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Digest of a Performance Audit of the Division of Information Technology Services

This audit of the Division of Information Technology Services (ITS) is the result of a Legislative Process committee request. Our audit reviewed significant information technology related activities throughout the state. To assess the degree to which information technology related activities and functions are coordinated throughout the state, the scope of this audit was expanded beyond the Division of Information Technology Services. As such, we reviewed the responsibilities and functions of the state Chief Information Officer as well as the activities of various institutions of higher education relative to purchasing of equipment, long-distance telephone service, and maintenance of desktop computer equipment. We also reviewed purchasing practices of agencies within the executive branch, an activity over which ITS has no authority.

Our findings indicate that ITS is generally providing services as directed by statute. However, they could improve in the areas of customer service and customer relations. Also, we believe the division should more accurately determine and document the cost of some services they provide. In addition, and external to ITS, we found the need for greater control and coordination in the areas of desktop computer equipment purchasing, long distance telephone service, and maintenance of desktop equipment. We believe greater control and coordination through the state Chief Information Officer is necessary.

Coordination of Information Technology Functions Could Improve. We found that while there are diligent and productive efforts to coordinate information technology (IT) activity in the state, there is nonetheless, significant opportunity for better coordination among information technology users. Significant savings may be realized through better coordination and increased controls over technology users. For instance, we believe that several million dollars alone could be saved annually through modified purchasing practices. Similarly, significant savings in long-distance telephone service and desktop computer equipment maintenance could be achieved annually through enhanced coordination and cooperation. Finally, we found that greater efficiency and effectiveness could be realized in the area of mainframe computing through the establishment of policies and procedures which mandate certain controls.

More Controls are Needed Over Customer Service. Our audit determined that staff within the Division of Information Technology Services (ITS) identify and correct customer service problems; however, ITS does not always maintain good customer relations. We are concerned with both delays in getting customer problems resolved and a lack of communication between ITS staff and the customer. We recognize the value of ITS' ability to correctly

diagnose and rectify customer problems but service delays and poor communication have increased customer frustration and dissatisfaction with the service.

Fiscal Review is Needed. We found that some service provision areas are making substantial profits in order to subsidize other areas that are losing money. Rates in some functional areas that have generated either a profit or loss for the past two or three years have not been adjusted based on the deliberate recommendation of the rate committee. We also found that information was not available to document the existing rate structure for some smaller functional service area.

Chapter I

Introduction

This audit of the Division of Information Technology Services (ITS) is the result of a Legislative Process Committee request that ITS receive an in-depth budget review. Our findings indicate that ITS, is generally providing services as directed by statute. However, they could improve in the areas of customer service and customer relations. Also, we believe the division should more accurately determine and document the cost of services they provide. In addition, and external to ITS, we found the need for greater control and coordination in the areas of desktop computer equipment purchasing, long-distance telephone service, and maintenance of desktop equipment. We believe greater control and coordination through the state Chief Information Officer is necessary.

Division of Information Technology Services

Information Technology Services is a division located within the Department of Administrative Services. ITS is an internal service fund agency, which by law is responsible for establishing, providing, or otherwise coordinating a central computer center and telecommunication systems used in delivering services for state agencies. ITS does not establish policy or procedures related to information technology issues, rather, they primarily provide technical expertise for information technology activities. Establishment of policy, procedures, and standards for state agencies is a function of the state Chief Information Officer. Note, however, that a state agency by definition in the **Utah Code** does not include the legislative and judicial branches, the State Board of Education, the Board of Regents, and institutions of higher education.

To accomplish its assigned tasks, ITS has been organized into five functional areas: Technical Services, Software Management and Support, Network Services, Operations, and Administration and Finance.

The Technical Services group provides support for telephone service including, customer consulting for determination of phone service needs, programming, and repairs. In telephone service, this group supports over 16,000 telephones statewide. This group also provides support and maintenance for a statewide microwave network, wiring of facilities for both telephone and data networks, and installation of radios, sirens, light bars, and other special equipment in vehicles, such as are required for police cars.

The Software Management and Support group is dedicated primarily to providing and supporting mainframe computing, a service that is ever growing in demand as well as being very complex and dynamic.

The Network Services group provides network planning for voice and data networks, planning for facility wiring, telecommunication planning and support for two regional centers (Ogden and Provo), and planning and operation of the state's wide area network. This group is also responsible for negotiating and monitoring several contracts with commercial vendors, including long-distance phone service, cellular phone service, pager service, and frame relay service for connecting users on the wide area network.

The three primary functions performed by the Operations group are the customer service help desk, the Network Control Center (NCC), and mainframe Computer Operations Technical Support (COTS). Note that customer service in ITS is provided via a two-tier system. The first tier, or first level of assistance, is provided by help desk personnel, under the management of the Operations group. They provide basically nontechnical assistance to customers calling in with problems or questions related to any service provided by or coordinated by ITS, including telephone service, mainframe operations, wide area network operations, and maintenance of desktop equipment. Problems that cannot be resolved by help desk personnel are dispatched to more technical work groups within ITS or to commercial vendors for problem resolution. These work groups and vendors collectively comprise the second tier of the system. For example, telephone repair problems not resolved by the customer representatives are dispatched to the telephone repair work group. From this group, technicians go to the customer's site to repair the telephone. Problems could also be dispatched to the NCC, which monitors the status of the networks, and the COTS, which monitors the state's mainframe computer.

The Administration and Finance group provides for internal financial accounting. This group also develops proposed rate structures, coordinates for the purchasing of software and the software master licensing agreements, and contracts and coordinates with private vendors for maintenance of desktop computer equipment.

Audit Scope and Objectives

As stated previously, this audit of the Division of Information Technology Services (ITS) is the result of a Legislative Process Committee request. Our audit was structured to enable us to address the following specific questions raised by the committee:

- Can coordination among technology initiative users be improved?
- Are ITS rates reasonable?
- Could some ITS functions be privatized (outsourced) on a cost-beneficial basis?
- Why does ITS have such a large retained earnings balance?
- Is ITS capable of handling new technology initiatives?
- Has SmartUTAH been appropriately planned?

Each of these questions, with the exception of the final two, are addressed in the subsequent chapters. This question of coordination is addressed in detail in Chapter II. The questions dealing with ITS rates, privatization, and retained earnings are addressed in Chapter IV.

From our observations, we believe that ITS has capably handled new technology initiatives. For instance, in the development of the state's wide-area network, ITS was one of the first to employ the frame relay architecture which has become widely used throughout the world. In fact, many other states we contacted regarding the use of frame relay networks are lagging behind Utah. Furthermore, through management of an extensive microwave network, ITS has provided Utah with a reliable and widespread public safety communications capability as well as a backup to commercially provided communications. In other telecommunications initiatives, such as fiber optics and Integrated Services Digital Network (ISDN), ITS has for years been developing or using these technologies and working to make them available to all state agencies and to the local citizens. Fiber optics are used presently in the Capitol Hill area of the wide area network and for many mainframe computer connections. ITS has also been active in encouraging commercial providers of communications to join cooperatively to build a statewide fiber optic network, recognizing this to be the conduit of communications in the foreseeable future. ITS is also evaluating the use of ISDN communications provided by a commercial vendor for use by state agencies. With ISDN technology, multiple and concurrent uses of a single connection are possible. As a final example of demonstrated capability, ITS provides and operates an advanced mainframe computer system to which all agencies can connect via the wide-area network.

As mentioned above, in discussing information technology with representatives of other states, we found that several of those states are just starting to employ such things as frame relay and fiber optic technology, technology that Utah has used for years. Indeed, when we discussed information technology issues with a representative from Wyoming, we were told that they patterned their telecommunications agency and practices after Utah's ITS division because they were impressed with its operations. Within the state, most customers interviewed believe that, despite some problems, ITS is providing them with the service they need.

Our conclusions stated above are based on our observations of ITS as well information gathered during the entire course of the audit. We believe that ITS can handle new technology initiatives based on our current findings and observations and from the historical ability of ITS to provide for the technological needs of the state.

Regarding SmartUTAH, early indications are that planning is appropriate and accomplishing the objectives set for it. The planning for SmartUTAH is patterned after *Smart Valley*, a similar effort underway in the Silicon Valley of California. Although tailored for our unique situation, the SmartUTAH program is similar to that of *Smart Valley*. Indeed, the SmartUTAH vision and methodology for attainment is nearly identical to that of *Smart Valley*. In both SmartUTAH and *Smart Valley*, the idea is to encourage the creation or development of

an advanced information infrastructure as well as the collective ability to use that infrastructure. For instance, a goal of SmartUTAH is to get businesses to provide online inventory and prices to enable customers to shop electronically through home computers or through computers provided by SmartUTAH at public buildings throughout the state. SmartUTAH also envisions that the public would have the ability to do such things as file tax returns and to explore political issues through the SmartUTAH network.

SmartUTAH is a non-profit corporation established through a partnership between the state and businesses operating within Utah. A primary purpose of the corporation is to promote Utah's ability to be a leader in the information age by encouraging the development and implementation of an advanced information infrastructure for use by business, government, and education. SmartUTAH is governed by a board of trustees, receives consultation from an advisory committee made up of public and private sector officials, and is primarily operated by a staff of three people. The SmartUTAH movement intends that the private sector be the source of funding and direction ultimately and that the current government involvement is only to act as a catalyst to get things underway.

During the approximate two years of operations of SmartUTAH, about \$134,000 has been spent for wages, professional services, and for trade shows and conventions, although about \$500,000 has been appropriated through fiscal year 1996. During the same period, approximately \$200,000 has been received from private companies with an additional \$95,000 of other in-kind support.

Ultimately, SmartUTAH is to connect government, business, and the people of Utah via an information infrastructure that will enable the replacement of old ways of doing things with new ways that are more cost-effective and/or more readily available to the public. For instance, through the SmartUTAH initiative it is intended that computers be placed in public libraries throughout the state for use by those who do not have computers in their own homes. Through a proposed "intranet," connectivity can be achieved allowing for such things as filing tax returns, doing comparison shopping, and for reviewing issues related to elections or other public processes. A series of town meetings are planned whereby the concepts of SmartUTAH are brought to the public with the intention of leaving the capability behind after the meeting. That is to say, after the meeting is over, the idea is to have the equipment in place in the public library as well as qualified personnel to assist in the use of the equipment. In addition, SmartUTAH is targeting chambers of commerce, various professional organizations, and civic groups in order to promote their program.

As with the previous question, there is no further discussion of SmartUTAH in subsequent chapters. Given the relative newness of the program, we do not see where further review is warranted at this time.

The body of this report is divided into three chapters. In the first chapter (Chapter II), we show where coordination among technology players needs to improve. This chapter focuses primarily on organizations external to ITS. The second chapter (Chapter III) shows where customer relations needs to improve at ITS. This chapter points out the need for further policies and guidelines relating to customer relations. This chapter focuses on the need for better coordination within ITS to improve customer relations. The third chapter (Chapter IV) shows that more fiscal review is needed. This chapter shows that some rates need to be reviewed as well as ITS' cost accounting systems.

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Chapter II

Coordination of Information Technology Functions Could Improve

We found that while there are diligent and productive efforts to coordinate information technology (IT) activity in the state, there is nonetheless, significant opportunity for improvement of coordination among information technology users. Significant savings may be realized through better coordination among and increased controls over technology users. For instance, we believe that over one million dollars could be saved annually through modified purchasing practices. Similarly, significant savings in long-distance telephone service and desktop computer equipment maintenance could be achieved annually through enhanced coordination and cooperation. Finally, we found that greater efficiency and effectiveness could be realized in the area of mainframe computing through establishment of policies and procedures which mandate certain controls.

