JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION
OF THE VIRGINIA GENERAL ASSEMBLY

Overview: Review of Information Technology in Virginia State Government

An Overview of a Report by
Gartner Group Consulting Services

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Preface

The 1996 Appropriation Act directed JLARC to complete a review of information technology services by January 1, 1998. The study was to include an evaluation of technology planning, an assessment of privatization of the State data center, and an evaluation of the effectiveness of multiple mainframe computer platforms. Because of the technical nature of the study, Gartner Group Consulting Services was hired to complete the review.

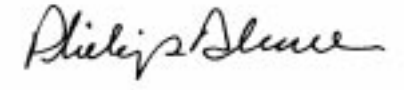
Gartner Group produced a number of reports in completion of the study, including reports on the results of benchmarking reviews of the State's data center and telecommunications services, and a final report on findings and recommendations. Combined, Gartner Group's reports total more than 500 pages, and make 23 recommendations for improvement in the State's management of information technology. Findings from the study relate to three broad categories: privatization of information technology services, management of resources, and reorganization of the information technology function. This overview document is a summary of the key findings and recommendations from the Gartner Group reports.

With regard to privatization, Gartner Group found no compelling business reasons to privatize the State data center. Some other information technology services are recommended for privatization. In pursuing the outsourcing of services, Gartner Group recommends that the State adopt a standard process to ensure that privatization decisions are sound.

Gartner Group's analysis of resource management resulted in recommendations to discontinue the use of the Unisys mainframe and to develop a new client/server operation within the State data center. Other recommendations address issues related to network administration, billing reconciliation, and procurement.

In the final area of review, Gartner Group recommends a major reorganization of the information technology function within State government. This includes creation of a Chief Information Officer position to be responsible for all information technology planning and services. In addition, Gartner Group recommends creation of a new technology services agency and an advisory council to better integrate State agencies into the information technology planning process.

On behalf of the Commission and its staff, I would like to thank the staff of the Department of Information Technology, the Council on Information Management, Virginia Tech, and the University of Virginia for their cooperation and assistance during this study.



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December 22, 1997

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Introduction

This report on information technology in State government is an overview of a study completed by the Gartner Group for the Joint Legislative Audit and Review Commission. It was prepared by the Commission staff with the assistance of the Gartner Group. The full Gartner report is available for inspection in the Commission's offices on request.

Information technology – computer processing and telecommunications – is an essential part of the operations of almost every State agency and institution. State government faces growing demands for a broad array of services to citizens and businesses. Taxpayers expect such services to be delivered in an effective, cost efficient manner. Today, the delivery of government services would likely be impossible without modern data processing and telecommunications support.

In Virginia, two agencies are primarily responsible for information technology support for State government. The Council on Information Management (CIM) is responsible for information technology planning and standards and is intended to provide for coordination of State government information technology activities. The Department of Information Technology (DIT) is responsible for provision of information technology services, including data processing, applications development and maintenance, and data and voice telecommunications. In addition, individual agencies and institutions have significant internal information technology operations.

In recent years, the ability of State government to manage its information technology resources and to effectively use emerging technologies has come into question. A perception has developed that DIT is not cost efficient in comparison with private sector providers of information technology services, for example. DIT is also seen as being slow to make available to its customer agencies new technologies which would lower costs and improve services. CIM is viewed as being unable to establish and enforce any statewide standards, or to use the information technology planning process to effectively influence agency information technology operations. All of these concerns are symptomatic of a basic, underlying problem – there is currently a lack of leadership and direction for information technology in State government. As a result, information technology in State government appears to be managed under a "chaos model," with individual agencies moving in many different directions. This has been evidenced most recently with the development of wide area telecommunications networks by agencies, essentially in competition with the State network managed by DIT.

Against this backdrop of concern about the direction of information technology in State government, the Virginia General Assembly directed the Joint Legislative Audit and Review Commission (JLARC), with the assistance of a qualified consultant, to complete a review of information technology services for State agencies and institutions (Item 14, 1996 Appropriation Act). Gartner Group of Stamford, Connecticut was selected in a competitive procurement to complete the review. This report presents the findings and recommendations of the Gartner Group research. The report answers

critical questions about the current status of information technology in Virginia government, and offers a blueprint for improved organization and management of information technology resources for the future benefit of the citizens of Virginia.

Study Approach

The Virginia General Assembly directed that an external consultant with specific information technology expertise be retained to complete a review of information technology and that the Joint Legislative Audit and Review Commission hire the consultant and supervise the work. An extensive search for consultants was conducted by JLARC, starting with the issuance of a request for proposals (RFP). Six initial respondents were pared down to two after the initial scoring. Formal presentations of the proposals from the two finalists yielded a decision to use the Gartner Group for the study.

Gartner Group's study approach drew from a broad array of skills and services in the company and was composed of three major components:

- Gartner Group Consulting Services (GGCS) – a consulting team was assembled to perform the majority of the effort associated with the review.

- Real Decisions (RD) Benchmarks – Real Decisions, a subsidiary of the Gartner Group, performed three traditional data center benchmarks. The benchmarks were performed for the DIT data center and the data centers at the University of Virginia and Virginia Tech. These studies allowed Gartner Group and JLARC staff to develop a detailed quantitative view of the operation of the State's major data centers. Additionally, Real Decisions performed a wide area data benchmark and a voice information processing benchmark to diagnosis the data and voice networking environment and the management capability in place in State government.

- External Services Providers Government (ESPG) Continuous Service – this service focused on information technology issues affecting federal, state, and local governments. Use of ESPG provided insight into the capabilities of external service provider organizations and helped JLARC staff to understand how privatization might proceed via these service organizations.

The Gartner Group research was completed in three phases. The first phase was data collection and diagnosis, and included a baseline analysis to examine the existing information technology environment, data collection for the five Real Decisions benchmark analyses, individual and focus group interviews, and site visits to a sample of agencies. Analysis of the data was conducted in the second phase, and included a structure/governance analysis, benchmark modeling and analysis, planning and standards analysis, and the privatization review. The third phase was reporting, and involved the development of findings and recommendations by the consulting research team.

This report is an overview of the findings and recommendations of the full Gartner Group report. Key issues relate to privatization of the DIT data center, management of information technology resources for the benefit of State agencies and institutions, and a revised structure for the management of information technology resources in State government.

The State Information Technology Environment

The information technology needs of State agencies and institutions of higher education in Virginia are very diverse. While one agency requires a distribution package and retail systems to manage its retail operation, another requires an accounting and financial management system. Higher education institutions have diverse needs as well, requiring student records, course assignment, library management, and other applications.

The Commonwealth of Virginia should respond to these needs with an appropriately flexible information technology strategy. This strategy should have enough direction to encourage a similar method for information technology service delivery across the many agencies, while affording the agencies necessary autonomy to fulfill their specific missions. Complicating this challenge is the nature of information technology which continues its relentless push toward "faster, better, smarter." The Commonwealth must attempt to maintain some degree of parity with the state of technology to benefit from such advances. Adding to the challenge of changing technology are the State government budget and political cycles, which tend to project two- and four-year business cycles upon the Commonwealth. Such cycles are often too short to sustain the development and implementation of strategic, mission critical systems to support agency programs.

One last issue, perhaps most important of all, is the level of spending on information technology. Currently, information technology spending for the Commonwealth is about $495 million annually. This amount represents spending for labor, services, hardware, and software by the various agencies and institutions in State government and includes approximately $71.5 million in expenditures for services provided by DIT. An often overlooked component is labor costs associated with end-user support. These end-user support costs come from several sources, including users supporting other users and lost productivity among users as a result of software or hardware failures.

Gartner Group has, apart from the work for this study, performed research on this specific issue. Results of that research demonstrate that up to 41 percent of the true cost of computing in client/server environments is this end-user component, and that these costs are not typically tracked by any traditional accounting mechanism. The percentage for end-user costs is much less in Virginia government because of continued use of traditional mainframe systems, but given the growth in information technology spending and labor costs, Gartner Group expects the true cost of computing will approach $1 billion by the year 2000.

