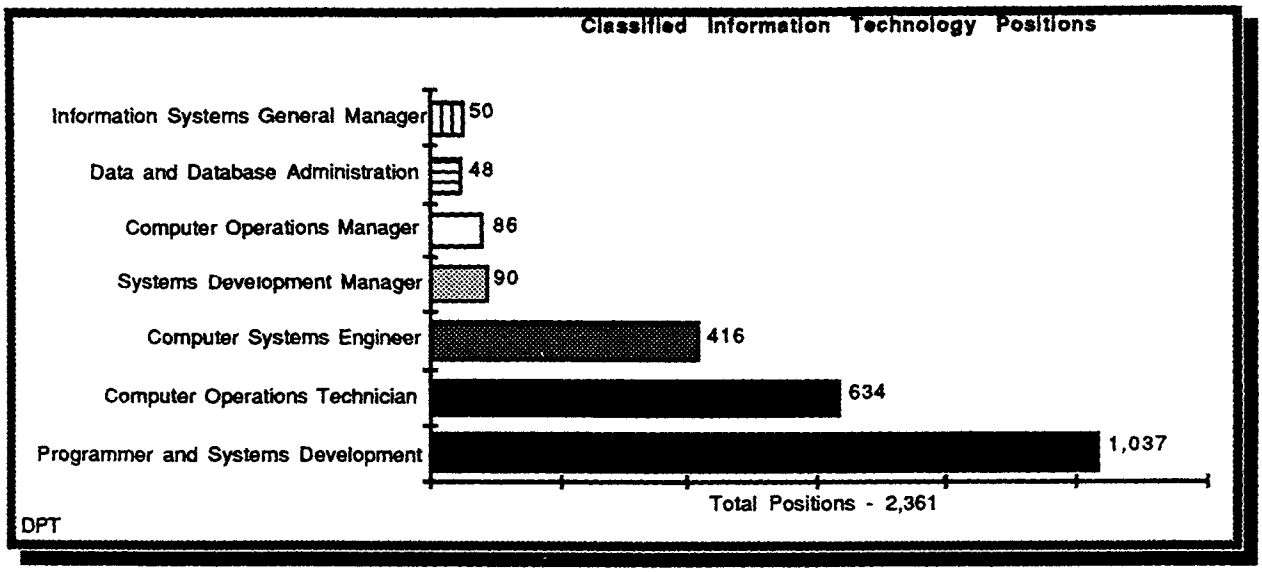


Figure 3

Of these positions, 48 percent are employed in computer systems operations and engineering, and a similar percentage work in the development and maintenance of software applications. Two percent are classified in data administration and data base management jobs, with two percent in general management positions at DIT or in agencies.

In addition to the classified service, a large number of the State's teaching and research faculty are employed in information technology fields.

Networks. Virginia's State government is highly decentralized with 76 percent of the total State employment located outside of the Richmond metropolitan area (Figure 4).

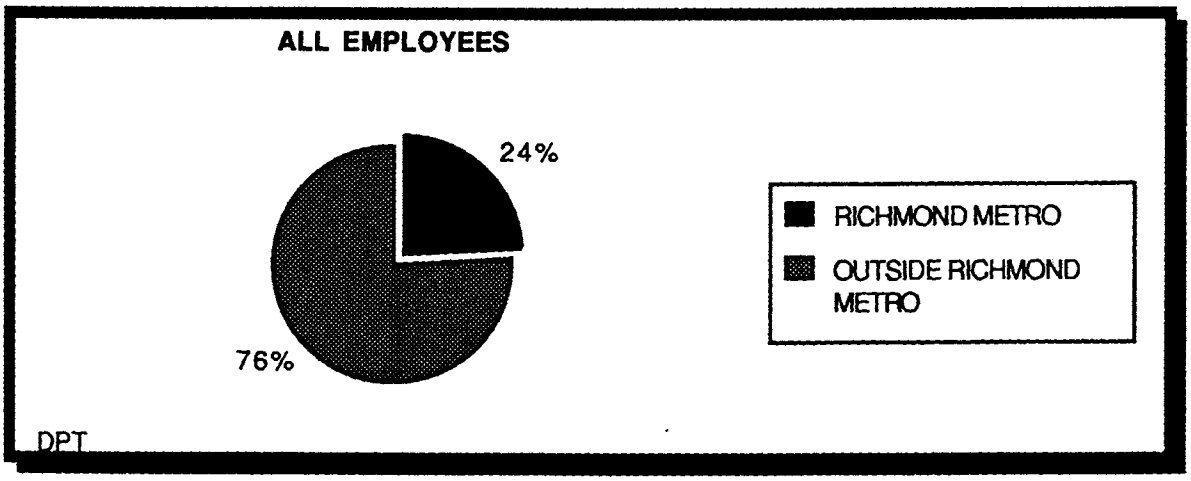


Figure 4

The State is heavily dependent on telecommunications technology to network government offices and institutions together efficiently. One consulting firm advised the JLARC recently that the State consumed 7 million minutes of voice telephone service each month and used 15,000 miles of data communication circuits to tie together over 3000 facilities across Virginia. In addition, microwave and satellite communication links are used by several agencies and universities for educational programming and administrative support.

The technologies used to operate State networks are varied. For example, the communications protocols used by various agencies and institutions include SNA/SDLC (IBM), DECNET (DEC), UNISCOPE (UNISYS), X.25 (HP), and other asynchchronous and bisynchchronous protocols. Several of the larger universities are installing sophisticated local networks to route voice, data and video communications around the campus.

Equipment. According to the latest inventory data available, 28 agencies and 16 educational institutions operate a total of 107 departmental or mainframe computer systems (Figure 5).

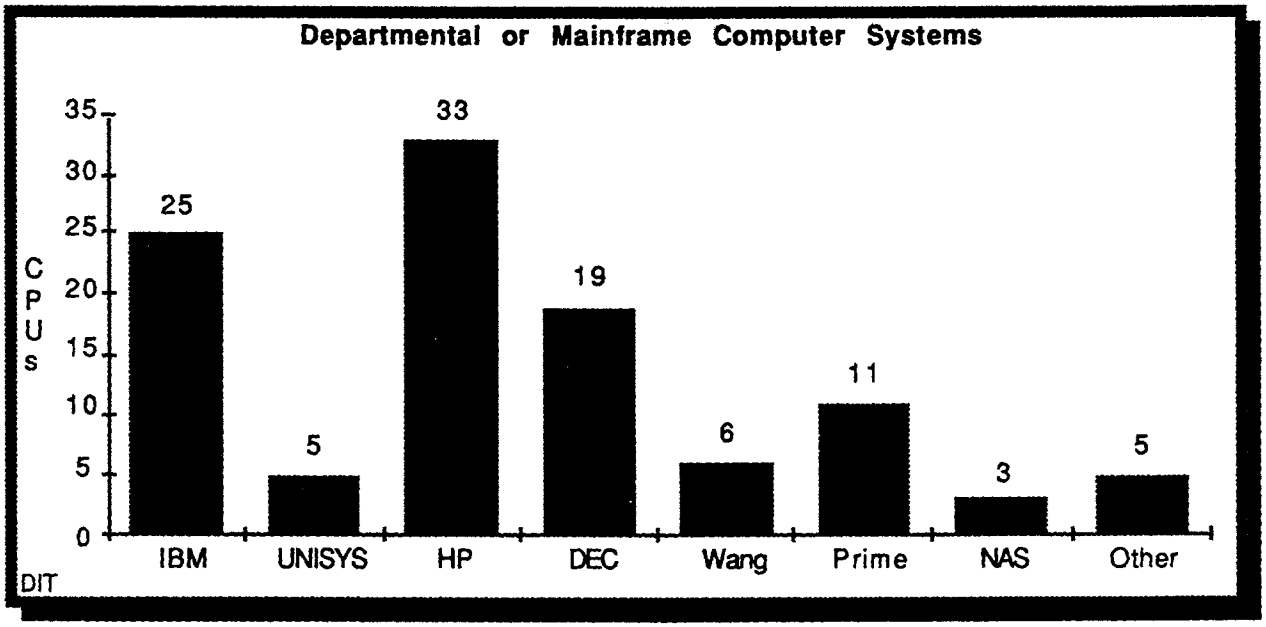


Figure 5

For the purposes of this report, "departmental" and larger computers are considered to include everything except micro (personal) computers. Changes in technology are making these distinctions less meaningful because the processing power of microcomputers can exceed by a large margin the capabilities of some departmental systems. Although DIT estimates that there may

be as many as 27,000 microcomputers in State government today, inventories of these systems are not readily available. The Department of Accounts has been asked to assist in extracting the necessary data from the State fixed asset accounting system.

Software. The term software includes computer programs which both operate the hardware and networks, and perform automated tasks for agency and institutional staff. The State today uses a large number of different software products and operates thousands of custom-designed programs developed by State employees or consultants. Of particular interest today are the various database management software systems used to maintain strategic information systems, including large installed systems using ADABAS, ORACLE, DMS 1100, IMS and IMAGE. The ability, or lack thereof, for sharing data between these various systems is an important consideration.