As suggested, we believe the current situation results in higher costs to agencies and taxpayers and does not enhance productivity. Consequently, we suggest there is a need for greater cooperation among information technology users. In this effort, there are three principle entities that must continue to work together to accomplish that goal: the Division of Purchasing, the Division of Information Technology Services, and the Chief Information Officer (CIO). However, we suggest that a “business as usual” approach is not sufficient to ensure greater cooperation. For instance, in the area of purchasing, centralized purchasing and comparison pricing on all purchases would likely result in significant savings, but are not being done at present. Also, the CIO should play a more proactive role by conducting routine IT audits, and by establishing policies and standards, as required by existing Utah law.

In addition, Utah law may need to be modified to provide more authority to the CIO and to ensure a greater degree of cooperation and coordination among all IT users. Existing Utah law tends to encourage an independent approach, at least among major entities within the state. Specifically, the current law exempts the legislative and judicial branches, as well as the State Board of Education, the Board of Regents, and institutions of higher education from the authority of the state Chief Information Officer. According to the law, participation by these exempt entities in IT coordination is on a “choose to participate” basis.

This chapter is divided into four sections. The first section shows where greater purchasing controls will lead to significant savings. The second section demonstrates how combining long-distance phone service will save money. The third section identifies how modifying equipment maintenance procedures will save money. The fourth section shows that more coordination would lead to more efficient mainframe computing.

Additional Purchasing Controls Are Needed

Many agencies have paid too much for desktop computer equipment because purchasing agents did not compare prices among authorized vendors. Our findings indicate that savings between 7 and 12 percent are possible when comparison shopping is used. With the volume of buying the state does on desktop computer equipment, savings of over \$1 million may have been realized in fiscal year 1995 by comparison shopping and selecting the vendor with the lowest price for any given equipment purchase. We believe the best solution to the purchasing problems identified in this section is to implement additional controls to ensure comparison shopping. Even though purchasing has encouraged agencies to compare prices, some agencies are not comparison shopping. The Division of Purchasing plans to audit and encourage agencies to shop and have written documentation justifying their purchases.

Contributing to the excessive amount that has been paid out is the lack of oversight in the past over the purchasing contract the state has with vendors. Monitoring purchases and auditing of vendor records to ensure compliance with the contract has not occurred. Indications are that this lack of control may have resulted in a situation wherein some agencies paid more than others for the same equipment and perhaps some price inflation at the end of the fiscal year. We suggest that routine purchasing reviews be accomplished by the Division of Purchasing to ensure contract compliance. The Division of Purchasing plans to conduct contract reviews of the vendors in the future.

Moreover, some equipment purchased in the past has been of questionable quality and reliability, leading to excessive down time because of component failure, malfunction, or network incompatibility. Further, some purchases were made at the end of the year with the objective being to buy whatever equipment was available, enabling the agency to avoid lapsing funds. Current purchasing policy and state contracts allow customers to buy any available brand of equipment. We suggest that purchases should be limited to a few quality brands.

To evaluate the purchasing practices in desktop computer equipment in this audit, we compared purchases made from three local vendors on state contract that we refer to as Vendor A through Vendor C.

Some Agencies are Paying too Much for Desktop Computer Equipment

Some state agencies pay too much for computer equipment because they do not conduct comparison shopping and because the Division of Purchasing is not currently conducting contract reviews of vendors. We recommend that the Division of Purchasing encourage state agencies to comparison shop by requiring the agencies to have written documentation for their purchases. Also, the Division of Purchasing should review the prices charged by the vendors to make certain vendors are adhering to the contract.

Comparison Shopping is not Being Done. We found that some state agencies do not routinely comparison shop among the authorized vendors. There is also a general attitude that the state contract guarantees the lowest price regardless of which vendor is selected. Many agency staff deal exclusively with the single vendor that they have determined to be the best. However, among the agencies there was not a consensus about which vendor was “best.” For example, we spoke with several agency representatives who recommend only Vendor A because of their good service and low prices. Yet several other agency representatives make the same claim about Vendor B. A few agencies indicated they switched to their preferred vendor at some time in the past due to a bad experience with another vendor. As such, they are even more sold on their new choice of vendor. This indicates that many customers make purchases based primarily on personal experiences without considering cost. We believe that through comparison shopping, the state could potentially save annually between 7 and 12 percent of the total spent on desktop computer equipment which equates to as much as \$2.8 million savings per year if all agencies buying through the computer stores are used as the comparison base or \$1.7 million dollars if only executive branch agencies are used.

As indicated, most agencies contacted do not regularly compare prices when making purchases. In fact, of 16 agencies contacted, only two indicated that they regularly compare prices among vendors when making purchases. For example, one agency representative who authorizes and purchases desktop computer equipment said he relies upon his close relationship with the staff of one particular vendor to provide him with the best price and service. As such, he does not comparison shop, believing that the state contract gives the lowest possible price. Another representative said he does not comparison shop because he likes the service he gets from one of the vendors. Another representative said that he buys from the vendor who delivers most quickly. From these and other discussions, we conclude that agency staff are often not doing comparison shopping, but rather they are depending on the state contract to get the lowest possible price.

Agencies should justify their purchasing decisions. Agencies should consider price and service when making their computer purchase. As noted above, our review found that agencies do not always consider these factors. For instance, some of those individuals doing the purchase do not comparison shop believing that just because they are buying from a vendor on state contract they will get the lowest price. Also, many of those interviewed indicated factors other than service or price, such as tradition, were used in making their decision.

To determine whether a lack of comparison shopping is costly to the state, we extracted a small sample of purchases made by agencies under the state contract during the period September 1994 through April 1996. For the sample, we randomly selected 175 purchases from a population of nearly 23,000 for the specified period. We limited our sample to purchases of personal computers, printers, and scanners.

We then grouped nine “like” items of equipment and compared the actual price paid for the items among the vendors. In this first test, the items compared were primarily specific models

of printers, and were selected for comparison because they were sold in larger quantities by at least two of the three vendors we compared. We conducted the price comparison in three time periods: the first period we compared prices over the 20-month period of August 1994 through March 1996; the second sample period is the six-month period of January 1995 through June 1995; and, the third sample period is a three month period that compares prices during the three-month period when each item was sold in greatest quantity. This latter period varied for each item. Since desktop computer equipment prices vary considerably over time, we employed this 3-phase comparison process to ensure that we did not compare an item purchased from one vendor at the beginning of our sample period to the price charged by another vendor at the end of our sample period.

Significant Savings can be Realized. The following figure shows the percentage savings that would have been realized had the customer purchased the equipment from the lowest priced vendor.

Figure I			
Potential Savings Through Comparison Shopping Test 1			
Description	20-month Period (% savings)	6-month Period (% savings)	3-month Period (% savings)
Deskjet 540	14	12	7
Deskjet 560C	2	15	8
Deskjet 850C	13	---	8
Deskjet 660C	14	5	3
LaserJet 4+	9	6	6
LaserJet 4M+	7	7	7
LaserJet 4SI	5	10	10
LaserJet 5P	10	6	19
Toshiba T4900CT	7	7	4
Averages:	8	7	7

As shown above, for the nine items of equipment tested, we found that the savings that could have been realized by shopping for the lowest cost were 8 percent, 7 percent, and 7 percent for the three respective periods covered. The average savings for the periods combined is just over 7 percent.

From the entire sample period of our first test, we determined the dollar savings to be approximately \$86,000 for the approximately 950 items purchased. This figure was calculated by subtracting the average cost of the item as sold by the lowest priced vendor from the actual price of the higher priced vendor, then multiplying the difference by the total quantity sold.

To expand our comparison base, we conducted a second test from our sample data. In this test we compared like items again, but in this case we compared items sold in somewhat disproportionate quantities among the vendors. That is, we compared sales wherein one vendor sold many and another vendor sold only a few of any given item. In this case we found 15 different items of equipment (specific models of a particular brand) from which to make a comparison. The percentage savings that could have been realized ranged from about 3 percent to 35 percent for an average of 12 percent and a savings of approximately \$26,800. These percentage and dollar savings figures were derived by comparing the price of the item sold by the highest cost vendor and comparing that to the lowest cost vendor, then multiplying by the quantity sold. Figure II depicts our findings in this second test.

Figure II			
Potential Savings Through Comparison Shopping			
Test 2			
Description	Item	Savings (%)	Dollar Savings
HP Computer	Model A	18	\$ 3,503
Compaq Computer	Model A	7	167
	Model B	35	2,316
	Model C	21	1,269
	Model D	7	109
	Model E	10	3,783
	Model F	3	177
	Model G	4	161
Toshiba Computer	Model A	6	1,262
	Model B	18	3,496
	Model C	25	8,919
Totals:	11 Items	12	\$ 26,789

Figure II shows that the average difference in price between the vendors was 12 percent.

While conducting our price comparison among the three vendors, we determined that the vendors sold approximately 6,800 different items as identified by their stock numbers. The two tests we ran account for only 20 of those items but still show a significant savings of about \$113,000. The 6,800 figure should not be confused with total quantity of items sold, which was in excess of 46,800. An exact count of items sold is not available since one vendor did not provide quantity figures with the data they provided. The 46,800 figure is conservative since it assumes that only one item was sold with each transaction from that vendor. If this vendor sold an average number of items per transaction that is comparable to the other two vendors, the total quantity may have been as high as 73,000 items.

Our tests indicate that savings of between 7 and 12 percent were possible by shopping and selecting the vendor with the lowest price for any given equipment purchase. If we project a 7 to 12 percent savings to all purchases made from these three vendors, between \$620,000 and \$1 million in savings could have been realized. In fiscal year 1995, state purchasing reported about \$23 million was spent by government agencies on the PC store contracts on desktop computer equipment and related components and accessories. If by simply comparing prices among a few authorized vendors and the 12 percent savings were realized across the board, that would have resulted in a savings of \$2.8 million if all government agencies spending in the PC stores are used as the comparison base; if just state agencies are used, this figure becomes \$1.7 million.

An example of the impact comparison shopping can have on the purchase price is demonstrated by a purchase made by one agency. They conducted a thorough review of equipment capability as well as cost before purchasing a large number of personal computers in June 1995. In this case, the agency contacted each of the vendors on state contract and informed them of their needs and that they were shopping among the vendors. The vendors in this case competed among themselves for the business, likely in part because this was a large quantity purchase. As a result of their effort, this agency office bought the computers for as much as 18 percent less than another agency that bought the same equipment, from the same vendor, at about the same time.

The following figure shows the different prices paid by three agencies. The vendor in all of these purchases was the same.

Figure III
Example Of Cost Savings Through Comparison Shopping

Purchaser	Date	Item	Price	Quantity
A	6/12/95	TOS PA1205U-T2A	\$4,590	26
B	6/30/95	TOS PA1205U-T2A	4,829	18
C	6/30/95	TOS PA1205U-T2A	5,572	1

In the above figure, we can see that purchaser A paid about 5 percent less than purchaser B and almost 18 percent less than purchaser C for the same item during the same month. It appears that volume buying may have influenced the price, but under a cost-plus contract system, prices should not vary so dramatically. The cost-plus contract is discussed in more detail below.

We discussed this purchase with purchaser B and found that he dealt exclusively with a single vendor and did not conduct competitive bidding. We also contacted purchaser C who paid about \$1,000 more for the same product and found that he likewise did not compare prices before making the purchase.

Relevant to our review of desktop computer equipment purchasing, this example illustrates two key points regarding purchasing in general and the benefits of a competitive bid purchasing process. First, purchaser A did not make a hasty purchase. They started by identifying the performance and capability they wanted and needed, then asked for price quotes on a couple of high quality brands that would meet that performance standard. This is a significant detail that not all agencies accomplish, and will be discussed in more detail below. Second, when obtaining price quotes, this agency contacted multiple vendors. They also made it clear to the vendors that they were contacting other vendors, likely prompting each of the vendors to be more willing to negotiate the price in order to get the sale. This worked to their advantage because although the vendors may not exceed their fixed markup percentage they certainly may charge less. This point is likely even more valid when considering that the agency was making a large volume purchase.