Privatization of Information Technology Services

A key issue for this study was the question of the feasibility and the advisability of privatizing the State data center operated by DIT. In addressing this question, the Gartner Group examined both the costs of operation and the quality of service provided by the data center. By bringing sound analysis based on tested quantitative tools to the issue, the Gartner Group has provided information that can help to make the privatization decision a business choice, rather than a political or emotional one. In addition, the Gartner Group has set out a process that can be used to guide the State's decision process for privatization and manage the privatization arrangement when outsourcing is found beneficial.

The Gartner Group can find no sound business reasons to privatize the State data center at this time. Some other information technology services could benefit from outsourcing, however, and the State should periodically reassess the advisability of outsourcing data center services. Just as the Gartner Group used analytical techniques to complete this review, it is important that decisions relating to outsourcing — now and in the future — be guided by a uniform process which draws on sound business practices. These findings are summarized below, and discussed in more detail in the full Gartner Group report.

The State Data Center Should Not Be Privatized

To address the privatization issue a summary of the benchmarks conducted for the DIT data center is first presented. The benchmark portions of this study permit the detailed quantitative measurement of the entity being studied, and permit the comparison of the organization to what is termed the peer group. For the DIT benchmark, the peer group consisted of government and private sector data centers of approximately the same size or computing power. The key, bottom-line metric for the comparison is termed the NOW Index. The NOW Index is a quotient of the workload costs (normalized) divided by the value of workload delivered:

$$\text{NOW Index} = \frac{\textbf{NO}\text{rmalized Costs}}{\textbf{W}\text{ork Produced}}$$

The workload delivered is calculated based upon Gartner's standards for each component examined (CPU minute, transmission sites, etc.). The normalized costs are the costs incurred by a particular data center – in this study, DIT. The higher the NOW Index, the less efficient the organization.

For the DIT data center, the Real Decisions Benchmark calculates a NOW Index of 1.10, representing the combined IBM and Unisys mainframe environments. This is based on the calculation of costs and work produced as follows:

$$\text{NOW Index} = \frac{\textbf{NO}\text{rmalized Costs}}{\textbf{W}\text{ork Produced}} = \frac{\$21.4 \text{ Million}}{\$19.5 \text{ Million}} = 1.10$$

This means that it costs DIT $1.10 to produce $1.00 of value in work produced. Examining just the IBM mainframe environment, the NOW Index is 1.06. For the Unisys mainframe it is 1.18. These indexes represent a slight degree of inefficiency at the DIT data center in relation to the peer group examined. Examining the benchmark data in more detail yields the following:

- The costs for software and technical services are higher than the peer group. This is a direct result of the many versions of a particular systems software application which DIT must support due to its wide constituency.

- Hardware costs and occupancy costs for DIT are somewhat lower than for the peer group. Splitting out the IBM and Unisys environments demonstrates a cost structure for the IBM environment which is lower than for the peers; and costs for the Unisys which are higher. Overall, costs for DIT are slightly less than those of the peer group.

- The workload is heavily weighted toward prime-time online processing. On a combined basis (IBM and Unisys), the workload is 178 percent of the peer group average. The other categories examined are less than the peers: batch processing (46 percent), interactive processing (62 percent), disk storage (63 percent), output (36 percent) and tape (95 percent). The overall utilization for the combined elements is lower than the peer group at 84 percent.

- Increasing the workload at DIT, if done efficiently, would lower the NOW Index. In fact, increasing the CPU utilization rate to the level seen in the selected peer group reduces the DIT data center NOW Index to .95.

Gartner Group also conducted a series of interviews intended to analyze the qualitative aspects of the privatization decision. In the interviews, the DIT data center was given high marks for quality by its customer agencies, in particular with regard to the knowledge and commitment of the data center professionals. Other results of these interviews yielded similar positive comments. Based on both the quantitative and qualitative aspects of this issue, Gartner Group recommends that the DIT data center continue to be operated by the Commonwealth. However, because of the continuing changes in technology and the changing needs of agencies, the State should periodically reassess the appropriateness of outsourcing the data center. Benchmarks of the sort used for the Gartner Group report can provide some of the objective information needed for the outsourcing decision. The Gartner report outlines a decision process for privatization which could be used when considering outsourcing in the future. This 14-step process is discussed later in this report.

Recommendation (1). **The Virginia General Assembly should not privatize the data center operated by the Department of Information Technology at this time.**

Recommendation (2). **The Virginia General Assembly may wish to require biennial benchmarks of the State data center. In addition, the General Assembly may wish to direct the Joint Legislative Audit and Review Commission to reassess, once every five years, the appropriateness of outsourcing the services provided by the State data center.**

State Telecommunications Services Are Privatized Now

The State telecommunications network is already outsourced to a great degree. On the data network side, all wide area data transmission services are outsourced. Bell Atlantic provides most of the intraLATA (local) capability and MCI provides the interLATA (long distance) capability. The technology employed is known as "frame relay," and this technology permits the connection of any specific geographic site into the frame relay network throughout the State.

DIT provides support for the State communications center and the associated hardware and software in the State center (routers, etc.). Further, DIT is responsible for the wide area network (WAN) side of every router that is connected to the frame relay network. Individual State agencies and institutions are responsible for the agency-side of the router and every component of their local area networks (LANs). In fact, no aspect of the LAN environment for the Commonwealth is privatized.

The voice network is also outsourced. The topology employed is known as a virtual private network, and permits many locations throughout the state to be interconnected through the network. The primary technology employed is Centrex, in which Bell Atlantic utilizes its own equipment to provide telephone services and calling features. Private branch exchanges (PBX) are used in a few locations. The only aspects of the voice network which are the responsibility of the Commonwealth are the coordination of changes in services used by agencies and the billing and billing reconciliation functions.

Recommendation (3). **The Commonwealth of Virginia should continue to outsource all voice and data telecommunications network services.**

Privatization May Be Appropriate for Some Services

Gartner Group believes that the Commonwealth could benefit from privatization arrangements for some services. The first of these is applications development. While already outsourced to some degree, Gartner Group believes applications development represents an opportunity to acquire resources as needed/on-demand which are considered to be state-of-the-art. Many organizations have been successful with major applications development projects by effectively using external programming expertise. Outsourcing in this area can include a broad spectrum of services, ranging from spot programming resources to full-blown custom

development and packaged applications acquisition and implementation. Maintenance of existing applications is achievable through such a strategy as well.

A second area in which the State might benefit from additional privatization is desktop computing procurement and support. Several specific services should be considered as follows:

- *Procurement.* Complete desktop outsourcing services in the procurement area would include hardware and software acquisition, dealing with the resellers or the manufacturers of products and services, and ensuring that orders are configured properly and delivered on a timely basis.

- *Asset Management.* Asset management services are concerned with understanding the life cycle of the products and services — and the human resources — that the government employs, and capturing that information in an open electronic database.

- *Maintenance.* Maintenance for desktop hardware is a classic service for outsourcing that involves a vendor responding to calls from end users concerning inoperative desktop computers, printers, and other equipment. The maintenance vendor dispatches technicians to repair hardware or software items. Many State agencies already have contracts for outsourced maintenance.

- *Deployment.* Deployment involves introducing new or replacement technology (e.g., the development of a new application to be deployed across the enterprise's infrastructure) by the outsourcing vendor.

- *Help Desk.* Generally the help desk function is the Achilles' heel of information technology departments for a variety of reasons. The help desk is the first line of desktop support and often represents the primary contact that end users have with the information technology department. Unfortunately, information technology help desks are often understaffed because of budgetary pressures.

- *Training.* Training is one service element that most desktop outsourcing arrangements do not include, but in looking toward the future of information technology in State government, training will become more important. Training for users of desktop computing can increase productivity and can reduce the workload of the help desk.