INFORMATION TECHNOLOGY RESOURCE PLANNING
PROPOSED PROCESS

Information technology resource planning involves translating organizational objectives into information requirements, and from these requirements, developing a plan to meet both short term and long range needs. Applying this process to a complex environment such as State government requires a carefully structured, well-orchestrated approach that involves the right participants at the proper points in the process. The scope of the effort should be both broad enough to adequately identify the needs for data-sharing and communication across the organization, and deep enough to address the needs of the organization at all levels: strategic, tactical, and operational. Such a comprehensive effort dictates an incremental approach to planning with the strategic phase providing the framework for the development of long-range tactical plans, action plans and budgets, and management plans (Figure 6).

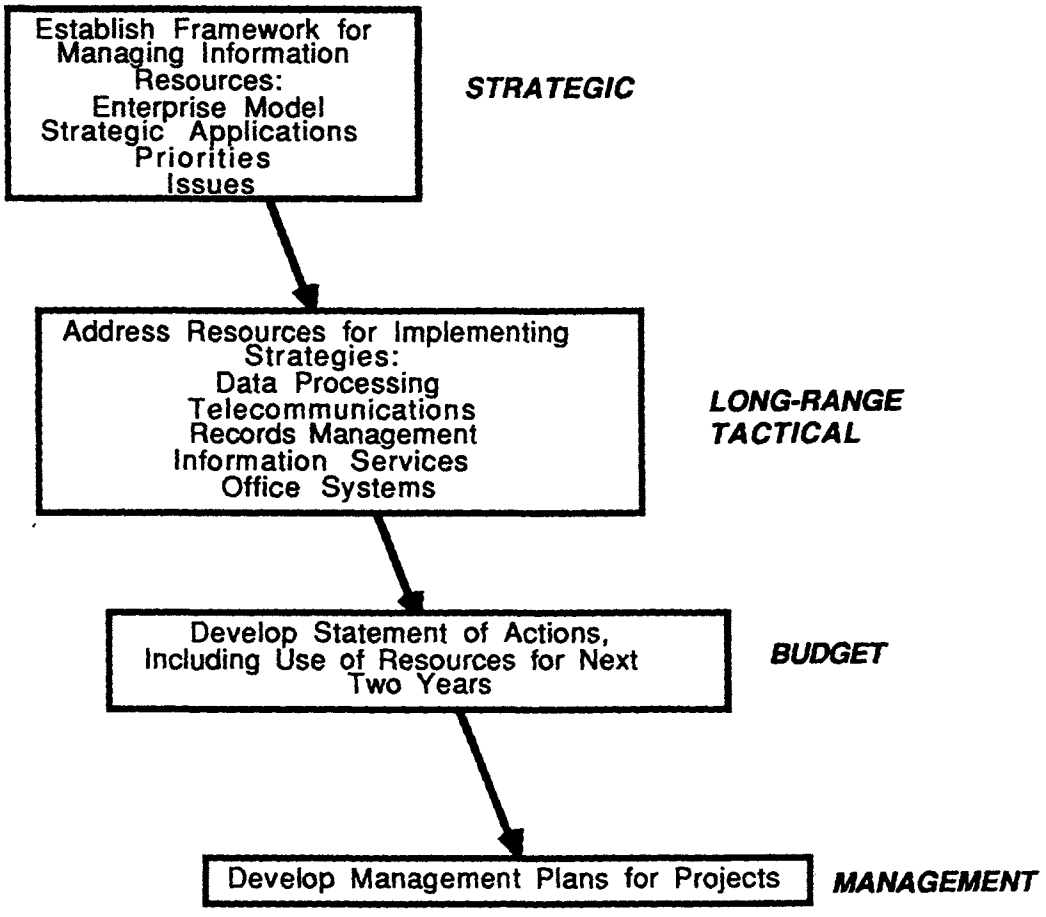


Figure 6

Moreover, the planning process to be developed by the Council on Information Management must operate at two distinct levels, each of which will incorporate these four components (Figure 7).

Information Technology Resource Planning Process

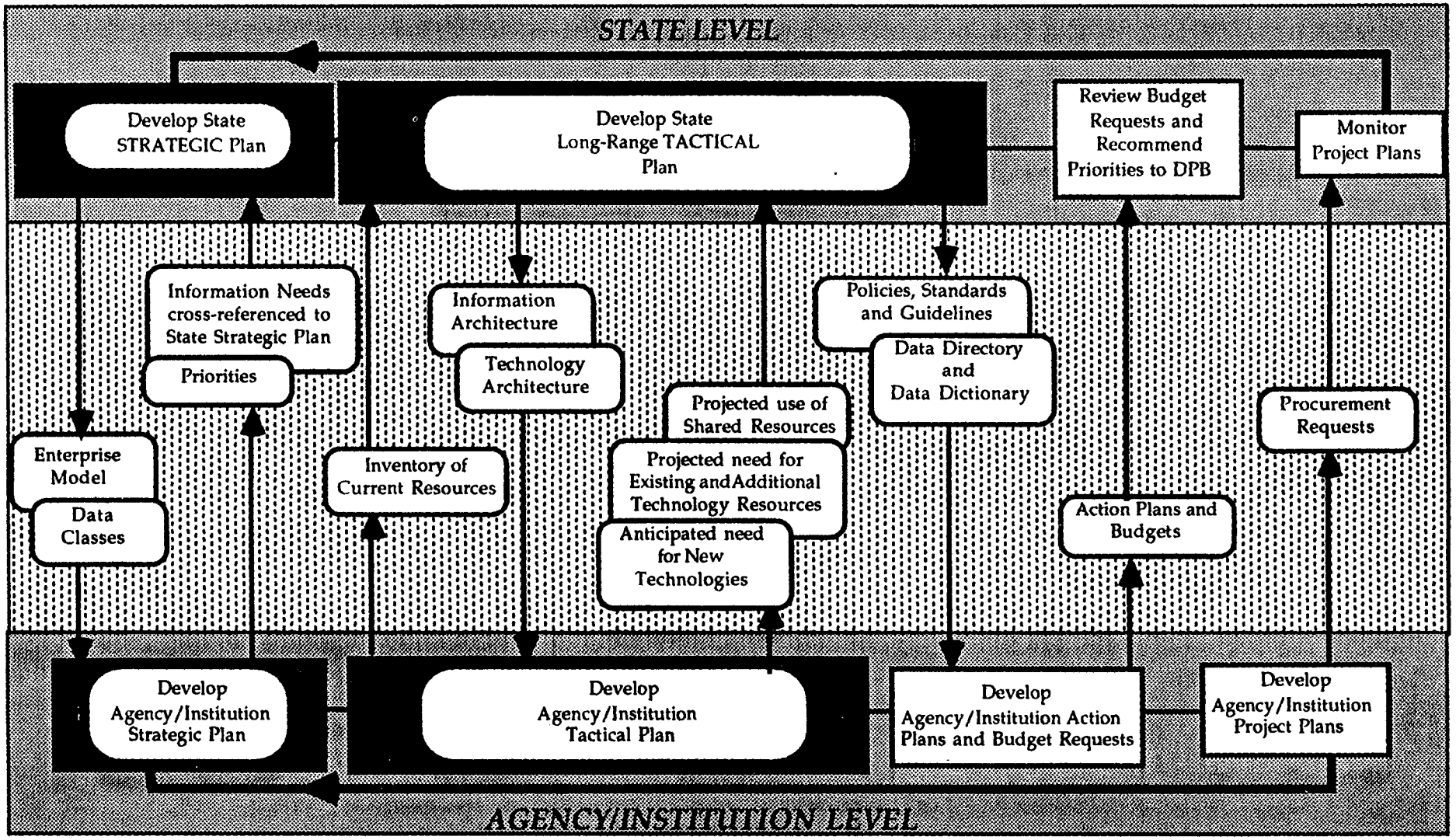


Figure 7

The CIM is required by law to develop and promulgate a Statewide Plan for Information Technology Resources in State government. Of necessity, this Plan must focus on high-level, strategic considerations to be effective. Strategic planning mandates a long-term view, and most states engaged in this type of information resource planning operate on a three to five year time horizon.

The CIM must also provide direction to agencies and institutions for the development of their information management plans. These plans also must adopt a strategic view, but one focused on that agency's or institution's mission, goals and objectives. Not all components of an individual agency or institutional plan will be incorporated into the Statewide Plan; in fact, the CIM will need to exercise discipline to avoid overburdening the Statewide Plan and reducing its effectiveness.

The objective is to develop a Statewide Plan that will provide the framework for the orderly migration towards data sharing and the use of shared and/or compatible resources. This will include defining standards for computer equipment (all sizes and power ranges), systems software (operating system and utilities), application software (applications and databases), telecommunications (voice/data/video), records management (data storage and file retention), and office systems (productivity tools and local area networks). Agencies and institutions will develop finer-grained long-range plans which fit within this framework.

Proper sequencing of the planning activities will allow the development of agency and institution plans concurrent with the development of the Statewide Plan. Products from each level will be exchanged throughout the first two phases of the planning process to ensure integration and coordination. The final Statewide Plan will reflect the needs, priorities, and technology environments of the agencies and institutions, and, likewise, the agency and institutional plans will be aligned to the strategies, directions, and architectures set forth in the Statewide Plan.

During the last two phases of planning, the CIM will provide an oversight function. Agencies and institutions will develop action plans and budgets which address the deployment of resources over a two-year time period, and the CIM will recommend budget priorities based on the priorities and strategies set forth in the Statewide Plan. Procurement requests will be reviewed by the CIM to ensure conformance with plans at both levels.