Cost-Plus Contracts Allow for Price Variations Among Vendors. For several years, a statewide contract has been in effect with several vendors. This contract is designed to provide for the procurement of personal computer hardware and warranty service. The contract is

available for use by all departments and divisions of state government and all political subdivisions within the state, such as city and county governments. The primary objective of the contract, as stated therein, is “to contract with suppliers who can provide the State with the most products possible, to make available to all users a low-cost solution.” For any given piece of equipment, the contract does not demand or imply that prices will be uniform among the various vendors. Rather, under the current contract, the vendors are allowed to charge enough to recover their cost plus a fixed percentage markup. This is the cost-plus concept. The vendor profit margin for the three primary local vendors varies and may be as high as six percent, depending on the vendor. Because vendor costs do vary based on their sources of supply, the Division of Purchasing requests all agencies to compare the asking price on potential purchases among the vendors to obtain the lowest price. What further exacerbates the situation is that many purchasing agents in state agencies are the local area network administrators for that agency. Their primary concern is running their respective networks, not evaluating equipment and ensuring that proper purchasing procedures are followed. We believe that a more proactive approach should be taken to ensure that state purchases are the most cost effective and that purchase contracts are being observed by the vendors. The purchases should be accomplished through a comparison shopping process. With that approach, the state is guaranteed to get the best price on any given purchase. Other states do require comparison shopping.

Routine Auditing of Vendor Prices is Needed. Regular monitoring of purchases on the contract should also be accomplished. Follow up on purchases on the state contract should be accomplished to ensure that vendors are complying with the contract. Division of Purchasing’s recently negotiated contract allows for contract review and the division intends to monitor the vendor contracts. As the previous example illustrates, some agencies are charged considerably more for the same product than others. In order to get an idea of how prevalent this situation is, we used our sample data of 175 transactions to run a third test on purchase prices. This test further validates the need to competitively bid on all purchases.

In this test we compared the prices each vendor charged for a specific item during any given month to their various customers. This was not a price comparison between vendors, but rather a comparison of prices charged by a single vendor. We accomplished this by comparing prices for all sales of the specific item of equipment that were identified on our sample. For this test, we used data provided by each vendor and we ensured that we were comparing the same item as determined by the stock number and description. We also compared the date of sale to ensure that the comparison month was either the same month or a previous month. We assumed, and the data generally confirm, that prices on any given piece of equipment tend to go down over time. The only variable was the customer.

We found that price variations occurred among all vendors, but that it was much more prevalent with Vendor A than with the other two combined. The following figure depicts only a few of the numerous occurrences we found from our small sample.

Figure IV
Price Variation By Agency

Purchase	Date	Item	Price	Vendor
Purchase 1	9/30/94	AST 501299201	\$2,442	B
Purchase 2	9/28/94	AST 501299201	2,992	B
Purchase 3	6/21/95	HP C2037A	1,388	A
Purchase 4	6/21/95	HP C2037A	1,593	A
Purchase 5	7/27/95	HP C2164A	452	A
Purchase 6	7/31/95	HP C2164A	525	A
Purchase 7	9/20/95	HP C3150A	1,035	A
Purchase 8	6/20/95	HP C3150A	837	A

As Figure IV shows, significant differences in cost were noted. We acquired invoices from the vendors for the above sales, but found nothing to explain why the prices varied so greatly from one sale to the next. Attempts to acquire invoices for a larger number of sales to do a similar analysis were not successful, primarily because Vendor A indicated they could not provide that information for review. Based on the information contained in the invoices we did receive, however; as well as the sales data provided by the vendors, it is apparent that vendor markups have varied, and in some cases very significantly. However, until the current contract was established in January of this year, there was no provision for auditing the vendors' records and there was no tracking of purchases to ensure that contract provisions were being observed. The lack of any kind of centralized purchasing and monitoring of the contract contributes to this kind of occurrence.

Past Purchasing Practices Contributed to a Loss of Productivity

We found that the equipment purchased by some state agencies in the past was of questionable quality and reliability, which led to a high degree of maintenance and down time for certain brands of equipment. We also found that end-of-year purchasing is a common practice among many agencies, and although not necessarily undesirable, it can be more costly and is often times less well planned.

Some Purchased Equipment was of Poor Quality. We found that the equipment purchased by some state agencies in the past was of questionable quality and reliability. The motivation to buy lesser quality equipment is most often due to budgetary constraints, real or

self-imposed. This purchasing philosophy is fostered, in part, by current purchasing rules that allow agencies to buy any brand of equipment even though some equipment is less reliable, more likely to result in failure or malfunction, and/or be incompatible with networks. In fact, we found that over 50 brands and several hundred models of personal computers and printers have been purchased in just the past few years.

Although we did not pursue the point, the practice of buying a wide variety of equipment likely contributes to higher costs since lesser quality equipment will likely be replaced earlier than desired. Owning lesser quality equipment also contributes to higher maintenance costs, as will be discussed later. Loss of productivity is a third concern and although hard to quantify, can be very costly. Indeed, an internationally known information technology consulting firm known as the Gartner Group, advocates an approach wherein all equipment purchases be evaluated based on what they call the total cost of ownership, or TCO. Through the TCO perspective, they point out that the annual cost of operating desktop computer equipment when considering such things as training, maintenance, and down-time, is more than many companies spend for hardware and software combined.

As an example of the problems that can arise from purchasing lesser quality equipment, consider one particular brand of personal computer that was purchased in large quantity, ostensibly because it was a relatively low-cost computer. This particular brand was a non-name brand manufactured locally by a company that has since gone out of business. The ratio of equipment owned to that requiring maintenance was very high, meaning that there was a disproportionate amount of maintenance required for the number of computers owned. With this brand, as well as other lesser-quality machines, the internal components were not of a uniform brand or variety, causing compatibility problems in many cases. It is also reported by the ITS maintenance specialist that the quality of workmanship was substandard, which contributed to the high maintenance rate. These problems likely would have been avoided had the state contract limited purchases to a few proven quality brands in keeping with the purchasing philosophy reflected in the TCO concept.

The following figure shows a ratio of equipment owned to maintenance required for several specific brands. The data cover maintenance action required over a period of about 18 months and include only that equipment on the State Maintenance Contract. Equipment that was repaired during this period and that was covered under a warranty agreement is not included in this figure.

Figure V
Maintenance Ratio For Personal Computers

Brand (All Models)	Quantity Owned	Maintenance Ratio
Brand W	1180	12:1
Brand X	358	11:1
Brand Y	875	17:1
Brand Z	342	23:1

The above figure shows that all equipment is not equal when considering reliability. For instance, the maintenance ratio figures indicate that agencies owning Brand W computers will have a problem requiring maintenance in one out of every 12 computers they own. That is almost twice as many maintenance problems as those agencies owning Brand Z computers. Less reliable equipment can be costly in both repair expenses and loss of productivity. To a degree, we have learned through trial and error which equipment to buy, and that can be a costly practice.

Many Groups Are Limiting Purchases To Specific Brands. There are a growing number of states, businesses, and other agencies that are limiting purchases of desktop computer equipment to a select few brands of quality equipment. This is because they recognize that not all equipment is of equal quality and reliability. For example, Florida hired the Gartner Group to provide information on what equipment is most reliable. The Gartner Group ranked equipment and placed them into tiers and Florida has chosen to purchase equipment only from the top or most reliable tier. In Nevada, only a select few brands may be purchased, as decided by a group of users from within the state. Likewise, Idaho, Michigan, Oregon, and Colorado have all limited agency purchases to a select few brands.

In the private sector we found more examples of limiting purchasing to a few proven brands of equipment. For instance, a large, international company once allowed each of their business units to negotiate their own agreements when purchasing computer equipment. Now the company has consolidated their contract into one national contract and they buy only two well known name brands of equipment. In so doing they report that they have realized two major benefits: first, they claim to have saved millions of dollars in acquisition costs through volume buying, and second, they reduced many of their maintenance support problems because technicians are better able to support and maintain the equipment because of its uniformity. Similarly, another major company has a “standards group” that approves the acquisition of both hardware and software to ensure that compatibility and reliability standards are met on all

purchases. As a final example, another world-wide organization also has limited purchases to two major brands of computer equipment for the same reasons stated above.

An information systems consultant hired by the Legislative Auditor for this audit indicated that there are definite advantages in buying only one or few brands of quality equipment. For instance, his experience indicates that three benefits occur: 1) The initial purchase price can be reduced because the number of items purchased is great; 2) Extended warranties are available; and, 3) Compatibility issues are resolved.

Even some state departments and divisions within Utah are imposing voluntary restrictions, standards, or other guidance regarding the purchase of desktop computer equipment. The Division of Information Technology Services (ITS) buys only Compaq computers, for example. According to the director of Local Area Network (LAN) operations within ITS, standardizing with a single quality brand of equipment has reduced their troubleshooting significantly. In the past they had two full-time employees who just installed and maintained PC's. Now, one employee does that function about half time. The Departments of Insurance and Agriculture have followed the lead of ITS and buy only Compaq personal computers. The Department of Corrections buys only Compaq and Hewlett Packard equipment while the Office of Employment Security/Job Service has limited purchases to IBM, Compaq, Hewlett Packard, and NEC brands. The Department of Commerce buys only AST and Compaq. The Department of Human Services has adopted a less stringent approach but nonetheless attempts to guide the purchases along certain paths. For example, Human Services issued a "technological standard" that they encourage their divisions to follow. This standard recommends that only a few well-known brands of equipment be purchased. A similar approach is taken by the Departments of Public Safety and Health with the department's Information Technology Plan as the guiding principle. Even these agencies should review their purchasing decisions periodically.

Although we see these self-imposed restrictions as a step forward, we are still concerned that the state has not formally adopted a policy of limiting purchases. We believe that this effort needs to be coordinated and set forth as formal policy to ensure the perpetuation of this practice and that indeed the practice is observed at all levels within state government.

Some End-Of-Year Purchasing Is Not Desirable. Another common purchasing practice that can have an adverse impact on the economy of purchasing is end-of-year purchasing. We recognize that end-of-year purchasing isn't necessarily bad and that some agencies intentionally plan for that occurrence. By so doing they have a fiscal cushion to protect against unforeseen expenditures in other areas. However, in contrast with the example we spoke of earlier, where the agency planned for their purchase, we found one agency that makes end-of-year purchases with the main criteria being to buy the brand that can be delivered before funds lapse and whose cost is within their budget. We believe that to be a short-sided approach that does not consider the total cost of ownership issues we discussed previously. In another agency, the purchasing agent indicated that paying higher prices would be acceptable as long as they can

take delivery before funds lapse. We also found a few examples where the prices of items were greater in June than they were before or after that month.

Although we do not see end-of-year purchasing practices as being a major problem, we do believe that the few problems we observed that are related to this practice would be resolved by centralizing purchasing, by ensuring that equipment purchased meets standards for quality, compatibility, and reliability, and by minimizing end-of-year purchasing. To illustrate the magnitude of year-end purchasing and the potential impact of hasty spending, consider the following information. We reviewed the sales records of three vendors on the state contract for the period of July 1994 through March 1996 and found that average purchases, excluding June 1995, totaled \$549,391. That average was less than half the June 1995 purchases which totaled \$1,192,027.

As stated above, we did find some isolated examples where the prices of items were greater in June than they were before or after that month. Although this did not occur on a large scale, it may indicate some vendors temporarily inflate prices to capitalize on the increased demand. For example, one vendor sold a personal computer to an agency in May 1995 for about \$250 less than they sold the same computer to the same agency in June 1995. In another case, an item that sold for \$2,250 in November 1994 sold for \$240 more in June of 1995. Similarly, an item selling for \$2,846 in March 1995 sold for \$3,013 during June 1995, but then dropped back to \$2,900 the next time it was sold in August 1995.