In assessing privatization of any of these services it is essential that the State base its decision on sound business considerations.

For each function, the State should consider whether the function's overall performance is acceptable or unacceptable by using conventional survey techniques. The second step is to determine the extent to which the State can reduce costs or im-

prove the function's performance. Third, it is necessary to determine what the level of risk is if the function is outsourced to an external provider. Finally, the State must decide whether the function is a candidate for external sourcing. This process needs to be kept at a level high enough to prevent it from getting bogged down in details about performance and costs. The objective is to determine if external sourcing should be considered, not to rate individual functions or make the final sourcing decision. Gartner Group performed this assessment for the Commonwealth, and reached the conclusions as summarized in Table 1.

Table 1

Desktop Outsourcing Recommendations

Area	Assessment	Cost Change	Performance Change	Risk	Consider Outsourcing?
Acquisition	Good	Moderate	Minor	Low	No
Asset Management	Poor	Major	Significant	Low	Probably
Maintenance	Varies, good to poor	Minor	Significant	Moderate	Yes
Deployment	Varies, good to fair	Minor	Minor	Moderate	Probably
Help Desk	Varies, good to poor	Moderate	Significant	Low	Yes
Training	Varies, good to fair	Low	Moderate	Low	Yes

Source: Gartner Group

Recommendation (4). **The Virginia General Assembly may wish to direct the Secretary of Administration to evaluate the feasibility of outsourcing systems development and desktop computing acquisition and support services. The Secretary should proceed with outsourcing such services if, after thorough evaluation, privatization is found beneficial.**

Outsourcing for Information Technology Services Needs to Be Carefully Considered

Outsourcing of information technology services is an important consideration for most organizations. As both corporations and governments search for ways to provide better services to customers, reduce payrolls, and cut costs, outsourcing of support functions such as information technology is seen as a panacea. Outsourcing support functions enables an organization to concentrate its efforts on core competencies. While

executives and managers recognize that information technology is critical to their organizations, they do not necessarily believe that owning and managing information technology resources and staff are critical.

Some organizations have found outsourcing arrangements to be successful, meeting all of their objectives. Others have found outsourcing not to be so successful. It is important, then, that the Commonwealth learn from the successes and failures of other organizations as it considers outsourcing. Gartner Group's research has identified many reasons why outsourcing arrangements fail. The five most frequently identified reasons are: (1) inadequate time to evaluate the outsourcing decision, (2) imprecise scope for the services to be outsourced, (3) selecting the wrong vendor, (4) failing to address key issues associated with management of the outsourcing arrangement, and (5) insufficient protection of the outsourcing customer's interests in the contract.

To successfully outsource, organizations need to set objectives, follow a disciplined process, and leave enough time to evaluate key issues. Complex outsourcing arrangements should be analyzed in three phases – establishing, managing, and terminating the outsourcing arrangement. Issues related to these three phases are interrelated and need to be fully addressed prior to any decision to outsource. The Gartner Group report outlines a number of best practices which can be used by the State to ensure that decisions are uniform and based on sound analysis. These best practices are listed in Exhibit 1 on the next page and discussed in detail in the Gartner Group report.

In addition to the best practices identified by Gartner Group, a 14-step process is proposed for information technology outsourcing. This process has been developed by the Gartner Group to help organizations which proceed with outsourcing to do those things which will enhance the likelihood of success. The process, as discussed below, draws on the experiences of many organizations which have attempted or successfully completed outsourcing arrangements. The process is as follows:

1. *Start with an information technology sourcing plan.* Outsourcing decisions should be made within the context of a larger information technology sourcing plan, not in a vacuum. This sourcing plan, which should be updated annually, can help an organization determine how best to obtain required information technology resources over time. This involves assessing current resources by information technology function, and then deciding whether to hire and train in-house talent or to augment or replace these resources by using external service providers.

2. *Set objectives, and communicate them to prospective vendors.* The outsourcing evaluation team must agree on and articulate its objectives. Frequently, however, evaluation team members are unclear or in conflict about what they hope to achieve by an outsourcing arrangement. If the organization cannot express its expectations and priorities to vendors, the vendors cannot be expected to achieve them. The more information the

Exhibit 1

Best Practices for Information Technology Outsourcing

- Identify key objectives and stay focused on them throughout the evaluation and negotiation process.
- While difficult in public procurement systems, be selective when inviting vendors to bid.
- Permit and encourage vendor due diligence.
- Do not count on bids until vendor due diligence is complete.
- Think about third-party consents.
- Anticipate personnel issues before and after the contract is completed.
- Reserve the right to hire third parties for new services.
- Stipulate service level agreements in quantitative and qualitative terms.
- Establish management controls.
- Write a comprehensive RFP focused on business issues.
- Be clear and comprehensive about the scope of services.
- Do not end the vendor competition too early.
- Consider business and major contractual issues early, but do not get bogged down in the terms and conditions.
- Plan software transfers.
- Avoid inflexible price structures.
- Determine methods for price adjustments.
- Negotiate reasonable liability caps.
- Define the ownership issues related to software developed by the vendor.

Source: Gartner Group.

vendors have, the better they can create proposals to meet the organization's needs.

3. *Leave enough time to properly perform the evaluation and choose a vendor.* Too many executives, excited at the prospect of cost savings or the ability to shed information technology responsibilities (which they consider important but not their core business), set unreasonable time limits for evaluating outsourcing and choosing a vendor. Performing an outsourcing evaluation in inadequate time is one of the top five reasons that outsourcing arrangements fail.

4. *Follow a disciplined, intensive evaluation process.* Following a disciplined evaluation process is vital to the success of the future outsourcing arrange-

ment, but few organizations follow this simple suggestion completely. Organizations often underestimate the difficulty of this step and the impact of organizational politics. Many simply call up one or two vendors and ask them to submit a proposal, often without preparing evaluation criteria or revealing essential information, such as budgets, equipment prices, and staffing levels. Somehow they expect the vendors to divine the key information, to create proposals that reflect their needs, and to tie them all together with reasonable (and low) prices.

5. *Hire experienced consultants and attorneys, and be familiar with the state of the art in outsourcing contracts.* Inadequate contractual protection is also one of the top five reasons that outsourcing arrangements fail. Outsourcing consultants and attorneys are constantly "pushing the envelope," and redefining the terms and conditions to which vendors will agree. Users must be aware of these new provisions, or they will continue to experience the same problems. However, most users and in-house attorneys cannot do this on their own.

6. *Choose a vendor that the organization can live with indefinitely.* Vendors vary significantly with respect to culture, attitudes toward profit margins, and other characteristics. Choosing a vendor that has a culture similar to the organization's, and one that the organization trusts, is probably the first factor in making these arrangements successful.

7. *Retain approval over the hiring and transferring of the account manager and account team.* The organization using the outsourcing arrangement must also have trust in, and respect for, the vendor's account manager and account team. Even an excellent vendor may have poor account managers, or ones whose skills do not match the customer's unique requirements. Further, account managers have their own objectives (e.g., to increase revenues or improve profit margins), which may be at odds with the customer's interests. Some organizations do not realize that they may be able to transfer unacceptable or under performing account members off the account; instead, they allow their frustrations to slowly build without communicating their concerns to the vendor's management.

8. *Make the scope well-defined.* A clear and comprehensive definition of the scope of services to be covered is critical. However, contracts often simply state that the vendor will provide the same services currently performed by the customer. Consequently, there is often significant misunderstanding between vendor and customer regarding the scope of services and functions to be provided, which usually works in favor of the vendor. The greater the specificity involving the scope of the services (in both the RFP and the contract), the easier it will be to ensure a smooth operation, or to avoid disagreements about what the vendor was committed to do.