Strategic Planning. The strategic planning phase focuses on issues, directions, and priorities; crucial to the success of this phase are a strategic vision and a thorough understanding of State government. Planning participants must have a sophisticated understanding of the mission and organization of State government

and its agencies and institutions, and they must also be in a position to apply policy considerations to the ranking of information needs. For this reason, strategic planning may not be delegated - it must be driven by top management.

The planning methodology must provide for the analysis of information needs from the general management view of State government, focusing on information as a valuable, dynamic resource which supports and underpins the formulation and implementation of strategies. The foundation for this phase of planning is a comprehensive enterprise analysis. In enterprise analysis, processes are identified and defined along with the organizational units and the general categories of data (entities) that support these processes.

The product of the enterprise analysis is an enterprise model (Figure 8) which summarizes relationships in a series of matrices.

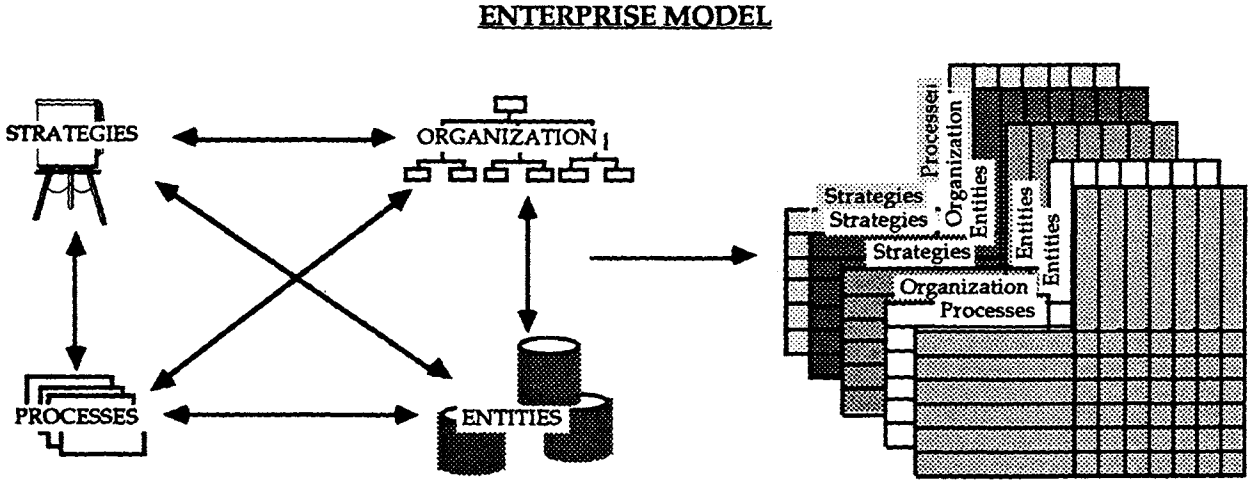


Figure 8

The most important matrix relates data entities to processes. It indicates data sharing requirements across processes, identifies data that is necessary but either unavailable or insufficient for use, and establishes the groundwork for data policy formulation, including data integrity responsibility. Matrices which map strategies to processes, organization and entities indicate priorities.

As shown in Figure 9, State-level strategic planning will produce an enterprise model and data catalog which can be used by agencies and institutions in the development of their information resource plans.

Strategic Planning Process

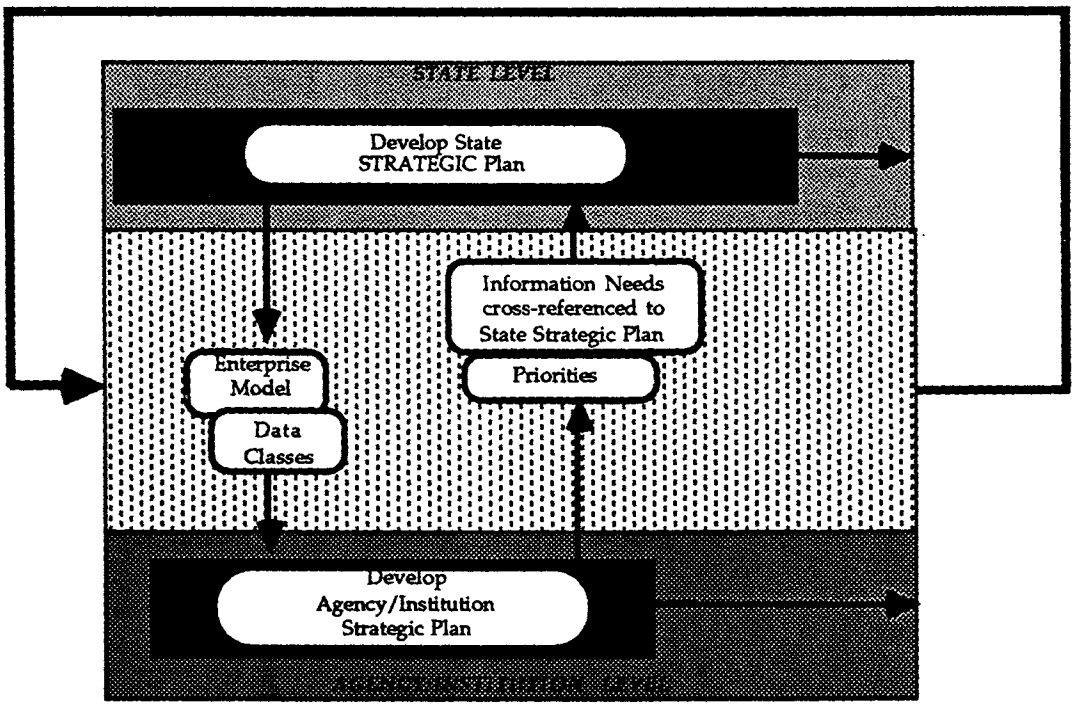


Figure 9

Agencies and institutions must develop enterprise models and define information needs to fit within the larger framework of the State model. This will facilitate the incorporation of agency and institution needs and priorities into the Statewide Plan. As data needs are catalogued, a comprehensive picture of the need for data sharing will emerge, and the foundation for State-level data administration will be laid.

The products of this phase are:

1. An overview of the organization and its information and communication requirements (Enterprise Model).

2. A list of strategic applications based on a preliminary analysis of data sharing needs.

3. A summary of the issues, directions and strategies for information resource management with a discussion of priorities.

This phase must be revisited on an annual basis.

Tactical Planning. This phase focuses on how to implement the

strategies identified in the first phase. The tactical plan provides the framework for data base and application system development, defines the standards for technology, and addresses the resources required to implement the planned objectives over a three to five year time period. Future requirements for resources and services are developed from an assessment of the current installed base and an analysis of the resources required to meet the planned objectives. Information resource specialists and MIS managers have the primary responsibility for developing this phase of the plan.

The tactical planning methodology must refine the strategic plan into an information architecture (logical) and a technology architecture (physical) and address the resources required to implement both. Underpinning this phase is a comprehensive environmental analysis which, along with the enterprise analysis, is prerequisite to the development of the architectures (Figure 10).

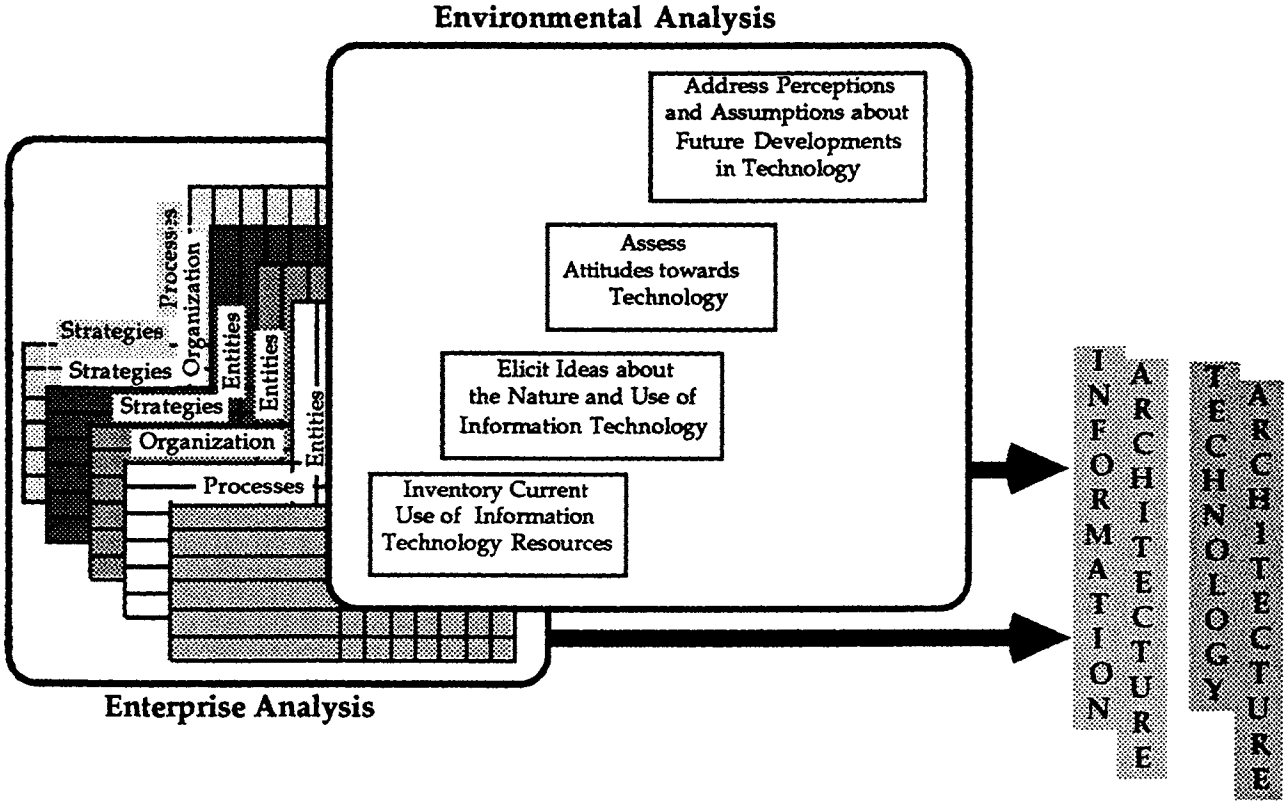


Figure 10

The methodology must synthesize the results of each analysis to formulate recommendations for the use of information technology, The information architecture deals with information needs. It logically groups the processes that must be automated to form a

system and defines the subject data bases that are used by these processes (Figure 11).