Although we did not evaluate this aspect of purchasing exhaustively, we suspect that large scale end-of-year purchasing may foster undesirable purchasing practices whereby agencies buy what is available and deliverable rather than considering the total cost of ownership, at least to some extent. Also, if prices are adjusted upward by the vendors during this period, by even a small amount, the increased volume of buying can result in significant overall cost increases to the state.

In summary, we found that agencies pay too much for desktop computer equipment and related accessories. This problem exists for several reasons. First, buyers do not comparison shop; second, without more control and monitoring, the state cannot fully benefit from the discounts that are typical with volume buying. We also found that certain agencies were charged more than other agencies when buying on the state contract. We attribute that, in part, to a lack of monitoring of the state purchasing contract. Purchasing numerous brands of equipment is also costly from the perspective of initial cost, and maintenance, and compatibility problems. Finally, certain end-of-year purchasing practices are of concern.

Recommendations:

1. We recommend that the state limit the number of brands and models of desktop computer equipment that may be purchased by state agencies. This should be accomplished through establishment of IT policy and standards as well as state

purchasing policy and be further defined by specifying that only certain equipment may be purchased in any state purchasing contract.

2. We recommend that the purchasing process be modified whereby price quotes are received and the purchasing decision is justified.
3. We recommend that purchases of desktop computer equipment be monitored on a regular basis to ensure that agencies have documented their purchase and that all vendors are in compliance with the state contract.

Combining Long Distance Phone Service Should Save Money

Combining ITS' and higher education's long-distance minutes into a consolidated bid should lead to lower rates. As a whole, the state would likely save money if state agencies and higher education purchased their long-distance phone service together. Currently, state agencies get their long-distance service through a contract managed by ITS; higher education institutions purchase long-distance service separately. Though there is some coordination among higher education institutions and ITS, the long-distance minutes of ITS and higher education have not been combined in negotiating long-distance rates. Further, even within higher education some institutions are not combining their purchasing power. Vendors report that the state as a whole can get lower rates if all higher education and state minutes are combined. Further, other states have reported savings through combining with higher education. However, we were unable to document how much could be saved through combining. Consequently, we recommend that higher education and the state coordinate their efforts in negotiating a single contract to obtain lower rates. However, at a minimum, if any higher education institution perceives the need to negotiate individually, they should be required to negotiate rates at or below the existing rate for any contract for which they are eligible, or be required to join the existing contract.

Both state agencies and higher education get long-distance phone service from private carriers. There are two different categories of long-distance phone service: intrastate--long-distance phone calls within Utah; and interstate--long-distance phone calls outside Utah. Currently, higher education and ITS contract with five different vendors to provide these services. Each higher education institution and ITS contract separately for these services.

Volume Discounts Result From Combined Purchasing

Other factors being equal, vendors typically offer lower long-distance rates as the customer purchases more minutes. Three vendors interviewed all said rates can be reduced by combining state agencies' and higher education's long-distance minutes to get more total minutes. In addition to what the vendors said, our rate evaluation supports the principle that rates are lowered when long-distance minutes increase. For instance, from 1993 to present,

ITS' intrastate rates have averaged 6.6 cents per minute while higher education institutions along the Wasatch front have averaged 8.5 cents per minute. We believe a major reason ITS has been able to get significantly lower rates is because state agencies have a lot more intrastate phone service. We estimate that in 1995 ITS had over 9.0 million intrastate minutes whereas the higher education institutions had about 4.2 million intrastate minutes. Conversely, ITS only has about 2.4 million interstate minutes compared to about 8.1 million minutes for higher education.

By combining state and higher education for both intrastate and interstate calls, total usage is increased by about 45 percent. All three vendors interviewed said that with this increase in volume, they would offer significant discounts. Although two vendors would not give a specific discount figure, the third vendor estimated at least a 10 percent discount. As explained below, Oregon has consolidated higher education and state agencies telephone service. Oregon's telecommunications specialist estimates that higher education has added about 40 percent more long-distance minutes and combining higher education and the state has saved about 20 percent. Using current state contract rates and 1995 estimates of total minutes, the state spent about \$2.8 million dollars for long-distance minutes. A 10 percent discount equates to \$280,000 annual savings; a 20 percent savings equates to \$560,000.

Current Purchasing Approach is Somewhat Fragmented

Higher education institutions and the state have historically negotiated separate contracts. These contracts have been negotiated at different times throughout the year for different periods. For instance, Utah State University in 1990 did not have a formal contract for phone service; rather, USU had informal agreements with vendors to provide service. USU gradually brought more and more of their services under a formal contract. In June 1996 they negotiated a new contract with AT&T. Weber State University plans to piggyback with USU's new contract. Salt Lake Community College's (SLCC) contract was negotiated in June 1993 with Tel America. When SLCC's contract expires, SLCC is planning to join with the state contract. The state negotiated a contract in 1991 that lasted until 1995 when the state negotiated its contract with MCI and US West.

We reviewed with higher education's and ITS' telecommunication directors the feasibility of combining the purchase of long-distance service to get lower rates. They explained that over the years, higher education and ITS have typically not coordinated their phone service. ITS staff said they did not make coordinating with higher education a high priority in the past. ITS staff believe that higher education telecommunication directors are mistrustful of the state and are not anxious that higher education and ITS combine. However, ITS staff feel it would be beneficial if the state and higher education combined purchasing long-distance service.

The telecommunications directors in higher education were mixed in their feelings about joining with ITS for long-distance service. They agreed, however, with ITS that coordination between higher education and the state has not been a priority. They pointed out that even

though they are not totally successful, they are making efforts to combine their purchasing power within higher education. For instance, the University of Utah's contract allows other higher education institutions to get the University of Utah's prices. Some institutions have taken advantage of this. In addition, as pointed out earlier, the state contract allows other public institutions to get the same state pricing. Some institutions are planning to take advantage of this feature. However, several directors felt that there are unique situations in higher education that make it difficult to have a "one size fits all contract." The institutions have more operated assisted calls and international calls than the state, for instance. Several telecommunications directors also expressed concerns about ITS trying to "dictate" to higher education. One director was particularly concerned about international calling. His institution wants to use AT&T because of the excellent service they provide in this area.

Higher education officials were also concerned about "locking-in" to a rate on a long-term contract. Telecommunication rates as a whole are declining. The institutions all have different renewal times. Different renewal times allow the institutions to use the state's contract price to match or possibly get an even lower price than the state's price.

Other States Have Combined Long-distance Service

To see how feasible it would be to combine ITS' and higher education's long-distance purchasing power we contacted several Western states to see if they have tried combining higher education service with the state. Colorado, Washington and Oregon report they have successfully combined higher education's and state agencies' long-distance phone service.

We contacted Colorado's higher education and state agency telecommunications staff to see how significant the problems are with combining service and what solutions they have developed for any difficulties. Colorado's higher education telecommunications representative and the state's telecommunications director said that the key to developing a successful combined purchasing approach is to ensure that all concerned have a voice in the contract negotiation. In Colorado, any Request For Proposal (RFP) is developed jointly by representatives of the state and higher education. By doing this, the unique needs of higher education and the state are incorporated into the contract. For instance, one way higher education's unique needs for international phone service can be resolved, is to bid it separately from the other long-distance service. Finally, they pointed out that the state can take advantage of declining costs through negotiating a "most favored nation" status in their contract. This clause allows the contract prices to be reduced when the state provides evidence that prices in the industry have declined. In fact, Colorado state's telecommunications staff said that they have done this several times with their international carrier.

The director of Oregon's telecommunications explained that several years ago higher education and the state's telecommunications staff were mistrustful of each other. He explained that a consultant went to each higher education institution and state agency to determine their needs and to explain the benefits of combining their purchasing power.

Together, state agencies, higher education and the consultant developed an RFP that met the needs of higher education and state agencies.

Our review of this information suggests that ITS and higher education should consolidate their minutes into a joint bid for long-distance service to see if the rate reduction is sufficient to justify consolidating. Our information suggests that significant rate reductions may result. However, we cannot say for certain because Utah's current rates when compared with rates from Oregon, Colorado and Washington are very competitive. The differences may be due to a variety of factors such as Utah's extensive microwave system which puts pressure on vendors to lower rates because the state has the microwave system which could be used if commercial rates get too high. Nonetheless, we believe the state and higher education should try combining their service with one or more vendors to see if rates can be significantly reduced as the vendors claim. At a minimum, this consolidated effort will eliminate much of the redundant negotiating.

Recommendation:

We recommend that ITS and higher education coordinate their efforts by negotiating a single long-distance phone contract. However, if any higher education institution can negotiate lower rates independently they may enter into a separate contract.

**Savings Through Modifying Desktop
Computer Equipment Maintenance Practices**

Currently some agencies are paying more than \$300,000 in premiums than they are receiving in service for maintenance on their desktop computer equipment. ITS has a contract with vendors to provide maintenance services on agency desktop computer equipment. ITS manages the contract but agencies have the choice of deciding on one of two maintenance options. First, they may select to pay an insurance-type premium on the equipment, wherein the agency pays a monthly fee and any repairs on the machine are accomplished at the vendor's expense. Second, the agency can choose a time and materials option where the agency only pays if maintenance occurs and then only the actual cost of repair on the equipment. Our tests show that if more equipment were on the time and materials option the state would save money.

There are about 18,000 pieces of equipment statewide that are either on the insurance-type maintenance service or on a time and materials contract. About half the devices are on insurance and half on time and materials. Total cost of maintenance is over \$1 million.

Tests show that savings are possible through changing how the agencies obtain desktop computer equipment maintenance service. Our first test showed the overall potential for

savings in desktop computer equipment maintenance by reducing the amount of equipment on insurance-type coverage. In this test, we analyzed maintenance cost data from fiscal year 1996 for the two primary providers of desktop computer equipment maintenance. We determined that state agencies paid over \$694,000 in insurance premiums to the two vendors during that period. Actual cost of repairs for that same period was only \$375,000, which means the state paid more than \$319,000 in insurance premiums than was received in services.

Our second test identified examples of equipment that should probably use a time and materials approach rather than insurance. In this test we compared the costs of insurance with the value of the maintenance service received for three types of desktop computer equipment-- Compaq personal computers, all brands of printers, and all brands of file servers. This test included about 56 percent of all items on insurance. As the following figure shows, the costs of insurance far exceeded the value of the maintenance received on the machines.

Figure VI			
High Cost of Insurance			
Fiscal Year 1996			
Type of Equipment	Insurance Premium Paid*	Value of Maintenance	Difference
Compaq PC	\$ 83,239	\$ 18,873	\$ 64,366
Computer Printers	235,946	16,610	219,336
File Servers	70,373	24,089	46,284
<i>* Premium amounts are based on ITS' practices for recording premiums and are not exact amounts</i>			

As the above figure shows, the amount paid for insurance premiums far exceeds the value of the maintenance on the above items. Insurance premiums far exceed the value of maintenance because the equipment overall did not have much maintenance performed on them. For instance, out of 448 Compaq computers covered by insurance, only 57 had maintenance performed on them (14 percent); and, out of 2248 printers covered by insurance, only 563 had maintenance performed on them (25 percent). Further of the 448 Compaq computers on insurance only 27 had maintenance performed on them whose value exceeded the insurance payment.

To help us determine the optimal way to obtain desktop computer equipment maintenance, we addressed this issue with our consultants. The consultants said that their organization is strictly using time and materials because the personal computers and printers are becoming

more reliable and have longer warranty periods. Further, their analysis identifies where time and materials is a better option. The machines have fewer breakdowns, thus minimizing the need for insurance-type coverage. However, there is a risk associated with going to time and materials. There will be some machines that will require repairs that cost more than an insurance premium. However, as noted above in Compaq computers there are far more machines that had either no repairs or repairs that cost less than premium amounts.