9. *Avoid the partnership trap.* Most vendors talk about trust and partnerships (as in "trust me, I'm your partner"). Normally tough-nosed executives sometimes fall prey to the partnership argument and neglect to adequately protect their organizations in the contracts. Yet most of these arrangements are not true partnerships (as defined by having mutual economic consequences), and therefore the relationship must be backed up by precise (not vague) contractual terms and conditions. Even in the best relationships, the potential for conflict between the vendor's profit motive and the customer's needs will arise.

10. *Put the three service fundamentals in the contract.* The customer must always remember the three fundamental elements of the outsourcing relationship when writing a contract: services to be performed; price for those services; and performance standards associated with each service. While this sounds like a simple mandate, the majority of contracts seen by Gartner Group fail to do this adequately and experience related problems later on.

11. *Define and enforce measurable service level agreements.* Many organizations do not have service level agreements at the time they sign their contracts. Instead, they agree that the vendor will define the service level agreements in the first six months of the outsourcing arrangement. However, three years later, these service level agreements are often still undefined, leaving the customer unable to obtain reasonable performance levels or to levy associated penalties.

12. *Think carefully about how to manage the outsourcing arrangement before the contract is signed.* Few users think sufficiently about this before the fact. Many of the problems observed by the Gartner Group are caused by inadequate management of the outsourcing arrangement. Organizational, process, and contractual mechanisms are often ignored, resulting in significant problems after the contract is signed.

13. *Retain sufficient in-house staff to manage the outsourcing arrangement.* Do not transfer or fire the entire in-house staff. Frequently, too few people (and particularly good people) are left behind to manage the outsourcing arrangement. Some organizations do not even have enough staff to gather sufficient statistics to demonstrate inadequate performance on the part of the vendor. Other organizations have no way to determine whether systems such as DB2 or CICS are performing adequately, and whether they have been properly tuned. (The latter issue is particularly important for companies that are being charged for all CPU and direct access storage device resources they consume.) Still other organizations, because they have no technical expertise left on staff, cannot even determine what functions the vendor should be performing.

14. *Plan for change.* There is not a single outsourcing arrangement that has not changed dramatically from what the customer envisioned when the contract started, either because the organization's business functions or the technology changed. Yet few organizations understand how to protect themselves in the contract from both planned change and change that they cannot even begin to imagine.

Recommendation (5). **The Virginia General Assembly may wish to establish by law the process which shall be used to privatize information technology functions or services in State government.**

Management of Information Technology Resources

In addition to the assessment of privatization, Gartner Group examined the Commonwealth's current information technology services. Individually, data processing and telecommunications services were found to be appropriately managed, though reorganization of some functions might improve the delivery of services, as discussed later in this report. The Gartner Group analysis identified several concerns that should be addressed to improve services to State agencies and institutions. These issues relate to the types of computer platforms which the State data center should operate over the long term, how the State manages telecommunications services, and the need for new approaches in information technology procurements.

Long-Term View of Multiple Mainframe Platforms for the State Data Center

The mainframe processing environment most certainly has a place in Virginia government. The investment in capital for these processors, disks, printers, communications devices, and other equipment is significant. Additionally, the investment in personnel, based upon both the experience at DIT and at the agencies, is extensive. This experience is both generic to the processors involved and specific to the implementation, programs and configuration in the Commonwealth.

It is the view of Gartner Group, therefore, that the mainframe is of continued value to State government. It is important then to address the issue of which platforms are in the best interest of the Commonwealth over the long-term. Clearly, the IBM mainframe has a preponderance of the marketshare, by any measure used. Gartner Group data collection efforts indicated a substantial reliance and investment in the IBM mainframe environment. Its maturity, scalability, and reliability, combined with the breadth of resources (capital and human) available to support it tend to render it a solid solution.

With regard to the Unisys environment, Gartner Group made several observations regarding its use now for State agencies, and its perceived future as well:

- The Unisys environment is not viewed as a platform for use in new information technology projects.

- The Unisys hardware components, currently in use at DIT are dated. Gartner Group expects that support will become more limited over the next several years.

- The Unisys processor was recently upgraded to support the ADAPT system at the Department of Social Services; however, the ADAPT system required additional processing capacity and the decision was made to transfer a significant portion of the processing to an alternative Unix platform.

- The Council on Information Management (CIM) issued a letter in March of 1995 recommending the discontinuance of the Unisys mainframe as a strategic platform by 1998.

The Gartner Group analysis leads to similar conclusions. The proprietary and dated nature of the Unisys environment combined with its non-consideration for new projects leads Gartner Group to conclude that its use should be discontinued and that all applications should be migrated toward alternate platforms. The challenge, however, is the ADAPT system which is being implemented now and is clearly a critical application for the Commonwealth. The ADAPT system is expected to be in use until at least 2005, the expected life of the application. Based upon this, Gartner Group recommends the migration of all applications, with the exception of ADAPT, to alternative platforms. This should be accomplished by 2002. Gartner Group further recommend the creation of a $2.5 million fund to finance this effort. This fund would be available to all agencies with significant investment in Unisys technology. The agencies would apply for a grant from the fund to assist with their migration efforts. Such funding should be supplemental, however, with agencies making some commitment of agency funds to migration projects. The Department of Social Services may also want to continue the process of migrating additional components of the ADAPT system to the Unix processor.

Recommendation (6). **The Virginia General Assembly may wish to direct that use of the Unisys mainframe be discontinued by the year 2002, with the exception of the ADAPT system at the Department of Social Services. To facilitate migration of systems to other computer platforms, the General Assembly may wish to create a fund from which agencies may receive grants for development costs.**

A Central Client/Server Operation Should Be Established

In addition to restructuring mainframe processing, Gartner Group has identified the need for creation of a client/server operations group within the State data center. This group would be responsible for the operation of any centralized client/server servers used by the Commonwealth. This includes providing general utility and data management software products to support batch processing, online processing, and remote job entry (to the extent necessary). Operation of client/server platforms would also facilitate migration from the Unisys mainframe for some applications. This operations group would have as its first platform the Unix processing currently being implemented at DIT for the IHRIS and ADAPT projects. The need for centralized operation of servers in a client/server environment has been clearly demonstrated by these two projects. Many other agencies could likely benefit from such arrangements in the future.

This operations group should not be expected, at least initially, to operate network servers, such as Banyan, Novell, or NT (in a local area network server role); those activities should remain with the individual agencies and institutions. A client/

server group within the data center would deal with operation of major agency applications, similar in scope and nature to those currently residing in the mainframe environment.

With the introduction of client/server technology in the State data center, the continued use of the mainframe computers may be questioned. Some agencies may feel compelled to migrate to the client/server platform as quickly as possible. It is the view of Gartner group that mainframes hold a definite place both as development and deployment platforms with central organizations such as the State data center. It is also essential that State agencies recognize that client/server technology is not a panacea for defective business processes. The Gartner Group expects that the mainframe and client/server computing models will need to coexist for some time. Therefore, migration of large, enterprise systems to a client/server platform should be carefully evaluated.

Recommendation (7). **The Virginia General Assembly may wish to create a client/server operations group within the State data center for the purpose of providing centralized client/server information technology services to State agencies.**

Existing State Networks Should Be Consolidated

There are several networks which exist for use by State agencies and institutions. The largest and most widely used is the Commonwealth Telecommunications Network (CTN). This network was developed and is maintained by DIT. The CTN provides both frame relay services and SNA connectivity among the various physical State agency locations. The CTN is used by the legislative, judicial and executive branches of the State government.

The educational institutions, under the leadership of Virginia Tech, have developed an ATM network called Net.Work.Virginia. The network was originally created as a pilot by Virginia Tech, Old Dominion University, and the Community College System. Now operational, it has expanded to include all of the State's colleges and universities except for George Mason University. In addition, the Department of Health, the Department of General Services, the Virginia Employment Commission, and the Department of State Police are now using this network. In all, there are 143 sites connected to the network.