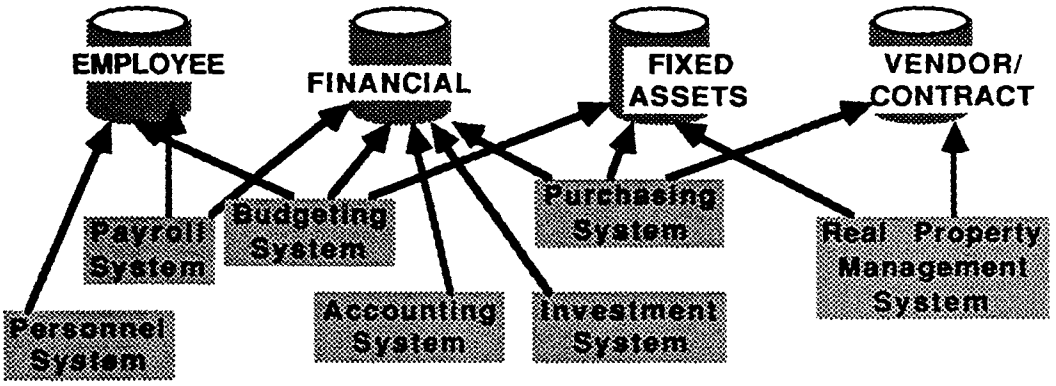


Figure 11

The technology architecture provides the blueprint for connecting and sharing technology resources such as hardware, telecommunications networks, and database management systems.

An important component of the environmental analysis is an inventory of current resources which must include an applications portfolio describing current information systems and the technologies used to support these systems and a summary of the use of information technology resources by type of resource. Agency and institution long-range plans will provide the vehicle for establishing this inventory at the State level. These plans will also identify and quantify the need for shared resources and services and project the total need for resources over a three to five year time period.

Tactical planning at the state level must address several issues:

- Development of strategic systems
- Data administration
- Telecommunications
- Standards for data storage and records management policies
- Access to information services (internal and external)
- Office systems and inter-departmental electronic mail

Statewide tactical planning will produce policies, standards and guidelines for the use of data and technology, and a statewide data directory and dictionary.

Tactical planning controls must be developed to incorporate five levels of systems management: problem management, capacity planning, change management, configuration management, and service level agreements.

Final plans at both levels must include:

1. A statement of the philosophy, mission and direction for information resources, its management and use

2. Overview of the organization and its information requirements (Enterprise Model)

3. Assessment of current information technology environment (environmental analysis)

   - Inventory of networks, applications, systems software, hardware, office systems, and personnel
   - Discussion of the state of technology, trends (external standards, emerging technologies, attitudes towards technology)

4. Information Architecture - blueprint for data base and application systems development

5. Technology Architecture - blueprint for physical connectivity and communications

6. Nature and scope of information technology resources required to implement the architectures

   -Personnel
   -DBMS Software
   -Development Tools
   -Communications
   -Systems Software
   -Information Services
   -Hardware Storage and Processing
   -Training and support

8. Implementation Plan - a timeframe and cost estimates for the implementation of goals, objectives and strategies with a statement of benefits after each major phase of implementation

9. Summary of Benefits - statements as to how the plan will

   -Improve productivity and effectiveness
   -Reduce costs
   -Increase income
   -Improve competitive advantage

10. Disaster Recovery/Security Plan

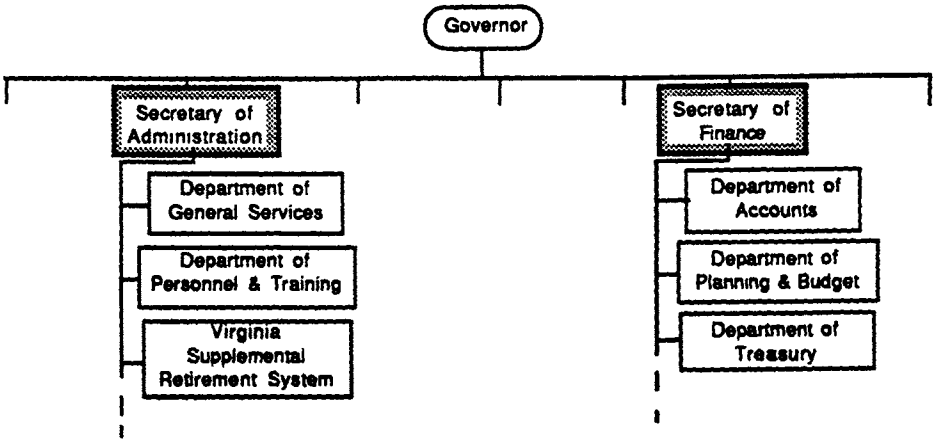
11. Tactical Planning Controls - a set of disciplines (and policies and procedures) to manage and control information processing.

AGENCY PROFILES

Preliminary Information

PURPOSE:

This section provides a profile of the information systems operated by each of the six central agencies covered in this study: Department of Accounts (DOA), Department of General Services (DGS), Department of Personnel & Training (DPT), Department of Planning & Budget (DPB), Department of Treasury (DOT), and Virginia Supplemental Retirement System (VSRS).



The Agency profiles are intended to:

- Provide preliminary descriptions of the information system mission and objectives of each agency.
- Chart current information system personnel functions.
- Identify existing information technology training programs.
- Inventory system software, hardware, and application programs.

Staff members of the Council on Information Management conducted interviews with MIS representatives of the six central agencies.

Topics of discussion included MIS support personnel, training, hardware, software, and application systems used to carry out the mission of the agency. Data used in the development of the inventory also included materials supplied by the Department of Information Technology (DIT), budget documents, and documents supplied by the agencies.

All divisions of the six agencies are included with the exception of the investment management function of VSRS. A determination will be made at a later date as to whether this function should be included within the scope of this study.

Staffing

The information systems staff of each of the agencies is shown on the chart below. Positions have been grouped according to major functions: management, development, operations, and data base administration. The data do not reflect contract or wage employees but does include positions which appear to have principal information systems responsibilities, although they may not carry technological classifications.

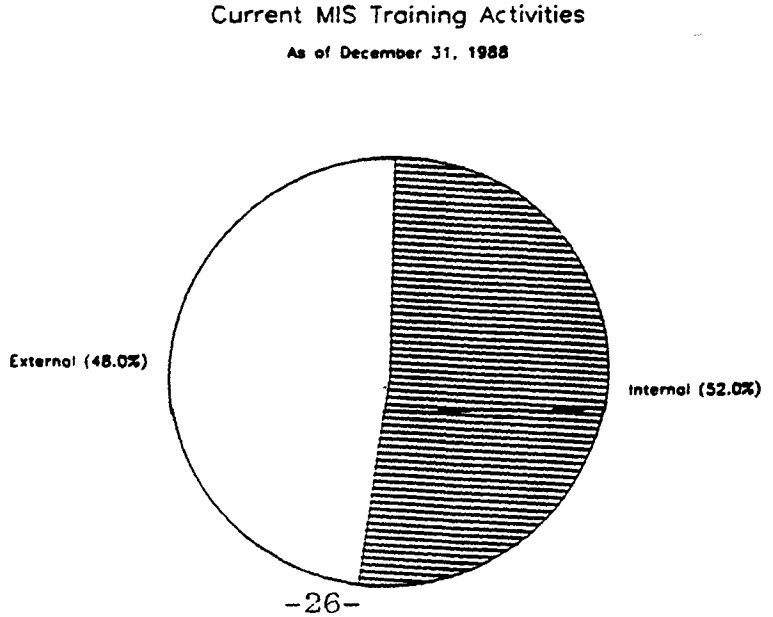
CURRENT INFORMATION TECHNOLOGY STAFFING

Classification	DOA	DGS	DPT	DPB	DOT	VSRS
Administrative Management	4	1	1	1	1	2
Development	14	9	2	5	0	7
Systems Analyst	4	4	2	1	0	1
Programmer Analysts	6	5	0	4	0	6
Programmers	3	0	0	0	0	0
Other	1	0	0	0	0	0
Operations	43	4	7	6	3	3.5
Engineers	4	1	0	1	0	1
Operators	6	2	4	3	1	2.5
Technicians	13	1	2	2	0	0
Data Entry	20	0	1	0	2	0
Data Base Administration	2	0	0	0	0	1

DPT and DOT relies entirely on DIT and outside contractors for systems development and maintenance support.