We contacted seven data processing coordinators in Utah state agencies to determine how the decision was made to obtain either time and materials or insurance coverage. We found that the agencies were making this decision based on their perceptions and not on a formal evaluation of costs and services. One organization put everything under insurance, while others had a combination of the two options, and still others put everything under time and materials. They did not conduct a formal evaluation of what is the most cost-beneficial method but rather they made this decision based on past experience and preferences. However, there are some agencies that agree with the viewpoint of our consultants who favor the time and materials alternative. They base that opinion on the reliability of the equipment and the fact that it oftentimes becomes obsolete by the time the warranty expires.

We also found that Colorado did analysis on this issue of desktop computer equipment maintenance. They determined that the time and materials approach is a more cost-beneficial way to obtain desktop equipment maintenance. In their study, the State Auditor's Office evaluated this topic and recommended that the state move to time and materials as opposed to insurance type maintenance.

We believe that ITS should establish guidelines on what computer equipment should be maintained on a time and materials basis and what should be on insurance. This evaluation should include a cost-benefit analysis but does not have to be limited strictly to costs. For instance, equipment that is very critical to an organization such as a file server might need to be on insurance because the vendor will guarantee a speedier response time when the equipment is covered under insurance. The agencies could identify the critical equipment that need this kind of response and put the remaining equipment on time and materials.

Recommendation:

1. We recommend that ITS establish guidelines on what equipment should be on time and materials and what should be on insurance. This evaluation should include a cost-benefit analysis but does not have to be limited strictly to costs.

Mainframe Computing Can Be More Efficient and Effective

Another area where more coordination would help improve productivity is in how mainframe computer resources are utilized. A mainframe computer is a powerful computer

which can be used by hundreds and thousands of users at the same time. In our review of ITS we found that the mainframe computer resource could be used more productively. For instance, by establishing software testing guidelines and doing software evaluations before loading them onto the mainframe, down time could be reduced and would result in more efficient use of the mainframe computer.

Testing Guidelines and Formal Evaluations Would Help

In two cases, the mainframe ceased functioning or was not used efficiently because the applications put on the mainframe were not adequately tested. These kinds of problems can cause delays to the users. However, there are no guidelines requiring the testing of software used on the mainframe. We also found that ITS does not collect problem data on all the areas of the computer, called regions, to document what problems are occurring and to systematically resolve these problems.

We collected data for a recent eight-month period that documented the times particular regions of the mainframe could not be accessed. During this eight-month period these data showed regions or applications on the mainframe being unable to operate because of unplanned problems for about 60 hours. In addition, we obtained data showing that thousands of users can be affected if one region is inoperable. Because there are potentially thousands of people using different regions of the mainframe, delays can seriously impact productivity. Though we did not have time to review all the reasons for the delays, we did analyze the reasons for the delays during this eight-month period.

In one case, the application ran several thousand pages of unwanted reports. In the other application, the programmer made a mistake in programming that caused the application to perform the same operation repeatedly without stopping (loop). This problem made it so the region was inaccessible to other users.

The reason the above problems occurred was because there are no specific guidelines on testing applications. One programmer said she conducted some testing of the application before it was put on the mainframe but she did not test adequately for volume usage. The other programmer said he tested the application but he did not catch this bug in the program. Programmers in both of these organizations outside of ITS report their organization does not have specific guidelines on what testing is required before an application is put into production.

While certainly not all problems can be caught through testing, reasonable testing guidelines would likely catch more problems before the application is put on the mainframe and affects other users. Some very large, complex applications would likely require more extensive testing than smaller applications. Certainly the guidelines should take into account the size, complexity and significance of the application. However, all applications should go through some testing to make certain they do not cause problems within the mainframe.

Several state and private organizations have specific guidelines that users must follow before they can put an application on the mainframe. One organization requires that the application be tested sufficiently that it can be certified as “production worthy”. This organization requires among other things that testing be done to prevent the system from malfunctioning and that the testing be documented.

We interviewed ITS’ application specialists and managers. ITS application specialists showed us software applications that can help identify problems with an application that might cause it to go into a loop, thus adversely affecting mainframe operations. The programmers explained that these tools are available if the agencies want to use them. They feel that some agencies do not make testing a high enough priority and consequently agencies do not always use these tools. They said they would like to have guidelines that agencies test applications before they are put on the mainframe, but because ITS has a “customer is right orientation”, they won’t tell the customer what to do. ITS has, however, formed a users committee that has made a recommendation that more testing of applications on the mainframe occur.

In addition to developing testing guidelines, ITS needs to systematically collect data to assist in evaluating outages. Currently, logs documenting when outages occur, what caused the outage and steps taken to resolve the outage are not systematically maintained by ITS’ software support staff. To help resolve problems, ITS needs to collect data on what is causing outages and work with the agencies to help resolve these problems. The only region that had problem logs documenting outages on the mainframe was that known as the CICS region. There are other regions on the mainframe for which data have not been collected to document what has happened. Without this information, ITS management cannot systematically resolve the problems. ITS has formed a users’ committee that has come up with recommendations to reduce outages. However, without the specific data the committee may not consider all the factors causing outages. Based on these analyses, ITS’ can develop guidelines.

Several organizations have quality control individuals who evaluate how well the agency is performing. They look at problem logs to look for trends, then make recommendations to resolve agency problems. ITS managers said they would like to have this kind of function but they don’t have the resources to specifically devote to accomplishing this.

When we discussed the problems we found related to mainframe applications with the CIO he indicated that he was unaware of the situation. To implement testing guidelines will require ITS to first, develop guidelines and second, for the CIO to require that the guidelines be followed by any agency developing a mainframe application. As noted before, authority for determining policy and procedures rests with the CIO.

Recommendation:

We recommend that ITS develop testing guidelines for all software applications that are loaded onto the mainframe computer. The CIO should review and approve these guidelines

and require adherence to those guidelines. In addition, ITS should collect data to assist in evaluating outages on the mainframe as a preventive measure.

More Coordination and Control Is Needed

We believe that a higher degree of coordination and control of IT functions and activities among all users is critical in ensuring the most cost-effective and efficient IT service. As discussed previously, we found great autonomy among state agencies when it came to information technology practices. We believe that this autonomy does not enhance productivity and that it is costly to the agencies and the taxpayers. To correct this shortcoming, we suggest the state Chief Information Officer (CIO) play a more pro-active role by conducting routine IT audits and by setting policies and standards, as required by existing Utah law.

The state's Chief Information Officer (CIO) needs to play a more proactive role in guiding IT growth in the state. For instance, regular audits of IT functions for various agencies and activities throughout the state are not being accomplished, nor have needed IT policies and standards been set. Both of these responsibilities are levied on the CIO by law.

To a degree, some of the independent activity of the various state agencies is partially attributable to the past philosophy of the state's CIO wherein a "bottom-up" approach to establishing policy and standards was employed. In this approach, the goal of the CIO was to get "buy-in" from the various agencies. To accomplish that, various agencies within the executive branch were empowered to guide their own IT development in many ways. This resulted in an evolutionary process whereby agencies often learned from their own mistakes, but wherein there was little collective learning. This somewhat ad hoc approach relied in great part on trial and error to come up with workable solutions and practices that will eventually become defacto standards. The CIO was hesitant to use the authority granted in law because he felt that he would not receive the desired response or outcome.

Regardless, the CIO expressed to us that he advocates a strong role for the CIO with the authority to develop and direct the state's IT growth. Indeed, the CIO reported to us that he believes he is now ready to take on that role and be more authoritative, since the agencies have provided much information for the policies and standards he intends to promulgate. In fact, he intends to publish standards in 35 areas within the next two months. However, the authority of the CIO extends only to the executive branch agencies, a problem area that is discussed in more detail below.

Utah law requires the Chief Information Officer of the state to conduct performance audits of state information technology resources. Although this law has been in effect for several years, we found that such audits have never been conducted by the CIO or by his staff. According to the CIO, he has never been staffed with adequate personnel to accomplish this

task. We suggest that routine accomplishment of IT audits is not only required according to the law, but also that audits are beneficial in providing guidance to agencies and for ensuring the most cost-effective application of taxpayer resources toward IT growth.

Recommendations:

1. We recommend that regular and routine IT audits be accomplished by the Chief Information Officer (CIO) and his staff.
2. We recommend that the CIO continue his efforts to establish and enact policies and standards that will guide the IT development of the state. Included should be recommendations contained in this report.

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Chapter III

More Controls Needed over Customer Service

Our audit determined that staff within the Division of Information Technology Services (ITS) do a good job of identifying and correcting customer service problems; however, ITS does not always maintain good customer relations. We are concerned with both delays in getting customer problems resolved and a lack of communication between ITS staff and the customer. We recognize the value of ITS' ability to correctly diagnose and rectify customer problems but service delays and poor communication have increased customer frustration and dissatisfaction with the service.

Our conclusion that customer relations need improvement is based on several tests. First, we reviewed a sample of 138 action requests. We found about 20 percent of the cases (27/138) had problems where we were concerned that ITS resolved the problem but did so in such a way that good customer relations were not maintained. We reviewed the documentation on every sampled action request for timeliness of response, for problem resolution, for whether the customer was kept informed of progress and for adequacy of documentation. For many of the action requests where we identified concerns about any of these factors, we also interviewed the customer representative and the work group specialist.

Second, we interviewed agency staff (ITS' customers) about the service. Staff from seven of ten agencies interviewed said that ITS generally resolved the problem or gave the assistance needed but did so in such a way that good customer relations were not maintained. They reported concerns with delays, not keeping the customer informed, or the fact that no one person at ITS is responsible for making sure the problems get resolved. For instance, one local area network administrator told us of concerns when dealing with ITS on network problems. This administrator provided us with 18 examples of action requests that allegedly were not handled well by ITS. After reviewing those specific requests, we believe that ITS resolved the problems. However, ITS failed to take steps to ensure good customer relations. In fact, for several of those action requests, a lack of follow up with the customer seemed to be the real issue.

Third, we reviewed a customer satisfaction survey prepared this year by a consultant hired by ITS. This survey asked questions about network services, phone service, mainframe computer services and overall service provided by ITS. Survey questionnaires were mailed to all state agencies. 217 surveys were completed, but not all questions were answered by each respondent. Respondents answered each question on a scale of one to five. Several questions on this survey related to overall customer satisfaction. *"I am satisfied with ITS's problem tracking and resolution procedures"*. Over 130 customers responded to these questions and their responses averaged 3.0, 3.1 and 3.1. These responses indicate that the customers, in general are neutral rather than satisfied or dissatisfied in their feelings on these questions. These answers indicate improvements in customer relations are possible, at least from the customer's perspective.

The mission of ITS is to provide data processing and telecommunication technical assistance to state agencies. When an agency has a problem they cannot solve, they contact ITS' help desk. The customer representatives at the help desk either provide the customer with information to correct the problem (first level resolution) or dispatch the problem to a work group within ITS for resolution (second level resolution). The customer representatives log the basic information (complaint, time of request, action taken, etc.). If the request is forwarded to a work group, the specialist within the work group assigned to the request is responsible for logging a chronology of what the specialist did to resolve the problem. Communication among the work groups is challenging because there are four different work groups (telephone service, mainframe computer operations, local and wide area network service, and network control center) reporting to different managers and operating independently of each other. In addition, the help desk staff also report to a different manager and operate independent of the work groups.

Our audit determined that ITS needs to develop policies and procedures that ensure improved customer relations. These policies will improve both the timeliness and the effectiveness of the agency's response to customer complaints. Responding to customer complaints is a major part of ITS' services. From August 1995 to February 1996 the customer help desk responded to over 19,000 customer calls or requests for service. Over 14,000 of these requests were referred to an ITS work group of specialists for further assistance in resolving the problem. Improvements in communication with the customer and timeliness of response will reduce customer frustration and enhance the overall productivity of ITS' customers.