A downtown Richmond Metropolitan Area Network (MAN) has also been developed. This network was designed and installed by the Department of General Services (DGS) with the view that it is a service equivalent to any other building utility, such as electricity, telephone, or water. DGS utilized rights-of-way located throughout downtown Richmond to lay fiber and to install communications hardware. Essentially, DGS avoids using any public carrier, providing very low-cost data connectivity among facilities in the Capitol Square area.

Gartner Group's recommendation is that all of these network efforts should be combined in order to coordinate operations, ensure proper control of the networks for the benefit of all agencies, and reduce costs. The centralized information technology organization recommended by Gartner later in this report should oversee the consolidation and be the single provider of all network services. Under this proposal, the centralized network support organization would manage and promote the use of the CTN, Net.Work.Virginia and MAN. The wide area network technology should be re-evaluated with the next contract in an effort to provide affordable and advanced wide area data connectivity. To ensure that advances in networking technology are captured for use by State government, Virginia Tech and the other universities should be expected to continue to use the networks for research and advanced development. End-user agencies should be prohibited from developing any independent wide area networks.

Recommendation (8). **The Virginia General Assembly may wish to direct the consolidation of the administration of the Commonwealth Telecommunications Network, Net.Work.Virginia, and the Metropolitan Area Network under a central network support organization. Wide area network research for State government should be established as the responsibility of the Commonwealth's research universities. Individual agencies should be prohibited from developing independent wide area networks.**

State Agencies Should Not Pay for Billing Reconciliation

Currently, DIT is responsible for the billing of voice telecommunications services for all State agencies. DIT is billed for the aggregate of all telecommunications services provided by vendors to State agencies. DIT in turn uses data provided by the vendors with their billings to bill the individual agencies. The purpose of this process is to permit DIT to reconcile billings against contractual rates for services and to verify the accuracy of the services billed. The process captures and corrects billings in error because the vendors have not properly accounted for changes to service or have improperly applied the contract rates for service.

This process has apparently more than justified its use (from a cost perspective) by capturing significant over-billings made by vendors. In FY 1997, for example, DIT reports that it corrected errors in excess of $1.76 million, at a cost to the State of $158,340. Currently, these costs are borne by DIT customer agencies. The reconciliation process has worked well because DIT is familiar with the contract rates and has been responsible for the coordination of the changes to services used by State agencies.

While the billing reconciliation process used by DIT has been successful in correcting errors, it also points to excessive billing errors by the major telecommunications carriers. It is the view of Gartner Group that the amount of billing errors should be considered unacceptable by the Commonwealth. It should be the responsibility of the vendors to correctly bill for telecommunications services, and the State should not have to bear the financial burden of correcting any errors.

Gartner Group believes that the Commonwealth should include in its contracts with telecommunications vendors a standard for an acceptable level of errors, and a provision for the recovery from vendors of any costs the State incurs to correct billings in excess of the standard. The State may also want to consider the assessment of penalties for vendors which show no improvement in billing accuracy over time. The goal should be to reduce the level of billing errors, and to reduce the costs associated with the current billing reconciliation process. In any event, the costs of billing reconciliation should not be charged to the customer agencies but should be recovered from vendors.

Recommendation (9). **The Department of Information Technology should include provisions in all telecommunications contracts to establish acceptable levels of billing errors from vendors and require reimbursement from vendors for any costs incurred by the State to correct errors is excess of the standard. As vendors are brought into compliance with reasonable standards for billing accuracy, the billing reconciliation process could be converted to an audit on a periodic basis.**

New Approaches Should Be Considered for Information Technology Procurements

The federal government and some states have begun to use new and innovative procurement tools to improve their procurement of information technology goods and services. Gartner Group believes that the Commonwealth could benefit from some of these new approaches. The Gartner report discusses two approaches that have been used with success, performance-based procurement and the P-card.

Performance-based procurement (PBP) calls for strategic partnerships with qualified vendors in developing business-driven solutions that represent best value, not lowest cost, for the State. Instead of the usual adversarial relationships with vendors, it emphasizes long-term, mutually beneficial business relationships based on trust, honest and open communications, and teamwork. Instead of the State bearing the financial risks of potentially unworkable solutions, PBP provides for payment to the vendor only if and when benefits are realized after implementation of the proposed solution. The Department of Taxation is now attempting to use this model to procure a replacement for the State Taxation and Reporting System. The State should evaluate the success of the Department of Taxation before using PBP in other procurements.

Another possible area of improvement is through the use of the procurement card (P-card). Gartner recommends the P-card as a possible option for those items which are already under contract with the Division of Purchases and Supply. P-cards are special-purpose credit cards used for low-value purchasing. They are issued by the major credit card companies (e.g., Visa, MasterCard and American Express). Government agencies in Canada and the United States were the first to test this tool, which corporations have since embraced as an alternative to traditional requisition, purchase order, payment request paper cycles, and as an alternative to EDI for smaller pur-

chases. Enterprises process millions of invoices each year, with typically 75 percent of them for items costing less than $1,000. While some agencies in State government appear to be using credit cards in this fashion, it does not appear that a formal, statewide program has been implemented.

Recommendation (10). **The Virginia General Assembly may wish to direct the Department of General Services to evaluate the feasibility of using alternative approaches to procurement of information technology goods and services. Among the approaches which should be examined are performance-based procurement and a statewide, mandatory procurement card (P-card) program for small purchases.**

Reorganization of the Information Technology Function

As State government moves into the next century, the role of information technology will become increasing important in providing high quality, low cost services to citizens. To meet this challenge, State government will need to ensure that agencies have available to them advanced computer and telecommunications capabilities. It also means that the State will need to have in place a strategic plan for information technology, standards for implementing those plans, and strong leadership to carry out the vision for information technology in government. The State will also need to ensure that information technology services to agencies are flexible, grow with agency needs, and change according to advances in technology.

It is the view of the Gartner Group that the existing structure for information technology in State government will not be supportive of those essential needs. The critical lack of leadership in information technology, the structural separation of the planning and service functions, and the disconnection of agencies from the information technology policy process will make it difficult for the State to support the information technology needs of agencies over the long term. Therefore, the Gartner Group recommends that the Commonwealth reorganize the information technology function of State government. The reorganization would involve the abolishment of the existing information technology agencies; creation of a Chief Information Officer position with a staff to provide policy, planning, and standards support; creation of a new Department of Technology Services; and better integration of the agency information technology units into information technology policy and planning.

Information Technology Should Be Managed by a Chief Information Officer

Gartner Group recommends that the information technology function be managed by a Chief Information Officer (CIO). The Chief Information Officer would report to the Governor and serve as a member of the Governor's cabinet. This organizational relationship is similar to that of the Director of the Department of Planning and Budget. Creation of the CIO position is a vital element in reorganizing the information technology function for several reasons. First, the CIO would be a single point of responsibility and accountability for information technology policy, planning, and services. Second, the CIO could provide leadership in coordinating the information technology activities of State agencies and institutions. In addition, the CIO would be a single voice representing Virginia's information technology interests with the federal government, other states, local governments, and the private sector.

Responsibilities for the CIO would include development of information technology policy, implementation of strategic information technology planning, and oversight of the Department of Technology Services. Given the critical nature of information technology in State operations, it is critical that the CIO be a highly quali-

fied individual. Therefore, Gartner Group recommends that State law specify certain management and technical competencies to be required for the position.

Recommendation (11). **The Virginia General Assembly may wish to reorganize the information technology functions of State government by assigning responsibility for all information technology policy, planning, and services to a Chief Information Officer. The Chief Information Officer should be appointed by the Governor, subject to confirmation by the General Assembly. The Chief Information Officer should report to the Governor and serve as a member of the Governor's cabinet. The Virginia General Assembly may wish to establish in law specific management and technical qualifications for the position of Chief Information Officer. The role of the Chief Information Officer should be reviewed on a periodic basis to ensure that the office is appropriate to the changing information technology environment.**

The Council on Information Management Should Be Abolished with Its Planning Functions Transferred to the Chief Information Officer

The Council on Information Management (CIM) is the planning and standards setting body for information technology in State government. The current organization consists of the Council with nine members and its staff of seven. Membership of the Council, which includes several corporate information technology managers, is intended to make available to the State the expertise of external professionals.