Training

Each of the agencies provides some form of training, both to MIS personnel and to systems users. Additionally, all take advantage of training from sources outside the agency, including DIT, and local universities as well as professional and commercial organizations.



Department of Accounts (DOA)

Information System Mission: To provide automated information technology support so as to ensure adequate accounting records are generated and maintained and appropriate financial reports and analyses are generated on an agency and statewide basis through the establishment of policies, systems and procedures that will ensure that the financial functions of financial accounting, financial management and compliance assurance are effectively executed in conformance with state and federal laws, administrative regulations, and general accounting principles.

DOA created Commonwealth Accounting and Reporting System (CARS-II), an online database system, to maintain the general ledger accounts and produce non-payroll warrants for the Commonwealth. All State agencies and institutions are required to submit information into CARS-II. Data entry is performed under outside contract for information submitted in hard copy.

All employees are in one of DOA's payroll systems. The Commonwealth Integrated Payroll/Personnel System (CIPPS) produces 55,000-60,000 payroll warrants and accounting information for CARS-II. The Central Payroll System handles 60,000-65,000 employees' warrants, including seven payrolls falling under mirror-image programs whereby tapes are submitted by agencies and institutions ready for warrant preparation to DOA. The Central Payroll System is being phased out by CIPPS. Post-auditing is done on both systems using tapes provided by DPT from PMIS.

The Fixed Assets Accounting System (FAACS) is a batch system created to provide complete plant, property and equipment records. FAACS also contains a lease subsystem. The system generates 5-6 million pages per month which is distributed to State agencies and institutions. Microfiche is produced for DPB. All State agencies and institutions are required to submit information for entry into FAACS. All systems utilize DIT's IBM central computer.

DOA uses its departmental computer for data entry and office automation with connections to DPB, LAS (Legislative Automated Services), the Secretaries' offices, and the State Internal Auditor.

The agency plans to increase capacity by installing an additional departmental computer (NAS 6650) to reduce the workload on existing equipment. A 40-station local area network (LAN) is planned for data entry and access to DIT and the current departmental computer. Multiple microcomputer software packages are being evaluated to establish a standard office software environment.

Commonwealth of Virginia
Agency Application Software Description Table
Department of Accounts (DOA)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-IBM								
Central Payroll System	Custom	15,000/day	0	300	IS	COBOL	Statewide	Generates the payroll for 60,000-65,000 employees. System is being phased out by CIPPS.
Commonwealth Accounting & Reporting Downloading System (CARDS)	Custom	n/a	30	5	ADABAS	COBOL Assembler	Statewide *	Provides summary CARS-II data by agency, for agency manipulation and reporting. CARDS is in a pilot testing phase.
Commonwealth Accounting and Reporting System (CARS-II)	Custom	30,000/day	225	290	ADABAS Sequential	COBOL NATURAL	Statewide	Maintains General Ledger Accounts for 232 agency cost centers. Handles the printing of non payroll type checks.
Commonwealth Integrated Payroll & Personnel System (CIPPS)	Package	25,000/day	1,020	900	VSAM	COBOL	Statewide	Generates payroll for 55,000-60,000 employees. System is being phased in as a statewide system.
Fixed Asset Accounting and Control System (FACCS)	Custom	6,000/day	0	458	VSAM	COBOL	Statewide	Records and maintains the Commonwealth's plant, property and equipment records.
MICROCOMPUTER APPLICATIONS								
NONE								
DEPARTMENTAL COMPUTER APPLICATIONS								
HOTPOTS System	Custom	n/a	10	0	IS	Assembler	DOA only	Provides the ability to track audit reviews and comments.
WATCHMIN System	Custom	360/week	50	5	IS	COBOL	DOA only	Maintains employee time keeping records.
Word Processing	Package	n/a	n/a	n/a	n/a	WP-PLUS	DOA only	Uses PC's as terminals connected to DOA's Wang departmental computer to handle 95% of the agency's word processing needs.

* Only available to agencies with SNA/SDLC protocols

Department of General Services (DGS)

Information System Mission: To provide automated information technology support so as to provide support services to other state agencies and local political subdivisions where appropriate; assist in the administration of the Capital Outlay Budget; and provide for the efficient management of the fixed assets of the Commonwealth.

Overview: DGS, created through a merger of four pre-existing support service agencies, is comprised of six divisions - Consolidated Laboratory Services, Risk Management, Administrative Services, Engineering and Buildings, Purchases and Supplies, and Mapping.

Information Systems Services (ISS) provides data processing services utilizing the Hewlett-Packett (HP) departmental computer for Administrative Services, Consolidated Laboratory Services, Risk Management, and Engineering and Buildings.

Purchases and Supplies is the central purchasing agency for materials, equipment and supplies required by State agencies and institutions. This Division manages the Vendor and Supply System containing names of vendors and the Contracts System containing awarded contracts. Contracts for non-computer-related equipment and supplies of items not on state contract by law are managed through Purchases and Supplies; however, delegated authority has been given to some institutions of higher education.

ISS provides central word processing and spreadsheets using HP3000 and IBM 5520 computers.

ISS does their own development and maintenance; however, Purchases and Supplies uses DIT's contractual staff.

Plans are to allow agencies to have on-line access to the Contracts System and to provide for automated purchase order preparation. Approximately 70 microcomputers are planned for purchase over the next five years. The plan for these microcomputers is to provide Engineering and Buildings Division with office automation and access to internal databases. This is necessary due to lack of vendor support for the IBM 5520. Information Systems Services plans to migrate applications from its HP3000 to a recently installed HP950. Plans are to utilize the HP3000 for office automation.

Commonwealth of Virginia
Agency Application Software Description Table
Department of General Services (DGS)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-IBM								
Central Warehouse System	Custom	2,340/day	80	35	VSAM	COBOL	DGS only	Supports the inventory, purchasing, accounts receivable and accounts payable central warehouse functions.
Contract System	Custom	856/day	150	35	VSAM	COBOL	DGS only	Used in the preparation of contract bids and awards. (250-300 active contracts)
Scheduled Purchasing System	Custom	87/day	26	19	ADABAS	Natural	DGS only	Assists in the production of purchase orders for the monthly purchase of large quantities of meat, eggs, etc., used by state institutions (250 purchase orders per month).
Spot Purchase System (SPS)	Custom	1,760/day	20	17	VSAM	COBOL	DGS Agency Inq	Used for management decision making and for the production of documents in the spot purchasing contracts area.
State Surplus Property System (SSPS)	Custom	448/day	115	5	ADABAS	Natural	DGS only	Provides automated support to management in the transfer and sale of state surplus property.
Vendor Entry & Supply System	Custom	460/day	80	6	VSAM	COBOL	DGS & 8 agencies for Inq.	Maintains data on 13,000 vendors used in automated vendor selection for contracts and spot purchases. Contains the ability to track and report on complaints on DGS vendors.
MICROCOMPUTER APPLICATIONS								
Federal Surplus Property System (FSPS)	Custom	125/day	113	30	METAFILE	METAFILE	DGS only	Supports the inventory, billing and the functions of the State's Federal Surplus Property Program.
Spread Sheet	Package	n/a	n/a	n/a	n/a	EXCEL LOTUS 123	DGS only	Uses personal computers to provide staff with spread sheet capabilities. There are currently 37 packages in use.
Word Processing	Package	n/a	n/a	n/a	n/a	MS WORD MULTIMATE WP NBI	DGS only	Provides word processing using several PC based packages on stand alone personal computers. There is some limited use of the HP WORD/3000 on DGS's departmental computers.

Commonwealth of Virginia
Agency Application Software Description Table
Department of General Services (DGS)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
DEPARTMENTAL COMPUTER APPLICATIONS								
Drinking Water System	Custom	600,000/year	25	75	IMAGE KSAM	COBOL POWERHOUSE	DGS only	Records, tracks and reports on drinking water samples submitted for analysis, including the monitoring of fees.
Equipment Inventory System	Custom	3,000/year	3	22	IMAGE	COBOL	DGS only	Handles the recording and reporting of all DGS fixed assets.
Fiscal System	------	----------	---	---	------	-------	--------	Collects financial accounting, budgeting, purchasing and supplies inventory information. Uses a report generator for ad hoc and scheduled reports.
o DGS Procurement	Custom	350,000/year	107	107	IMAGE	COBOL POWERHOUSE	DGS only	Used to support the procurement process.
o DGS Stockroom Inventory	Custom	100,000/year	12	12	IMAGE	COBOL POWERHOUSE	DGS only	Used to support the inventory control and and inventory reporting processes.
o HP Budget	Package	1,000,000/year	n/a	n/a	IMAGE	n/a	DGS only	Used to support the budget process.
o HP Financial Accounting	Package	350,000/year	n/a	n/a	IMAGE	n/a	DGS only	Records general ledger, accounts payable and accounts receivable information.
HP Maintenance Management	Package	250,000/year	n/a	n/a	IMAGE	COBOL POWERHOUSE	DGS only	Used for planning, scheduling, and the recording of most facilities maintenance functions.
Library System	Custom	2,000/year	1	14	IMAGE	COBOL	DGS only	Maintains an inventory of books and periodicals acquired by DGS.
Newborn Screening System	Custom	1,200,000/year	11	32	IMAGE	COBOL	DGS only	Used to record and report on patients, submitters, samples, tests, retests, etc, of blood samples from newborn infants.
Personnel System	Custom	26,000/year	44	133	IMAGE	COBOL POWERHOUSE	DGS only	Maintains the personnel records of all DGS employees, produces status exception reports for personnel management. Uses a tape input from the PMIS system.