This chapter identifies action requests where the customer was delayed, where the customer was not kept informed of progress, and where inadequate documentation was kept on the action requests. This chapter also shows where these problems can be resolved through developing more policy guidance. A summary of these problems, the number of action requests associated with these problems, and a brief explanation of the solution is found in the following figure.

Figure VII
Problems and Solutions Identified From the Action Request Sample

Problem	Number of Occurrences	Solutions
Customer Delayed	11	<ul style="list-style-type: none"> • Develop a more knowledgeable help desk, use severity and priority codes more meaningfully, reduce duplicate requests.
Customer not Informed	2	<ul style="list-style-type: none"> • Develop follow up procedures.
Documentation Inadequate	14	<ul style="list-style-type: none"> • Develop guidelines on how action requests are to be documented.

As shown above, our action request sample identified problems primarily with customer relations. Also as noted, policy guidance in specific areas is needed to improve customer relations. For instance, policy guidance is needed in priority codes to clarify how quickly the work groups need to begin work on a problem. Maintaining good customer relations is very important, according to data processing experts because frustrations and delays can hurt productivity. A national organization, specializing in computers and computer systems, called the Gartner Group showed where customer delays and frustrations can be very costly to an organization. This study estimated that it costs about twice as much to resolve computer and computer related problems in the organization when good customer relations are not maintained. In addition, two data and telecommunications experts both emphasized the importance of maintaining good customer relations to help agencies solve their computer problems most efficiently. The suggestions we are making will help fine tune and improve the system, thus helping state agency staff avoid getting frustrated and becoming less productive.

Some Customers were Delayed

As indicated in the above table, eleven sampled requests showed where the customer was delayed in getting a problem resolved or obtaining a requested service. Delays can reduce productivity. If an employee's computer is down, for instance, the employee has to find a less efficient way to accomplish work until the computer is fixed. Further, the employees have to rearrange work schedules or tasks when a computer or telephone system is not operational.

To reduce delays and thus avoid the problems listed above, will require ITS to develop a knowledge-based help desk, make severity and priority codes more meaningful and reduce the number of duplicate action requests. Because these changes are primarily changes in policy they

nwill likely not involve increases in staff. We recommend that ITS develop a knowledge-based help desk, make severity and priority codes more meaningful and reduce the number of duplicate action requests.

Develop a Knowledge-Based Help Desk

One way to reduce customer delays is for the customer representatives to be more knowledgeable in responding to requests for help. Currently, the bulk of customer requests are received by customer representatives at the help desk and then assigned to a work group with expertise in the specific area of concern. Resolving more requests directly by the customer representatives solves the problem more quickly for the customer because the request does not have to be dispatched to a work group. Also, it is less expensive for the customer representative to resolve the problem than it is to send the problem to the work group specialist. The customer representatives become more expert at resolving problems through using menu-driven help screens. These screens prompt the customer representative to ask certain questions to assist the customer representative solve the customer's particular problem or provide the requested assistance.

In one sampled action request, the request was assigned to the Local Area Network (LAN) work group from the customer representative. The problem was resolved through "re-booting" the computer (turning the machine off and starting it up again). The LAN work group specialist said that these kinds of problems occur frequently and fixing the problem could easily be done by the customer representative. The LAN specialist said that the customer representative should ask the customer a simple question in this kind of problem: "Is your neighbor's machine working?" If yes, that means the problem is localized to one machine and "re-booting" often helps. In these instances if the customer representative did more to resolve the problem, rather than just assign the problem to a work group, customer time could be saved.

In another action request, the customer called the customer representative to get a password to gain access to the state's main computer (called the mainframe). When these requests are received the customer representative routes the call to a work group mainframe specialist who then has to call the customer back to get the information he needs to review and approve the request. The work group specialist explained that he gets numerous requests from customers to get new passwords and change existing passwords. To get a new password, the customer provides standard information. According to the specialists, this information could easily be obtained by the customer representative and then transferred via E-mail to the mainframe specialist.

For the customer representatives to solve more problems rather than merely assigning them to the work group will require the development of a "knowledge-based" response. Currently, the customer representatives have general guidelines telling how to determine problem severities and where to route calls, but they don't have a formal knowledge base to provide

initial troubleshooting. Some customer representatives have a more complete understanding of the system and how to trouble shoot customer problems, than other representatives. Without a consistent knowledge base among the customer representatives, there are significant differences in both the number of calls handled as well as the percentage of calls closed among the customer representatives. For instance, out of 477 calls in a seven-month period, one customer representative closed 39 percent of the calls without passing the calls on to the work group. Out of 438 calls in the same period, another customer representative resolved only 20 percent. (The help desk system is established so that calls are received on a random basis, therefore, the differences in resolution rates are not explained by differences in the requests themselves).

These differences in resolution rates result from several factors, the most prominent being that the level of expertise among customer representatives varies. The help desk supervisor said there is a significant variation in expertise among the customer representatives, a main cause for the differences in resolution rates. The supervisor said that the customer representatives need a computerized system so they will be consistent in how they help the customers. The supervisor would like an "expert system" to help the customer representatives. The Help Desk Institute (an international organization involved with improving help desks in many organizations) identifies an expert system as one that provides guidance based on matching actual events against a predefined set of rules or knowledge. The institute notes that expert systems can save time, help solve customer problems, and make the help desk more efficient. We found that most organizations reviewed either have an expert system or would like to develop one.

One organization, for instance, has a design engineer who evaluates problem requests and designs decision trees to help customer representatives resolve problems directly. When a call comes in, the customer representative follows a script that tells the customer what steps to take to resolve many of the more straightforward problems. This organization reports that customers are very pleased with the system. Another organization is developing specialists along with the decision trees. When a call comes in it is routed to customer representative specialists in networking and mainframe. This organization has a goal of resolving 80 percent of the incoming calls without dispatching to a work group. Other organizations do not have engineers formally scripting calls, but rather develop the scripts through purchased software and experience.

A knowledge-based help desk has advantages. First, the customer gets a more timely response. Instead of the customer's problem being assigned to a work group, the problem is handled directly. This saves the customer time and reduces the customer's frustration. Second, ITS requests are handled more efficiently. This saves the time of specialists.

ITS can develop a knowledge-based help desk through evaluating action requests and through developing scripts for resolving straightforward requests. The action request system already tracks what was done to fix various types of calls. ITS could use this information, in

conjunction with interviews with work group specialists, to categorize some of the more straightforward problems. The steps needed to resolve them could then be incorporated into help screens.

Use Codes More Meaningfully

Another way to reduce customer delays and frustrations is for the severity codes to indicate when the work group specialist is to contact the customer; and the priority codes to indicate when the work group specialist will begin work on the problem and when the problem is expected to be resolved. Severity codes are assigned by the customer representative when an action request is first called-in. The code is based on the seriousness of the problem and currently indicates only how quickly the action request needs to be dispatched to the work group. Priority codes are assigned by the work group and are supposed to indicate how soon the work group can begin work on the problem. At present, severity and priority codes are not always meaningful in resolving customer problems because they do not adequately communicate the urgency of contacting the customer, beginning work on the problem, and giving the customer an estimate of when the problem will be fixed. This situation leads to customer frustration and dissatisfaction because the customer is not sure when the work group will begin work on the problem and when the problem will be fixed. ITS should give more policy guidance on severity and priority codes indicating, not only the criteria for a particular rating, but also indicating when the work groups need to contact the customer, an estimate of how soon work will begin on the problem, and an estimate of how soon the problem will be resolved.

In this section we show that severity and priority codes need to communicate clearly to the work group when the customer needs to be contacted and work begun on the problem. Also, in this section we demonstrate that priority codes need to reflect an estimated time by when the problem will be resolved. Without adequate communication, we found examples where customers got frustrated and upset. In one instance, a customer avoids using ITS because she perceives that ITS is not adequately responding to her needs. In other instances, customers have urgent needs which, though relatively simple to correct, take weeks before they are finally resolved.

Codes Should Communicate When the Work Group Needs to Contact the Customer and Begin Work. In some action requests, the customer's needs are not adequately communicated to the work group because the severity and priority codes do not reflect the urgency of when the work needs to begin. Currently, the only time deadline incorporated in the severity codes is when the action request must be dispatched to the work group. There is no policy regarding when the work group needs to contact the customer and begin work on a problem. As a result, misunderstanding and frustration occur because the customer is not sure when work will begin on his/her problem regardless of the severity and priority rating. Copying the example of other organizations and clearly specifying when the work groups are to contact the customer and begin work on the problem will help alleviate the problem.

In one request a customer wanted questions about the Internet answered. Though this request was not rated as an urgent severity, it illustrates that the customer representatives and work group specialists should communicate to the customer an estimate of when the customer can get help. Otherwise, as this request illustrates, the customer may get frustrated with the timeliness of ITS' service and get help from others. This request was dispatched to the networking group. Some four hours later, the log records that the work group specialist called the customer back. The customer said that she was frustrated with ITS because she was not sure when ITS would respond to her requests. In this case they took too long to respond. As she remembered it, she went to a colleague to get her questions answered. She said she now avoids calling ITS for help, preferring instead to get help from colleagues. When the ITS person assigned to resolve this problem finally called her she had already gotten her questions answered. When we interviewed the work group specialist responsible for answering this person's questions, he said that he is frustrated because when he gets notified of a request for help, the requests do not indicate how quickly he needs to communicate with the customer. If he had known this person needed a quicker response, he would likely have been able to meet this person's need or at least explain when he could help. Other requests may require a quicker response because they are more critical than this action request. That, however, must be communicated to the customer initially. Other help desk organizations clearly communicate to the customer when the work group specialist will contact the customer.

Part of the problem is the lack of specific guidelines concerning severity and priority codes. The help desk worker may assign a severity code of one through four, with one being the most severe. ITS has developed guidelines but they need additional guidelines indicating when communicating when the customer needs to be contacted and work begin. The only formal guidance for assigning these codes is how severe the problem is and how soon it must be dispatched to the work group. The actual guidelines are as follows:

- Severity I** - Production system down or problem is preventing multiple people from doing work. The request is to be dispatched to the work group within 30 minutes.
- Severity II** - One or two people are out of service and have no other way to get their work done. The request is to be dispatched to the work group within 60 minutes.
- Severity III** - Problem is impeding customer's current work assignment, but the customer is able to switch to other tasks temporarily while the problem is addressed. The request is to be dispatched to the work group within 1 working day.
- Severity IV** - Customer can work around the reported problem. The request is to be dispatched to the work group within 2 working days.

While severity codes identify a standard time to dispatch requests to workgroups, priority codes are supposed to indicate how quickly the work group is to begin work on the request. However, there are no formal guidelines on what constitutes a priority I, II, III, or IV.

The use of priority and severity codes would help maintain good customer relations if they defined a range of time within which the work group needed to contact the customer and begin work on the request. Current ITS policy gives a definition for what constitutes the severity level and then requires the customer representative to dispatch the problem to the work group responsible for resolving it within that time. The policy, however, does not give any guidance on how soon the work group should respond to the action request. Likewise, meaningful severity codes are important to providing service because these codes ensure that the most serious problems are dispatched first. Meaningful priority codes would ensure that the work group begins work on the most serious problems first. Our sampled cases showed that the help desk does dispatch within the standard times but the work group does not always respond in a timely manner. In fact, one work group said they handle action requests based on the order in which they are received and not necessarily on the severity of the call.