CIM has most certainly provided a focus point for information technology planning in State government. State agencies and institutions recognize CIM as an organization which attempts to provide long-term strategic planning for information technology. Among CIM's achievements are the development and communication of an agency-level information technology planning process and a project to address the year 2000 non-compliance in agency systems. These initiatives have been of value to the Commonwealth and are consistent with the expectations placed upon CIM when it was first established.

There have been, however, a number of challenges associated with CIM and the fulfillment of its mission. The first and most obvious is the lack of long-term planning which actually has follow-through. CIM has no authority to enforce or police technical standards or adherence to a planning process. As a result, CIM cannot effectively translate its vision into agency decisions relative to dollars spent and professionals hired for information technology. Gartner Group found, then, that the information technology planning process – the primary purpose for CIM – has not been successful.

The other significant challenge faced by CIM has been the relationship with DIT. While DIT and CIM must work together for information technology to be effective in State government, the relationship between the two agencies has not been mutually beneficial. Moreover, the inability of DIT and CIM to work together on important is-

sues has not been beneficial to the Commonwealth. In light of these concerns, Gartner Group recommends the abolishment of CIM, with its key planning and standards setting activities continued within the office of the Chief Information Officer.

A policy, planning, and standards division within the office of the Chief Information Officer could be given responsibility for providing necessary policy and planning direction for State government. The division would work with the Technology Services Council, discussed later in this report, to ensure implementation of strategic planning in the agencies. In addition, the division would be responsible for technology standards, and would work with DTS, the Department of Planning and Budget, and the Division of Purchases and Supply to ensure implementation. Finally, the division would be responsible for development of a life-cycle approach to systems management. A key element of this approach would be the establishment of CIO approval authority for milestones in the applications development process in State agencies for any development project with costs in excess of $250,000. Gartner Group recommends that the life-cycle activity of CIM be transferred to this division. Gartner Group estimates that 11 staff positions will be needed for the policy and planning functions in the CIO's office.

Recommendation (12). **The Virginia General Assembly may wish to abolish the Council on Information Management, and assign all information technology policy, planning, and standards functions to the Office of the Chief Information Officer. The Chief Information Officer should be provided with adequate staff and other resources to carry out the information technology planning function.**

The Department of Information Technology Should Be Abolished with Its Service Functions Transferred to a Department of Technology Services

The Gartner Group report also recommends a restructuring of the information technology services function in State government. This would involve the abolishment of DIT and the creation of a new central agency for all information technology services. A comparison of the current and proposed structures is shown in Figure 1. Under the supervision of the CIO, the Department of Technology Services (DTS) would manage the centralized information technology resources for the Commonwealth and provide centralized computing and telecommunications services to State agencies. Gartner Group recommends that the Department of Technology Services be organized as follows (the employment levels and chargeback methods are outlined also):

- Office of the Director. The Director would provide executive direction for the agency.

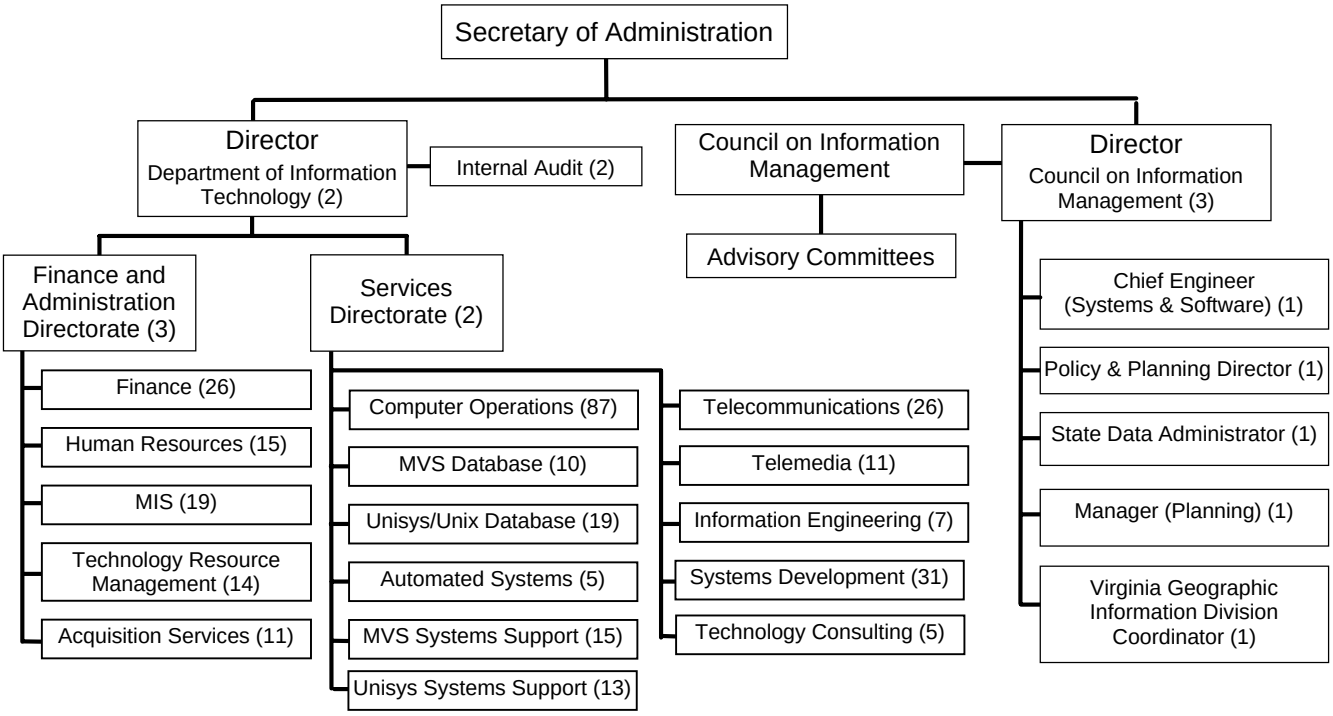
- Technology Infrastructure Directorate. This directorate would plan, implement, and maintain the technology infrastructure for State government, essentially the centralized computer and telecommunication operations. Most

Figure 1

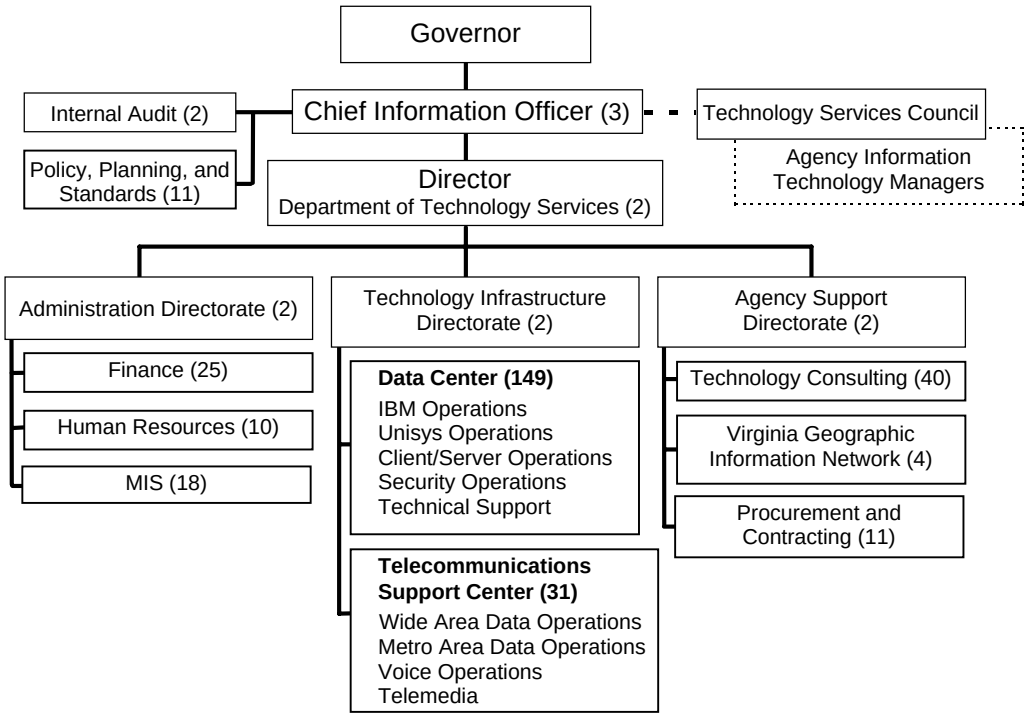
Current and Proposed Structure for Information Technology Services