Commonwealth of Virginia
Agency Application Software Description Table
Department of General Services (DGS)
December 31, 1988

(Page - 3)

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
DEPARTMENTAL COMPUTER APPLICATIONS (continued)								
Project Administration System	Custom	40,000/year	12	38	IMAGE	COBOL POWERHOUSE	DGS only	Provides time and project tracking and the corresponding reporting.
Property Insurance System	Custom	350,000/year	5	45	IMAGE	POWERHOUSE	DGS only	Records, monitors and reports on insurance information for Commonwealth facilities.
Recruiting System	Custom	100,000/year	5	45	IMAGE	COBOL	DGS only	Tracks, monitors and reports on DGS's hiring and recruitment activities.

Department of Planning and Budget (DPB)

Information System Mission: To provide automated information technology support so as to provide advice and analytical services in planning, policy development, budgeting, and evaluation for the Governor and Secretaries and other governmental officials.

Overview: DPB is responsible for developing the budget for the Commonwealth and provides State agencies and institutions with the ability to create and execute budgets. PROBUD (Program Budget) was designed and developed in 1979-83 solely as a batch system operating on DIT's IBM central computer to produce budget documents. On-line PROBUD, created later, is used for data entry and editing of budget information. The primary users of PROBUD are DOA and DPT. Budget information is input to CARS II via daily transfer of files from PROBUD. Appropriated position information is extracted from the budget for use in PMIS.

Agencies and institutions can elect to submit budget information to the PROBUD Master Files by using the microcomputer Budget Entry And Report System (BEARS). Fiscal analysts use special programs in SAS, SPSS, or LOTUS 1-2-3 to examine budget data retrieved from DIT's central computer.

The Agency performs office automation processes on its departmental computer and produces the budget document by a text and data merger process.

A database management system program is being developed in ORACLE by the Department of Education (DOE) as a cost-effectiveness forecast model for standards of quality in education. Because of budget implications, DPB will maintain the system on its departmental computer. The Agency is attempting to locate a user for its disconnected Wang VS85.

Commonwealth of Virginia
Agency Application Software Description Table
Department of Planning and Budget (DPB)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-IBM								
Program Budgeting (PROBUD)	Custom	10,000,000/month	0	120	VSAM	COBOL	Statewide	Maintains the Commonwealth's budget. Uses report writer to generate reports. The system contains 250,000 records in the budget master file, 150 data elements, 1000 byte records. Data entry is done through the Wang departmental computer.
PROBUD Report Generation	Package	n/a	n/a	150	VSAM	SAS DIAL-2	DPB only	Uses package software to create defined and ad hoc budgeting reports from the PROBUD budget data master and execution master files.
On-line Program Budgeting (OL-PROBUD)	Custom	1,600,000/year	77	3	ADABAS	Natural	Statewide	Used to maintain budget recommendations. Provides on-line agency access for the submission of budget data that is used to update the PROBUD data master files.
Statistical analysis	Package	n/a	n/a	n/a	n/a	SAS SPSS-X APPENDIXM	DPB only	Uses statistical packages to analyze the budget data and to make projections. Outputs from these packages can be down loaded to the departmental and/or PC's for other processing (graphics, spread sheets, and word processing/desktop publishing).
MICROCOMPUTER APPLICATIONS								
Desktop Publishing	Package	n/a	n/a	n/a	n/a	PAGEMAKER MACDRAW MACPAINT EXCEL MS-WORD CRICKET GRAPHS CRICKET DRAW	DPB only	Produces camera ready outputs using 3 Macintosh PC's, that meet most of DPB's desktop publishing requirements. These Macintosh personal computers can be linked to the WANG departmental computer via dial up capabilities.
PC Budget Entry & Report System (BEARS)	Custom	40,000/year	12	0	DBASE III+	DBASE III+	Statewide	Provides on-line menu driven data entry capabilities for PC's. Diskettes can be submitted for update to the PROBUD data master files. Seven (7) agencies were used as pilot test sites in 1988.

Commonwealth of Virginia
Agency Application Software Description Table
Department of Planning and Budget (DPB)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
MICROCOMPUTER APPLICATIONS (continued)								
Spread Sheet	Package	n/a	n/a	n/a	n/a	LOTUS 123 20-20	DPB only	Uses both the PC based and the WANG departmental based computers to provide staff with spread sheet capabilities. Most staff have the LOTUS package and are or can be connected to the departmental computer. Data can be transferred between these environments, as well as accepted from the central computer statistical packages listed above.
Word Processing	Package	n/a	n/a	n/a	n/a	WANG-WP	DPB only	Uses both the PC based and the Wang departmental based WANG-WP packages. Most of the 40 PC's are connected to the WANG departmental computer.
DEPARTMENTAL COMPUTER APPLICATIONS								
DPWP Merge	Package	900,000/year	n/a	n/a	n/a	COBOL WANG Utilities	DPB only	Provides the ability to combine, sort, and merge files from PROBUD with text files on the WANG departmental computer (using WANG-WP) to produce the State's Budget Document.

Department of Personnel and Training (DPT)

Information System Mission: To provide automated information technology support so as to establish an effective personnel management system for state government in the balanced best interest of employees, government management, and the citizens of the Commonwealth.

Overview: DPT makes exclusive use of the latest UNISYS (Sperry) mainframe technology. DPT is responsible for the overall management of the Commonwealth's Personnel Management Information System (PMIS). PMIS is a real-time data base system that resides on DIT's central computer. Other state agencies and institutions access the PMIS system via a telecommunications network. All DPT applications are integrated with the PMIS system. These include position description, benefits, recruiting, training, personnel evaluations, employee suggestions, and the extraction of PMIS related data needed to interface with other state systems and other state agencies and institutions. Transfer of PMIS data is normally handled via tape exchanges.

DPT utilizes personal computers throughout the organization, with more than half of these computers also serving as terminals to access the DPT central computer applications. The word processing/desktop publishing functions are handled using personal computers and word processing packages. DPT has made the decision to purchase IBM or compatible desktop publishing packages. Several other PC packages are used to create graphics and charts for use in DPT publications and presentations. The Office of Equal Employment Services makes extensive use of spreadsheet packages in preparation and analysis of equal employment opportunity statistical information. IBM and compatible microcomputers using MS-DOS operating system have been chosen as DPT's standard personal computer platforms.

DPT used approximately eleven full-time contract staff during the last year, and has averaged over six full-time contract staff over the last nine years for application support purposes.

DPT is currently planning to obtain the use of a text data base management system to support the employee position description function for 90,000 positions.

Commonwealth of Virginia
Agency Application Software Description Table
Department of Personnel and Training (DPT)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-SPERRY								
Benefits Enrollment System	Custom	25,000/month	10	7	DMS1100	COBOL	Statewide	Maintains insurance carrier and employee dependent data on state employees who are receiving health insurance.
Employee Evaluation System	Custom	17,600/month	12	20	DMS1100	COBOL	Statewide	Provides pay for performance monitoring and evaluation capabilities for 80,000 employees.
Personnel Data Analysis System (PDAS)	Custom	n/a	0	3	MAPPER	MAPPER	Statewide	Transfers PMIS personnel data to MAPPER files for agency user use and reporting. Ad hoc report generator system.
Personnel Management Information System (PMIS)	Custom	80,000/month	165	800	DMS1100	COBOL MAPPER	Statewide	Maintains information on all classified personnel records (90,000 positions, and 84,600 current/former employees)
Recruit	Custom	30,000/month	7	10	DMS1100	COBOL	Statewide	Used to support State job postings. Over 1,200 copies/500 positions sent weekly.
SCATS Telephone Directory	Custom	n/a	0	6	DMS1100	COBOL	DPT only	Provides PMIS data that is used by DIT to publish the SCATS telephone book.
Suggestion Award System	Custom	3,600/year	6	3	MAPPER	MAPPER	DPT only	Provides statistical reports on the status of employee suggestions.
Training Records System	Custom	2,000/year	12	10	DMS1100	COBOL	Statewide	Used to create/manage course registers. Allows agency inquiry and update.
MICROCOMPUTER APPLICATIONS								
State Employee Assistance Program	Custom	200/month	1	4	PFS:Prof File	PFS:Prof File	DPT only	Provides statistics/reports on employees who need assistance on substance abuse.
Spread Sheet	Package	n/a	n/a	n/a	n/a	LOTUS-123	DPT only	Used extensively for EEO data reporting and manipulation.
Word Processing	Package	n/a	n/a	n/a	n/a	PFS:Prof Write WORD PERFECT	DPT only	Uses personal computers to provide staff with word processing capabilities.
DEPARTMENTAL COMPUTER APPLICATIONS								
None								

Information System Management: To provide automated information technology support to conduct Treasury operations and programs so as to maximize invested cash balances and earnings on investments; generate the maximum amount of unclaimed property and escheat revenues; provide professional financial advisory and debt issuance services to the Commonwealth and certain of its political subdivisions and authorities; and receive, maintain custody of and disburse all State funds.