We found that other organizations have requirements on contacting the customer and indicating when action needs to be taken. We contacted large organizations in both the public and private sectors with help desks. For example, one organization requires that the specialists contact the customer and begin work on solving a high priority problem within 15 minutes of the problem being dispatched to the group. Another organization allows two hours. Another example of such an approach exists in the current Maintenance Management Services contract between ITS and the vendors who provide desktop computer equipment maintenance. The vendors are required to contact the customer within 30 minutes of receiving the trouble call, in part to provide an estimated time of arrival on-site to accomplish the repairs. Moreover, the maintenance contract requires the technician to start work on a problem within a specified period of time. Similar standards do not exist within the division for repairs or maintenance that are accomplished by ITS technicians.

Priority Codes Should Communicate an Estimated Time by When the Problems Will be Resolved. Besides indicating when the work groups are to begin work on the problem, priority codes should also indicate an estimated time by when problems will be resolved. In general, the more urgent the problem the quicker it should be resolved unless there are extenuating circumstances. If an urgent problem can not be resolved quickly, this should be clearly communicated to the customer. Despite the exceptions where an urgent problem takes longer to resolve, overall, problems with urgent priority codes should be resolved in less time than those problems having less urgent priority codes. However, the figure below indicates that priority codes do not always relate to how quickly the problem is fixed. The figure shows the average number of days to resolve a problem based on priority codes for all action requests from July 1995 to January 1996.

Figure VIII
Time to Resolve Problems Based on Priority

AREA	Priority Rating--Average Number of Days to Resolve Problem		
	Code I	Code II	Code III
Voice	5.3	2.1	3.2
Network	2.8	1.0	2.3
Mainframe	6.0	14.0	4.1

As shown above, those cases with a more urgent priority code (a code of ‘I’ is more urgent than a code of ‘II’ which is more urgent than a code of ‘III’) are sometimes resolved in more time than those with a lower code. Though part of this occurrence could be attributed to the greater complexity of the problem, we found instances where significant time passed before action was even begun. For instance, we found cases where problems were assigned a severity I and priority I, indicating a problem that was very severe and urgent. However, in many of these cases it took days and even weeks before the problem was resolved. In one example the action request log indicates that it took over 14 days to fix a problem where the customer’s phone would disconnect itself when dialing. All that was required was to clean a switch. In another example a request for action to be accomplished by 1:00 p.m. that day was not resolved until 21 days later, with the action request log indicating that the work group specialist had not tried to urgently resolve the problem. For other requests there was no action documented on the action request for several days despite the action request being urgent.

We found that other organizations have requirements on when the problem needs to be resolved. In several organizations the customer and work group mutually agree on when the problem is to be resolved. If the complaint is not resolved within the deadline period, both the customer and management are informed.

Reduce the Number of Duplicate Action Requests

Besides developing a knowledge-based help desk and making the prioritization codes more meaningful, another way to reduce customer delays is to reduce the number of times the customer has to contact the customer representative. From our action request sample, we identified an example of a duplicate request. Duplicate requests are instances where multiple customers called in on the same problem. Duplicate requests waste time. The customer’s time is wasted because the customer is calling in about a problem about which ITS is already aware and taking action on. The customer representative’s time is wasted because a second action request has to be completed.

The number of duplicate action requests is significant. ITS has recently developed a “Status Board” that helps identify the number of duplicate calls. This status board identified about 200 duplicate calls for a six-week period which indicates that there could well be over 1,500 duplicate calls per year. The manager interviewed believes there are more duplicate calls than this status board is showing because the status board is relatively new.

The customer’s and the customer representative’s time could be saved if ITS used a telephone messaging system such as other organizations use. One organization, for instance, broadcasts a prerecorded message for global problems that tells when the problem is expected to be resolved and changes the message when the problem is fixed. This organization reports that the customers are very pleased with this because they can determine what the status of their problem is without having to go through the formal procedures of calling in and logging a problem. The customer representatives are pleased because they do not have to fill out duplicate action requests and explain the same problem multiple times.

Customer was not Informed

In addition to preventing delays, keeping the customer informed of what is happening on the action request will improve customer relations. In two instances from our action request sample the work group did not keep the customer informed of what was happening. Rather, the customer often had to call back to find out what was happening. Solving the problem is critical, but making the customer aware that ITS understands and is working on the customer’s problems is also very important. Several organizations stressed the importance of contacting the customer when a request is received and keeping the customer apprised of what is happening on the request. Without this communication the customer can get frustrated and may seek alternatives to resolve the problem. According to a national study, this is ultimately more expensive and leads to lower productivity.

Examples from our action request sample demonstrated where the customer was not kept informed of what was happening on the problem. For instance, in one case the request was received on August 25th but no follow up was done until after the customer called back after 3 working days. Another action request showed a similar delay. This request was received on September 12th and forwarded to a technician. On September 14th the customer called and asked for an update. There is no other entry except that the problem was resolved on September 18th. In our opinion, even for the lowest priority request the customer should not have to wait more than a day or two before being contacted by the work group.

In addition to reviewing the action request sample, we also interviewed customers and found that customers complained about ITS not keeping them informed about the status of their problem. Generally, the customers were pleased with ITS performance in solving their

problem. However, the customers were frustrated with ITS' lack of communication on progress made or action taken. One customer was so frustrated she kept a log to document her concerns with ITS.

Some work group specialists are not making regular follow up calls because there are no formal guidelines on how often the customer is to be kept informed. Without guidelines, keeping the customer informed depends on the preferences of the work group specialist.

In contacts with other public and private sector organizations similar to ITS, we found that standards exist which require communication with the customer regarding progress on resolving the problems within a specified time. If communication has not occurred or the work is not completed the request is escalated to a higher level for automatic review. In these instances, the customer and management are both contacted to determine why the problem is not resolved and what action is required. ITS does not have such a practice internally, yet the state maintenance contracts with private vendors (that service ITS' customers) require the vendor to make contact with the customer. Some organizations visited do follow up after the customer and the service provider agree mutually upon an acceptable time in which to resolve a maintenance request. If that time is exceeded, the request is escalated to a higher level in the organization. The customer and maintenance provider are also contacted, with the goal of taking whatever action is necessary to resolve the problem. In addition, the state has a maintenance contract that requires the vendor to call the customer within 30 minutes of the request and give the customer a status report.

Keeping the customer informed does not necessarily improve how well the customer's problem is resolved. It does, however, reduce the customer's frustrations. Our review of the literature, discussions with our consultants and discussions with help desks in other organizations all indicate that keeping the customer informed is vital to a service-oriented organization like ITS.

Another way to improve customer relations is follow up with customers to determine the quality of service provided on particular cases. As we pointed out previously in the case of the LAN administrator, good service is oftentimes a matter of customer perspective. With better communication and attention to customer needs, customer relations would likely improve dramatically. Our discussions with customer service representatives from various organizations validates this point. For example, one organization makes routine call backs to the customer and regular random surveys of customers. ITS has also conducted customer surveys.

A follow up call does not have to be particularly burdensome on the individual resolving the problem. The work group specialist could talk to the requestor directly and simply state the status of the problem. If the problem takes a long time to resolve, a periodic update could be made. Another way the customer could be contacted is for the work group specialist to send a short E-mail message or for an intern to follow up with the customer.

ITS is taking steps to improve customer relations. During our audit they developed a call-back system where customers responded to E-mail messages about the service received on individual cases. Also, they have conducted a periodic survey of customer satisfaction. However, as noted in this section, ITS also needs to develop specific policy on steps the work group should take to keep the customer informed as to the progress being made in fixing the problems.

Documentation Inadequate

The previous two sections identified areas where customer service could improve by reducing delays and by keeping the customer informed. Customer service can also improve through better documentation. With adequate documentation, ITS can build a system that documents routine steps needed to fix particular problems or to answer a particular request. This system can be used by the customer representatives to provide more expert assistance to the customer and this system can also be used to identify where there are weaknesses in ITS' services. However, as the following examples illustrate, without adequate documentation it is difficult to tell how quickly action was taken to resolve problems and what particular action was required. In addition, it is impossible to determine from the log whether the customer was kept informed of what was happening on the request. Without this information, ITS cannot pro-actively try to improve customer service in these areas.

For instance, the log for one action request in our sample had no entries other than an assignment of an action request number and dates of receipt and dispatch. There was no description of the problem or what steps were taken to resolve the problem. Another action request's log had an entry for the solution stating, "Re-booted and it was OK?????". There was no other information on how the problem was resolved, who resolved the problem, or when the problem was resolved. Finally, another action request was received and processed for work only to have the customer call in two days later for a status update, which indicates the problem had not been resolved. A final entry came a week later indicating that the problem was resolved. There was no explanation of the delays or action taken.

Other organizations require complete documentation for several reasons. First, these organizations use the information to build the knowledge into their expert system. Second, the information is used to identify trends that would indicate where the organization might be able to pro-actively improve their service. Third, these organizations use the information to determine whether timely action was taken to resolve problems.

ITS needs to obtain complete documentation so customer relations can be improved as do other organizations. With documentation, ITS can build a knowledge-based expert system. As we have noted previously, ITS does not now have an expert system. Also, with complete documentation ITS staff can identify trends where the organization can improve their service. Currently, ITS does not formally review trend data to identify where services can be improved.

Finally, with adequate documentation on all requests, ITS can determine whether timely action was taken to resolve problems. As we have noted in this section, the documentation on some action requests is so poor that ITS' management could not determine whether timely action was taken to resolve the problem.

ITS has not provided guidelines on what documentation the customer representatives and work groups are to complete. ITS managers need to determine what documentation is required and then develop guidelines.

As noted, ITS needs to develop additional guidelines on how customer requests are to be handled. In addition, accountability for solving customer problems needs to be clearly established. Currently, there is no one person responsible for resolving an action request in a timely manner. Once the action request is forwarded to the work group specialists, the customer representatives have no more responsibility for it. When the work group specialists get the action request, as we have seen, the work group specialists resolve the problem according to their own preferences. Also, as our sample data show, some work group specialists do a poor job of keeping the customer informed and in other ways maintaining good customer relations. To bring consistency to this system requires that some kind of organizational accountability be established. As other organizations have done, ITS may wish to formally establish agreements among the customer representatives and the work groups as to when action will be taken, what documentation will be required and what the procedures will be to escalate cases where time deadlines and other parameters are not met. Regardless of how ITS chooses to establish accountability, accountability for resolving customer complaints in a timely and effective manner needs to be clearly established within the organization.

Recommendations:

1. We recommend that ITS establish a knowledge-based system for the help desk.
2. We recommend that ITS prepare policy indicating:
 - a. The urgency of when ITS work groups need to begin work on problems or requests and a deadline on when the problem is to be resolved.
 - b. How the customer is to be kept informed throughout the time the problem is being fixed.
 - c. The extent of documentation needed on an action request.
3. We recommend that ITS clearly establish accountability in their organization for resolving action requests.

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Chapter IV

Fiscal Review Is Needed

We found that some service provision areas are making substantial profits in order to subsidize other areas that are losing money. Rates in some functional areas that have generated either a profit or loss for the past two or three years have not been adjusted based on the deliberate recommendation of the rate committee. We also found that information was not available to document the existing rate structure for some smaller functional service area.

Rates for each service provided should be determined based on the cost to provide that service. While determination of cost data for major functional areas such as mainframe computing and the wide-area network were well documented, other areas, such as rates for the radio shop and rates for wire installation, were less well documented. The cost of providing each service is important from a management perspective since cost is one indicator of efficiency. It is also important to allow for valid comparisons to other sources of service provision and evaluating alternatives to the present method of providing service. Knowing operating costs is a precursor to making sound and prudent outsourcing decisions. Finally, as a cost recovery agency, it is imperative that the division know its operating costs in every functional area, thus enabling appropriate rate structures to be established.