(Staff Positions Shown in Parentheses)

Current Organization



Proposed Organization



of the functions for which this directorate would be responsible are in the DIT Services Directorate as it currently exits. This group includes the following two major information technology centers with eight operational groups:

- The *Commonwealth Data Center* would be responsible for operating the State mainframe and server computers. Operational divisions would include:

  - IBM Operations
  - Unisys Operations
  - Client/Server Operations
  - Security Operations
  - Technical Support Operations

- The *Commonwealth Telecommunications Support Center* would be responsible for procuring network services from telecommunications carriers and for managing the State's voice and data networks. The operational units include:

  - Wide Area Data Operations
  - Metropolitan Area Data Operations
  - Voice Operations
  - Telemedia Services.

  Gartner Group recommends that the Data Center be staffed at 149 positions and that the Telecommunications Support Center be staffed at 31 positions. The costs for all of the services of this unit would be recovered though chargeback to the user agencies as performed currently by DIT. One notable exception from the current cost recovery would be that the overhead for telecommunications billing reconciliation would be recovered from telecommunications vendors rather than from customer agencies.

- Agency Support Directorate. The Agency Support Directorate would provide services to support agency information technology operations. This directorate should include the following three divisions:

  - The *Technology Consulting Division* would provide systems development services, local area network design and implementation, business analysis, information processing design or re-engineering, and other information technology consulting. Gartner Group recommends staffing of 40 positions initially, but staffing would likely vary based on demand for services. Chargeback would be based on hourly or project rates.

- *The Virginia Geographic Information Network Division* would be responsible for fostering the creative utilization of geographic information and overseeing the development of a catalog of GIS data available in the Commonwealth. Other aspects of the division, as originally assigned to CIM, remain the same. Gartner Group recommends that the MEL of this division be four professionals.

- The *Procurement and Contracting Division* would play a new role within DTS. The division would have responsibility for coordinating all information technology procurement activities of DTS, the agencies, and the Division of Purchases and Supplies. It would also be the primary unit responsible for privatization evaluations. Gartner Group recommends a staff of 11, with costs supported through overhead on direct service charges.

- Administrative Directorate. The Administrative Directorate would provide all necessary administrative services for the Department of Technology Services. Many of these divisions are currently operating at DIT. Gartner Group recommends the following three divisions:

  - The *Finance Division* would provide accounting, financial reporting and analysis, and contract administration for all DTS internal units. The division would also be responsible for cost recovery, budgeting, and capacity planning. A staff of 25 is recommended. All costs would be supported as overhead on direct charges.

  - The *Human Resources Division* would be responsible for the DTS personnel programs, internal training, and career development. Gartner Group recommends 10 positions for the division, with all costs supported overhead on direct charges.

  - The *Management Information Systems Division* would provide for the internal information technology needs of the Department of Technology Services. Gartner Group recommends a staffing level of 18 for the division. This division would be supported by overhead on direct charges.

The director's office and each of the directorate offices would have two positions. The total maximum employment level for the office of the CIO and the Department of Technology Services would be 312. Currently, the combined maximum employment level of DIT and CIM is 361, with 330 positions actually filled. Data center, telecommunications, and other direct service positions in DIT should be transferred to the new department. Management and support positions should be examined on an individual basis to determine if they are appropriate in the new organization.

Recommendation (13). **All information technology services and activities now performed by the Department of Information Technology should**

be re-established in a Department of Technology Services. The Director of Technology Services should be appointed by the Governor and report to the Chief Information Officer.

Existing Internal Service Funds Should Be Continued

A key element of the Gartner Group proposal for reorganization of the information technology function is that the costs of most services and functions would be recovered directly from users of services through an approved chargeback mechanism. This is the method used now to pay for information technology services. However, in the Gartner Group proposal, more costs are recovered directly, and the amount of indirect overhead is reduced. Gartner Group found that the current cost allocation of direct and indirect charges for information technology services is sound.

Given the proposed continued use of a chargeback mechanism similar to that in use now by DIT, Gartner Group also recommends continued use of the three internal service funds to finance and account for computer service, telecommunications services, and technology consulting services. For each fund however, the scope of services covered would be expanded. The current systems development fund, for example, would need to be expanded to include all of the services provided by the Technology Consulting Division. The computer services fund would include charges for the new client/server operation in addition to others. The three internal service funds would be managed by the Department of Technology Services.

Recommendation (14). **The Virginia General Assembly may wish to consider continuing the use of internal service funds to finance and account for the services provided by the Department of Technology Services. The three funds should be the Computer Services Fund, the Telecommunications Services Fund, and the Technology Consulting Services Fund. Expenses of the Office of the Chief Information Officer should be recovered as overhead in the direct charges for the internal service funds.**

Technology Services Council Would Promote Agency Coordination

As a part of the new structure for information technology outlined above, Gartner Group also recommends the creation of a Technology Services Council (TSC). The TSC would be composed of the director of the Department of Technology Services, two agency information technology managers from each secretariat, one information technology manager each from the judicial and legislative branches, three information technology managers from the institutions of higher education, and two information technology professionals from local governments. Members from the executive branch agencies would serve for four year staggered terms to ensure continuity over time. Membership from the institutions of higher education should include Virginia Tech, the University of Virginia, and one additional representative selected by the State Coun-

cil on Higher Education for Virginia for a four-year term. The two local government representatives should be appointed by the Governor. The council would be chaired by the Chief Information Officer.

The purpose of the Council would be to assist the CIO in the development of standards and long-term plans and strategies for information technology statewide, and to provide feedback on services provided by DTS. Gartner Group's design for the Council is intended to more closely integrate the individual State agencies into the central information technology decisionmaking process. To this end, it would be important for the Council to be proactive in representing agency information technology interests, but also for it to develop a State view on critical information technology issues. It is anticipated that the Council would need to meet monthly in order to address the necessary array of computing and telecommunications issues.

Recommendation (15). **As a part of the new structure for information technology, the Virginia General Assembly may wish to create a Technology Services Council to advise and assist the Chief Information Officer in the development of plans, standards, and policies related to information technology. Membership of the Council should consist of the Director of the Department of Technology Services, two agency information technology managers from each secretarial area, one agency technology manager each from the judicial and legislative branches, three information technology managers from State-supported institutions of higher education, and two information technology professionals from local government. Members from executive branch agencies and local governments should be appointed by the Governor for four-year, staggered terms. The Council should be chaired by the Chief Information Officer.**

Standardization of Information Technology Functions Is Needed at the Agency Level

Gartner Group's review identified a number of different management and organizational strategies relating to information technology at the individual agency level in State government. The larger agencies typically have large information technology organizations which are responsible for information technology operations, local area network (LAN) support, end-user support, applications development, and planning. Smaller agencies typically have much leaner information technology units. Any concentration of personnel at these smaller agencies tends to center around end-user and local area network support. These agencies typically rely on DIT for a greater portion of their host processing needs, utilizing the IBM and Unisys mainframes. The majority of the investments are made in LAN servers, personal computers (PCs) and other office automation hardware and software.