Overview: DOT serves as custodian and trustee of Commonwealth funds. Two systems reside on the DIT IBM central computer: (1) Account Reconciliation System and (2) Unclaimed Property System.

A number of support applications, one with a large volume of transactions, are processed on the DOT departmental computer; however, development and maintenance are contracted outside the agency. Significant among them is the Demand Deposit Accounting System (DDAS) which serves as the Commonwealth's checkbook and the Literary Fund System where records of temporary and permanent loans to localities are maintained.

In response to the Secretary of Finance initiative calling for all finance agencies to communicate among themselves, the current departmental computer is in parallel testing and will be replaced by the newly acquired IBM AS/400.

Microcomputers are used for desktop publishing, spreadsheets and word processing. The AS/400 when totally operational will offer centralized office automation.

Commonwealth of Virginia
Agency Application Software Description Table
Department of Treasury (DOT)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-IBM								
Account Reconciliation System	Package	8,500,000/year	n/a	n/a	VTAM	n/a	DOT only	Provides the capability for on-line check reconciliation of all checks issued by the State against checks paid by banks. Used for stop payment/forgeries processes.
Unclaimed Property Database System	Custom	500/day	0	50	IMS	DL1 ADF	Statewide	Maintains information on holders/owners of unclaimed property. On-line inquiry with scheduled and ad hoc reporting.
MICROCOMPUTER APPLICATIONS								
Spread Sheet	Package	n/a	n/a	n/a	n/a	EXCEL LOTUS 123	DOT only	Uses personal computers to provide staff with spread sheet capabilities.
Word Processing	Package	n/a	n/a	n/a	n/a	MULTIMATE WORD PERFECT DISPLAYWRITE 4	DOT only	Uses personal computers to provide staff with word processing capabilities. When the AS400 departmental computer is fully operational (02/89) it will contain additional word processing capabilities.
DEPARTMENTAL COMPUTER APPLICATIONS (IBM AS400 will totally replace System 36 by July, 1989)								
Demand Deposit Accounting System (DDAS)	Custom	25,000/month	3	25	IS	S-36 COBOL	DOT only	Records deposits and disbursements by all agencies and institutions. Accounts for the Commonwealth's cash in its banks.
Cash Disbursement System	Custom	n/a	0	5	IS	S-36 COBOL	DOT only	Provides reports on cash disbursements.
Check Index System	Custom	12,000,000/year	3	10	IS	S-36 COBOL	DOT only	Maintains the index for microfilm based check retrieval information processing.
General Ledger Accounting System (GLAS)	Package	300/day	n/a	n/a	IS	RPG	DOT only	Used to account for the Commonwealth's trust funds in the custody of the State Treasurer. Monthly/yearly reports for distribution to agencies statewide. (System will be dropped July 1, 1989)
Insurance Collateral System	Custom	30/day	5	11	IS	S-36 COBOL	DOT only	Maintains information on collateral held for insurance companies.

Commonwealth of Virginia
Agency Application Software Description Table
Department of Treasury (DOT)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
DEPARTMENTAL COMPUTER APPLICATIONS (continued)								
Literary Fund (LFS)	Custom	30/week	18	14	IS	S-36 COBOL	DOT DOE	Records and accounts for temporary and permanent loans to localities from the Literary Fund.
Moneymax Investment Management System (MIMS)	Package	150/day	5 *	3 *	IS	RPG S-36 COBOL	DOT only	Used to account for the Commonwealth's investments and for reporting on the portfolio's performance. This is a time sharing system owned by Wismer, Assoc.
National Data Corporation (NDC)	Package	285/day	6 *	5 *	IS	RPG S-36 COBOL	DOT only	Collects deposit data from 1,025 field deposit locations for the concentration of funds in the State's five concentration banks. This is a contract service provided by NDC
Securities for Public Deposit System	Custom	200/month	6	10	IS	S-36 COBOL	DOT only	Maintains lists of securities held by the Treasury Board as deposit collateral.
Time Deposit System (TDS)	Custom	100/year	8	10	IS	S-36 COBOL	DOT only	Accounts for all time deposits held by banks used by the Commonwealth.

* Indicated programs numbers are custom inquiry/report programs added to the basic package by the Commonwealth.

Virginia Supplemental Retirement System (VSRS)

Information System Mission: To provide automated information technology support so as to administer the Virginia Supplemental Retirement System, State Police Officers Retirement System, Judicial Retirement System, Group Life Insurance program, and the Federal-State Agreement for Social Security coverage for state and local public employees in Virginia.

Overview: VSRS manages RIMS (Retirement Information Management System), an employee retirement accounting system used by 500 state and municipal employers. Information is submitted both electronically and manually. Operating on DIT's IBM central computer, interfaces exist with DOA, DMV, Social Security, and Health and Human Services. RIMS is used to produce refund and death benefits and tracks disability claims. Monthly retiree benefits payments are calculated in B-CAL (Benefit Calculations) and processed in RAPS (Retiree Annuitant Payroll System). All benefit payments are processed via tape to DOA and Life of Virginia.

The departmental computer (Nixdorf 6001) is used as a communications device for transmitting information to and from DIT. A computer-assisted microfilm system is used for locating non-automated files.

VSRS has developed as a pilot program a micro-based system which it makes available to employers to enable them to submit retirement information. Three systems, RAPS, B-CAL, and the Central Accounting System will be incorporated into RIMS.

The Investment Department is separate from Administration and funds are managed primarily through outside advisors.

Commonwealth of Virginia
Agency Application Software Description Table
Virginia Supplemental Retirement System (VSRS)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-IBM								
Benefits Calculation System (BCAL)	Custom	5,000/month	94	10	ADABAS	COBOL Natural Easytrieve	VSRS only	Maintains an inventory of all members for whom VSRS is currently processing retirement applications or estimates. Used to calculate actual or estimated retirement benefits at a point in time.
Central Accounting System	Package	50,000/month	0	32	VSAM	COBOL	VSRS only	Used as the automated general ledger to handle the accounting for employers and VSRS expenses. (Informatics Accounting IV package)
Retiree Annuitant Payroll System (RAPS)	Custom	200,000/year	3	65	VSAM	COBOL Assembler DYL280 Easytrieve	Statewide	Maintains demographic, payroll & history on all retired members. Generates 50,000 plus retiree monthly payroll payments.
Retirement Information System (RIMS)	------	----------	---	---	------	---------	---------	The integrated statewide VSRS database retirement system. See subsystems below:
o Correspondence Tracking Subsystem	Custom	2,500/year	6	7	ADABAS	Natural	Statewide	Tracks correspondence that requires a response, provides inquiry on the status of any correspondence in the system.
o Death Subsystem	Custom	2,000/month	24	18	ADABAS	Natural	Statewide	Used to calculate death benefits.
o Disability Tracking Subsystem	Custom	1,300/month	19	30	ADABAS	Natural	Statewide	Tracks disability claims.
o Employer Data Subsystem	Custom	1,500/year	10	10	ADABAS	Natural	Statewide	Used to calculate employer contribution rates.
o Inquiry Subsystem	Custom	600/day	23	0	ADABAS	Natural	Statewide	Inquire member and employer information.
o Policy Conversion Subsystem	Custom	50/month	5	7	ADABAS	Natural	Statewide	Tracking/update of group life conversion to individual policy.
o Purchase of Prior Service Subsystem	Custom	4,000/month	22	2	ADABAS	Natural	Statewide	Maintains contract information on members who can purchase prior service credits for retirement (military, out-of-state, etc.).
o Refund Subsystem	Custom	2,000/month	15	28	ADABAS	Natural	Statewide	Handles refunds payment process for member withdrawal, death, etc.

Commonwealth of Virginia
Agency Application Software Description Table
Virginia Supplemental Retirement System (VSRS)
December 31, 1988

System Name	Application	Transactions	Number Programs On-line	Number Programs Batch	File Structure	Languages	System Use	Key Information
CENTRAL COMPUTER APPLICATIONS - DIT-IBM (continued)								
o Retirement/Group Life Subsystem	Custom	600-800,000 per month	53	77	ADABAS	COBOL Natural	Statewide	Maintains, accounts for 280,000 active/ inactive member contributions to the system, and premiums for group life.
VSRS Parking System	Custom	5/month	16	0	ADABAS	Natural	VSRS only	Maintains information on employee parking in the VSRS reserved parking spaces.
Word Processing	Package	n/a	n/a	n/a	n/a	IBM PROFS DISPLAY WRITER	VSRS only	Uses mainframe and personal computers to provide the staff with word processing capabilities.
MICROCOMPUTER APPLICATIONS								
Inventory Control System	Custom	100/week	1	0	Disk Diskette	Basic	VSRS only	Used to track and order office supplies.
Peach Tree Accounts Receivable	Package	100/month	n/a	n/a	Disk Diskette	-	VSRS only	Used to manage 200 accounts receivable accounts.
RIMS - PC Payroll Subsystem	Custom	10-80,000 per month	57	5	Diskette ADABAS	COBOL Natural Clipper	Statewide	Pilot project to provide an automated method to allow employers to submit their payroll via a diskette to VSRS. Replace hard copy payroll input and reduce data VSRS data entry requirements.
Spread Sheet	Package	n/a	n/a	n/a	n/a	LOTUS SYMPHONY	VSRS only	Uses personal computers to provide staff with spread sheet capabilities. Used to answer what if questions, perform budget and payroll projections, benefits calculations, and reporting statistical information to the retirement board.
DEPARTMENTAL COMPUTER APPLICATIONS								
None								

EQUIPMENT SUMMARY

CPU	MEMORY	DISK	TAPE	TERMINALS	PRINTERS	PLOTTERS	PEP/IRMA
Department of Accounts							
DIT/IBM							
Wang VS100	16 meg	56 gb	2 - 1600/ 6250 bpi	120	14		
15 micros					14	2	1
Department of General Services							
DIT/IBM							
HP3000/70	8 meg	4.7 gb	2 - 6250 bpi	150	12	2	
HP3000/950	64 meg	2.2 gb	1 - 6250 bpi	6	1		
IBM 5520	n/a			9	3		
63 micros					30		35
Department of Planning and Budget							
DIT/IBM							
Wang VS7310	16 meg	1.2 gb	2 - 1600 bpi	105	23		
Wang VS100	7.5 meg	shared	shared	shared	shared		
53 micros					19	1	
Department of Personnel and Training							
DIT/UNISYS							
DIT/IBM							
43 micros					37	1	19
Department of Treasury							
DIT/IBM							
IBM S/36	1 meg	400 mb	1 - 1600 bpi	25	1		
IBM AS/400	2 meg	8 mb	1 - 1600 bpi	25	1		
21 micros					21	2	1
Virginia Supplemental Retirement System							
DIT/IBM							
Nixdorf 6001/55	64 kb	34 mb	1 - 1600 bpi	60-70	1		
14 micros					6		6

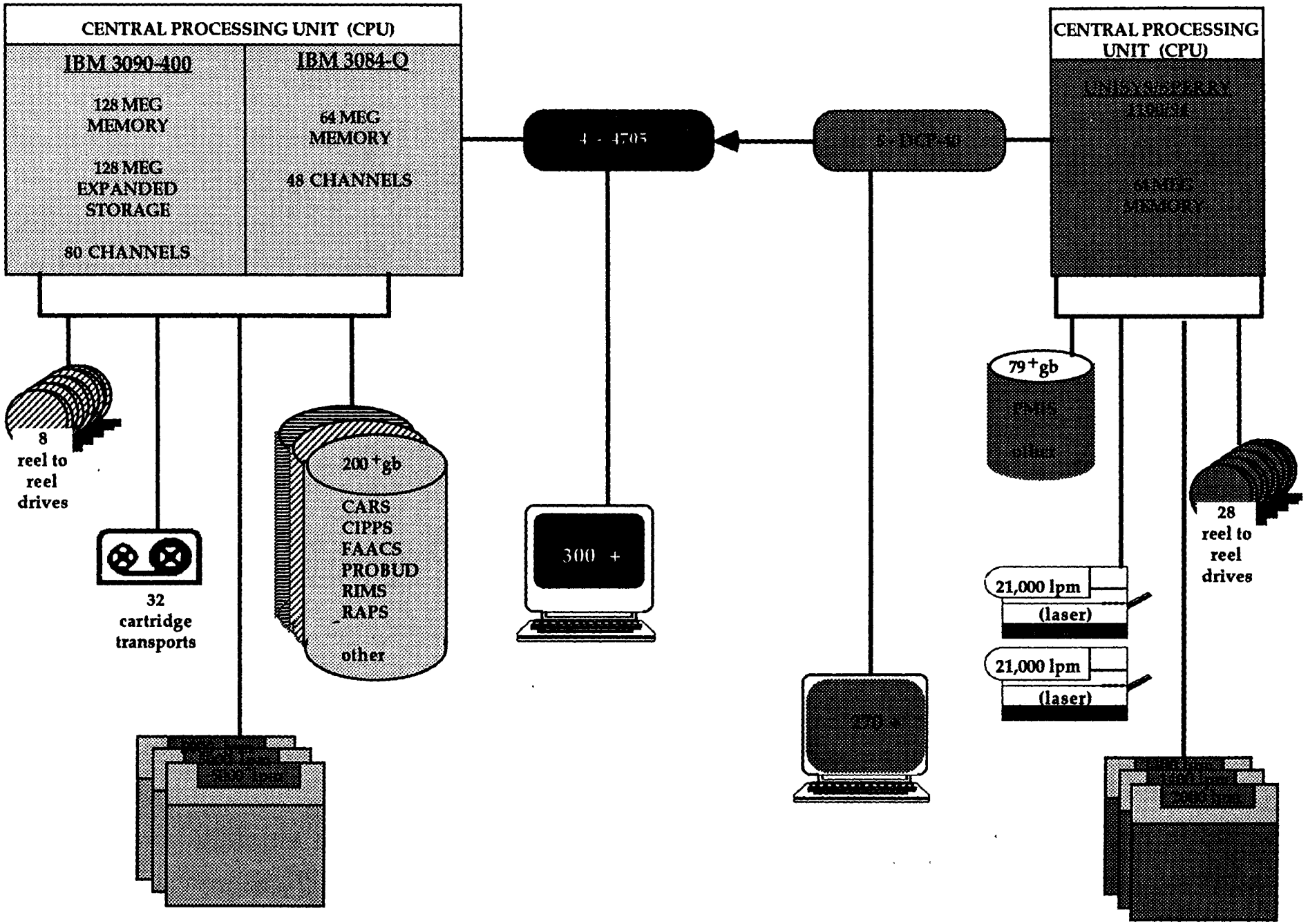
Department of Information Technology (DIT)

DIT houses the main computers for the six agencies and offers system maintenance and development for software applications.

DIT processes information on two distinct technology architectures; IBM and Unisys/Sperry. In addition, the Agency manages the allocation and maintenance of all computer system resources, including monitoring performance, managing files, capacity planning and ensuring environmental integrity.

DIT uses a variety of IBM compatible devices in its mainframe configuration for storage, printing and communications.

DIT HARDWARE CONFIGURATION



GLOSSARY

ADABAS	Data base management system by Software AG.
Application portfolio	Collection of organization's application programs.
Asynchronous Protocol	Transmission of data that requires the use of start and stop elements for each character because the interval of time between characters can vary.
Batch processing	Technique by which programs that are to be executed are coded and collected together for processing in groups.
Bisynchronous Protocol	Synchronous transmission of blocks of binary data, characterized by constant timing between two devices. Start of transmission is signalled by a synchronous character and end of transmission is denoted by two-block check characters.
Byte	Computer representation of a character or number.
Central computer	Computer (UNISYS or IBM) operated by the Department of Information Technology and accessible to all agencies and institutions.
Custom Application	Application designed to meet a specific set of requirements.
DMS-1100	Data base management system by UNISYS/Sperry.

Data	Representation of facts, concepts or instructions in a formalized manner suitable for communicating, processing.
Data base management system (DBMS)	Software that handles the organizing, cataloging, locating, storing, retrieving, and maintaining of data in a data base.
Data dictionary	Catalog of all data types, giving their names and structures and information about data usage. Also, software facility that maintains data on data base structures and processes that affect the data base and provides utility services, such as file and record descriptions to the user.
Data directory	Index to locations, format, access requirements, contact person(s) and other information about data that are maintained by agencies and institutions.
Data element	Smallest unit of data that has meaning in describing information; the smallest unit of named data.
Enterprise model	Representation consisting of four organizational components; strategies, structure, processes, and entities.
Entity	Person, place or thing or concept that has characteristics of interest to the enterprise. Something about which we store data.
Information	Meaning that a person assigns to data by means of the known conventions used in their representation. That which can be derived by data.

Information Architecture	Schema which integrate and standardize practices and planning for information on an organizational basis.
Interfaces	Connecting points between two pieces of hardware or between two systems.
Language processor	Program that translates human-written source language programs into a form that can be executed on a computer.
Local Area Networks (LAN)	Hardware and software systems that undertake the job of interdevice communications within limited distances.
Mainframe	A full-scale computer.
Microcomputer	A small computer; also called home computer, personal computer, portable computer.
On-line	Term describing equipment, devices, and persons that are in direct communication with the central processing unit of a computer.
Package	Program or collection of programs to be used by more than one business or organization.
Peripheral	Any piece of equipment that is attached to a computer.
Process	Groups of logically related decisions and activities required to manage the resources of the organization.
Protocol	Groups of procedures or conventions used routinely between equipment such as terminals and computers.

Real-time	Description of on-line computer processing systems that receive and process data quickly enough to produce output to control, direct or affect the outcome of an ongoing activity or process.
Report generator	Program that converts machine-readable data into a printed report organized for a specific purpose.
Standardized system development life cycle	Period of time and steps between initiation and completion of a systems development project.
Strategic issues	Concerns important in the initiation, conduct, and completion of a strategic plan.
Strategic planning	Planning that focuses on accomplishing or implementing the strategies of an organization.
Technology architecture	Schema which integrate and standardize technical practices and planning for information resources on an organizational basis.
Text data base management system	Software that facilitates the manipulation of alphabetic data under program control.
Time sharing	Method of operation in which a computer facility is shared by several users for different purposes at (apparently) the same time, although the computer actually services each user in sequence.
Transaction	Named collection of one or more related data items representing a unique event or occurrence.
Trunk (lines)	Direct line(s) between two telephone switching centers.
VSAM (virtual sequential access method)	A vendor-specific file access method.