Gartner Group recommends that, in addition to the restructuring of the central information technology function, the information technology operations of

the individual agencies be standardized. Specifically, the agency information technology divisions should be reorganized to include three major sub-units: applications development, end-user computing, and infrastructure. Each agency should have an information technology manager, who reports to the agency head, responsible for the computing and telecommunications operations of the agency. The Technology Consulting Division of DTS recommended earlier could help agencies with self assessments of their information technology organizations.

Recommendation (16). **As a part of the restructuring of the information technology function for State government, each State agency should conduct a self-assessment of its information technology organization. The assessment should evaluate the extent to which the agency information technology model proposed by the Gartner Group is appropriate for the agency.**

Information Technology in Higher Education Should Remain Independent

As part of its study, Gartner Group examined the information technology environment at two of the major State-supported higher education institutions, Virginia Tech and the University of Virginia. The assessments consisted of Real Decisions data center benchmarks, one at each of the institutions. The results of these benchmarks are provided in the form of the NOW Index, as described earlier in this report. As with the DIT benchmarks discussed earlier, the lower the index, the more efficient the data center operation. The results for the institutions were:

- Virginia Tech NOW Index = .41;
- University of Virginia NOW Index = 1.05.

From these results, Gartner Group recognizes Virginia Tech as having an excellent level of efficiency, though this is largely due to reduced expenditures for the mainframe operation as Virginia Tech migrates to client/server technology. Therefore, comparisons of the Virginia Tech data center to others operated in State government are not useful. Further analysis of the Virginia Tech benchmark data reveals several interesting points:

- The costs of the Virginia Tech data center are much lower than for the peer groups examined. In particular, the costs for hardware, technical services, and finance/administration are less than a third of the costs at comparable data centers. The costs associated with software, operations and occupancy are also much lower than for the peer groups examined. The low costs are due to the migration of the Virginia Tech computing environment from the mainframe to client/server technology. Virginia Tech is making a substantial investment in client/server computing, and conversely, is making little investment in mainframe computing. The benchmark does not measure the efficiency of the client/server operation, only the mainframe.

- The workload of the data center is heavier than the peer group by 37 percent. Contributing to this are high levels of interactive and online database transaction applications. The combination of low costs and high utilization yields the high efficiency rating.

With regard to the University of Virginia, the benchmark shows a slightly less efficient operation than the norm. However, it should be noted that a NOW Index of 1.05 is not indicative of a poor data center operation. In fact, further analysis of the University of Virginia benchmark data indicates that the university operates the data center with costs well below those of peer organizations. Among the key findings in the benchmark are:

- The costs of the university's data center are much less than the peer groups examined in the hardware, disaster recovery, and finance/administration areas. The operations and occupancy areas are less expensive than the peer groups by a wide margin. The only more costly item is that of technical services, but in this case only by seven percent. Overall, the costs at the data center at the University of Virginia are less than half that of the peer group.

- The workload of the data center is 68 percent of the peer group average. Factors contributing to this low relative workload are the interactive and batch components, representing 116 percent and 57 percent of the workload for the data center, respectively. The low utilization compensates for the low cost and yields a NOW Index which is slightly higher than average.

The central focus of this study dealt with the possible privatization and restructuring of information technology services and resources for the Commonwealth. One question which may arise in such an analysis is the relationship of educational institutions vis-à-vis the central information technology service agency. Could consolidation of institutional resources with those of the State achieve improved service or lower costs? Gartner Group finds that in the Virginia environment, consolidation of executive agency and educational computing is not advisable.

Clearly, the mission of the two academic higher education institutions examined in this study is distinct and different from that of the rest of State government. While both the universities and State agencies operate under the umbrella of State government, are funded by the government, and are in existence for the overall benefit of the citizens of Virginia, their missions and purposes are not the same.

It is Gartner Group's conclusion that the interests of the universities examined in this review are best served by the institutions continuing to procure, develop, maintain, and operate information technology services as needed independent of the provision of services for executive branch agencies. This includes data center operation, desktop computing, applications development, and campuswide communications. However, it should not include wide area data telecommunica-

tions needs, which would best be administered by the central telecommunications group. This would mean consolidation of Net.Work.Virginia, now administered by Virginia Tech, into the State network to be provided by the Department of Technology Services. In addition, the institutions of higher education should be involved in the statewide planning and standards activities of the Chief Information Officer.

Recommendation (17). **The Commonwealth of Virginia should maintain the existing decentralized approach for information technology services for State institutions of higher education, with the exception of wide area networks, which should be administered by a centralized telecommunications organization. In addition, institutions of higher education should make use of services provided by the Technology Consulting Division recommended in this report.**

Conclusion

In addressing the issues outlined in this report, Gartner Group has identified significant areas in which the Commonwealth's use and management of information technology are sound. DIT's operation of the State data center has been cost effective in providing mainframe computer services to agencies. Contract rates for telecommunications services are among the best seen for any Gartner Group client. Virginia Tech has shown leadership in bringing to the educational institutions new telecommunications technology, which State agencies can now use also. Both the University of Virginia and Virginia Tech are seen as having well run, efficient data centers. It is important that the Commonwealth build on all of these successes.

Yet, Gartner Group has identified significant reason for concern as well. Too much of the use of information technology in State government now occurs with inadequate planning and coordination. In addition, the State has been slow to respond to changes in technology. The issues discussed in this report point to the need for a more focused approach to information technology – one that has clear leadership from the top, and strong support from all the agencies which must rely on technology on a daily basis. The restructuring proposed in this report, in combination with the other improvements recommended, can be the foundation for improved information technology services for State agencies, and improved government services for the citizens of Virginia.

Appendix A

Study Mandate

ITEM 14 F - 1996 APPROPRIATION ACT
(As Amended, 1997 Session)

The Joint Legislative Audit and Review Commission shall conduct a study of data processing services for state agencies and institutions, including the feasibility and advisability of privatizing the state data center located at the Department of Information Technology. As part of the study the Commission shall: 1) evaluate the effectiveness of statewide information technology planning and standards, including the mission and operations of the Council on Information Management; 2) assess the scope and utility of current data center services, including the feasibility of further consolidation of state data processing systems; 3) evaluate the effectiveness of using multiple main frame platforms; 4) determine the short- and long-term costs associated with privatization of the data center as well as continued operation by the state; 5) examine the various forms or levels of privatization which could be used; 6) assess the impact on agencies and institutions using DIT services; and 7) examine the methods for managing the risks associated with privatization of critical data processing systems. To complete its work, the Commission may employ any consulting services it deems necessary. Expenses for such services shall be funded from a separate appropriation for the Commission from the Computer Services Internal Services Fund, in the amount of $495,000. In addition, the Commission shall include in its study an assessment of the current status of agency actions associated with computer hardware and software problems related to the year 2000. The Commission's assessment shall include, but not be limited to, an inventory of actions completed or in progress in each agency and institution of higher education, the cost of completing all necessary modifications to hardware and software, and potential mechanisms for funding the identified costs. To complete the assessment of year 2000 issues, a separate appropriation of $100,000 for the Commission shall be made from the Computer Services Internal Services Fund. All agencies of the Commonwealth shall cooperate with the Commission in the completion of this study. The Commission shall make a final report to the Governor and the General Assembly no later than January 1, 1998.

Appendix B

Agency Responses

As part of an extensive data validation process, each State agency involved in a JLARC review is given the opportunity to comment on an exposure draft of the report. This appendix contains the responses of the Secretary of Administration, the Council on Information Management, the University of Virginia, and Virginia Tech.

Appropriate technical corrections resulting from the written comments have been made in this version of the report. Page references in the agency responses relate to an earlier exposure draft and may not correspond to page numbers in this version.

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