Some Rates Do Not Reflect Costs

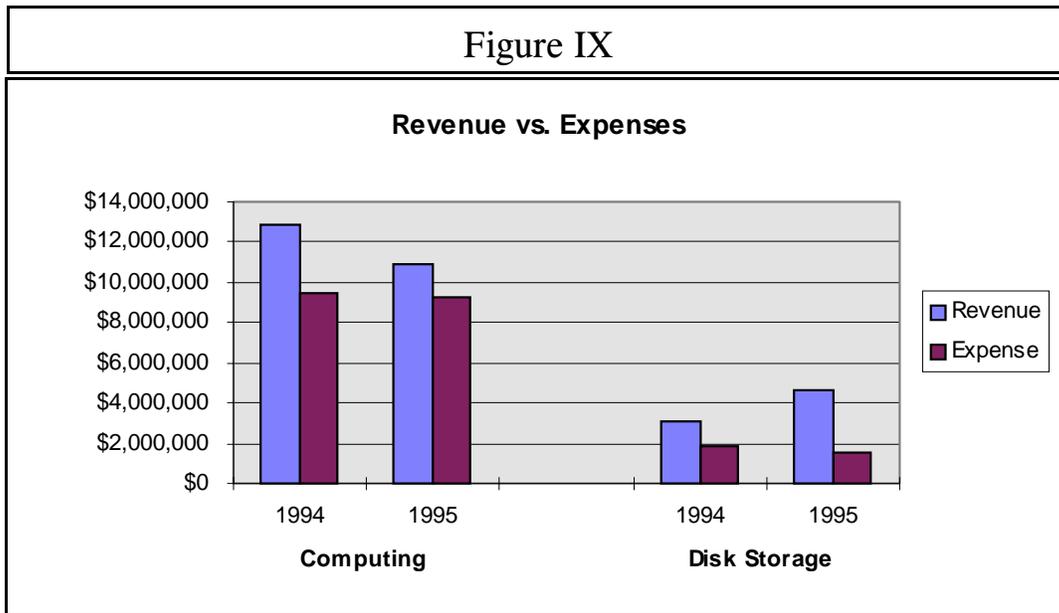
We found that the rates charged by ITS for some services exceed what is necessary to recover the cost of the service. In at least a couple of areas, the rates are intentionally inflated in order to offset insufficient rates charged for certain other services. Again, we found at least one significant service area where the rates appear to be intentionally set at a level less than the cost of the service. We also found that customers and some managers within ITS disagree with existing rates.

From information provided by ITS relative to fiscal year 1995, we found where 29 of 66 revenue activities showed a loss. Some of the losses were significant, such as in the wide-area network (WAN) and radio maintenance, where the losses were \$2.4 million and \$1.3 million, respectively. Moreover, some of the functional service areas have a losing financial trend. For instance, since fiscal year 1994 the WAN has lost over \$6.7 million. Similarly, the microwave network lost over \$960,000 over the three-year period of fiscal years 1992 through 1995 while the radio shop showed losses of over \$1.9 million between fiscal year 1994 and 1996.

Conversely, some areas such as mainframe computing and disk storage have shown a history of profit making, in the millions of dollars. For instance, disk storage generated profits

of over \$4.3 million for the two fiscal years 1994 and 1995 combined. Similarly, mainframe computing generated about \$5 million in profit for the same period. The practice of subsidizing areas that lose money requires that rates be intentionally inflated in other areas. This practice should be reviewed by the Legislature as to whether it meets legislative intent for an Internal Service Fund agency. Also, the large retained earnings balance of nearly \$5.5 million as of the beginning of fiscal year 1996 indicates that the division is more than recovering their costs, another indication that rates may be too high overall. Again, the Legislature may wish to consider if accumulating a large retained earnings balance is desirable and if so, to what extent. Finally, any decision regarding outsourcing of activities or functions should be postponed until the ongoing “bench marking” analysis is accomplished, as well as solid cost and rate information is available, thus enabling a more defensible and logical outsourcing decision.

Some Rates are Consciously Inflated. As indicated above, we found that certain rates were consistently excessive in relation to the cost to provide the service. Most notably, this is the case with mainframe computing and disk storage. For the two fiscal years 1994 and 1995, the profits generated from those two areas were about \$9.4 million. The following graph shows the relationship of rates to cost for these two services for fiscal years 1994 and 1995.



As the above graph shows, the revenue, generated by excessive rates, for both mainframe computing and disk storage well exceed the cost or expense of providing the service. The inflated rates in the areas of mainframe computing and disk storage are intentionally maintained in order to offset losses in other areas. Most notably, the profits from these areas offset losses in the WAN, a service that has lost money every year since it was implemented in

1993. While mainframe computing and disk storage generated over \$9.3 million in profit during fiscal years 1994 and 1995, the WAN alone lost over \$3.9 million for the same period. While the WAN is the source of the single largest loss, it is not the only losing venture. In fact, as pointed out earlier, over one-third of the functional service area in ITS showed losses in fiscal year 1995, and for many areas losses are not unusual.

ITS has taken steps in an attempt to balance the losses and profits. In August 1995, ITS proposed that rates for the WAN be increased to a level that would recover the costs of operating that service. In so doing, they proposed a 21 percent reduction in the mainframe computing rate to \$945 per hour, and just over 23 percent reduction in disk storage rates to \$1.80 per megabyte each month.

The 1995 rate proposal for the WAN would result in an approximate 83 percent increase in order to recover costs, going from \$18 to \$33 per hookup. As ITS pointed out at that time, the net cost to general fund agencies would be unchanged by this increase since decreases in the cost of mainframe computing and disk storage would offset this increase. However, there was concern that a minority of users, including local governments, would incur a cost increase since they are not appropriated from the general fund. In any event, the rate committee recommended a delay on any rate increases through fiscal year 1997 to allow for further study and validation of costs and to allow agencies, where appropriate, to plan for necessary budget increases. Indications are that a rate increase for the WAN will be endorsed by the rate committee for fiscal year 1998.

Some Rates Should Be Reviewed. During interviews with accounting personnel within ITS, we found that documentation to justify or validate some of the existing rates had not been accomplished. This lack of documentation was primarily in areas that were less conspicuous from a fiscal perspective. We believe that with some minimal effort accurate costs can be ascertained and appropriate rates established in these areas. For example, in the ITS Radio Shop, the recently appointed manager has taken some action to quantify rates as one step to better account for productivity and expenses in his shop. For instance, in the install bay where police radios, sirens, and lights are installed on vehicles, he determined through time and activity charting of activities that the current rate of \$50 per hour is too high and would more appropriately be about \$35 per hour. This manager is currently conducting ongoing analysis of other rates to determine their validity.

The lack of validation was also mentioned by some of the managers within ITS, who expressed their concern over certain rates. For example, the existing rate for technicians who do wiring for telephone and data hookups in buildings is \$50 per hour. This rate is nearly 70 percent higher than it was in fiscal year 1995, when it was \$30 per hour. In the opinion of the manager over this function, it doesn't even cost \$30 per hour to provide this service with state employees. That opinion is shared by the director of Technical Services in ITS.

From our conversations with several staff members and managers within ITS, we believe that the practice of setting somewhat arbitrary rates was an attempt to simplify the accounting process by establishing uniform rates for providing any given service, regardless of location. However, such an approach does not provide valid management information to determine the efficiency of operations, nor does it provide a basis for comparisons when making outsourcing decisions. This method of setting rates results in over charging some functions and services while under charging others.

Legislative Guidance is Needed

Legislative intent should be clarified regarding cost recovery within ITS and the corresponding retained earnings account. Furthermore, outsourcing decisions should be made only after a thorough analysis of cost and efficiency in the functional area of concern are completed. Decisions on outsourcing functions are of prime importance and closely associated with cost analysis of functions.

Legislative Intent Needs To Be Clarified

Legislative intent language is needed to clarify whether rates need to be established in order to make each functional service area self-supporting. An internal service fund agency, by law, is an agency that provides goods or services to other agencies of state government or to other governmental units on a capital maintenance and cost reimbursement basis, and that recovers costs through interagency billings. What is not clear in the law, however, is the legislative intent regarding cost recovery. For instance, in the case of ITS, the division is charging higher rates for some services in order to offset insufficient cost recovery in other services. Overall, however, excess revenues are generated as evidenced by a history of a growing retained earnings in the fund.

We contacted several other states and found that all had equivalent agencies to ITS that are also internal service fund agencies. However, a significant difference is that almost every state we contacted has a goal or requirement that each functional service area either break even or show a small profit. Those states that allow for excess revenues to accumulate have the equivalent of ITS' retained earnings account, while states that do not allow for excess revenue accumulation provide rebates to the customers or rate reductions. Most states allow for transferring of money among functional service areas on a short-term basis in order to offset unforeseen losses. Those subsidies are only temporary, however.

In Colorado, for instance, each functional service area is expected to break even and, when necessary, adjustments to rate schedules are made within a year or two to ensure that end. They do not allow one functional service area to subsidize another as an ongoing practice. Although some profit generation is allowed, they are limited to a \$2 million dollar retained

earnings balance. Once they reach that threshold, any additional profits go back into the general fund.

In Idaho, as a practice, they do not allow one functional service area to subsidize another. Within specific functional areas, like telecommunications, some elements are allowed to subsidize other elements. But they will not allow a functional area, such as mainframe computing, to subsidize another functional area like the wide-area network. The goal is to break even and as such, they do not have a retained earnings account.

At present, Nevada does not allow functional service area profits and losses by law. When either a profit or loss is developing, they must immediately adjust the rates to work back to a break-even philosophy. Accordingly, they have no retained earnings at present. According to our source, however, there is an initiative to change their law to enable minimal profit generation and to start a retained earnings account. At present, without the retained earnings account, they have to borrow from the general fund for everything and that complicates planning for new equipment purchases and upgrades.

New Mexico and Oregon also require each functional service area to break even. In each of these states, when either a profit or loss is being generated, rates must be adjusted to compensate.

In our opinion, the Colorado perspective is very reasonable. They concede that it is very difficult, if not impossible, to manage every functional service area to the exact break-even point. As such, from one year to the next, it is anticipated that functional service areas will generate either a small loss or excess revenue. Subsidizing from one functional service area to another on a temporary basis while costs and rates are reviewed and adjusted is a reasonable approach. We do not recommend that all functional service areas be required to show a positive return annually.

As mentioned above, the product of excessive collections is a retained earnings balance. Simply stated, retained earnings will accumulate whenever revenues exceed costs. As stated previously, through fiscal year 1995, retained earnings for ITS had grown to almost \$5.5 million. At that time, the Legislature directed that \$2.3 million be transferred from retained earnings to the General Fund and \$1 million to the State Board of Bonding Commissioners for Debt Service. In addition, approximately \$1.2 million was transferred back to the federal government as their portion of the money that was in retained earnings.

The cost to ITS to provide mainframe computing has decreased. As indicated above, however, ITS also reduced their rates on a couple of occasions, but they are still charging a rate that by their own estimation is at least 21 percent too high. This “profit-generating” rate when applied to the steadily increasing demand for mainframe computing, is the primary contributing cause to the creation of retained earnings.

Relative to the retained earnings issue, there are a couple of advantages to having a retained earnings balance. Perhaps the most notable is that the state can invest those retained earnings and draw interest on those assets. Although there are certain limitations imposed, a sizeable portion of the funds come from the federal government, not from the state's general fund. Also, as pointed out above, it is very difficult to manage every functional service area to the break-even point. As such, having excess profits is beneficial in that temporary losses can always be offset. The question then becomes what to do with the retained earnings. In that regard, there are several alternatives. One is that the Legislature can do nothing and continue to review the retained earnings on an as-desired basis and transfer funds whenever deemed appropriate by the Legislature. As a variation of this approach, the Legislature can place a cap on retained earnings whereby any funds in excess of the cap are transferred back into the general fund, as is done in Colorado. Rebates to the customers are also an option when retained earnings accumulate. Regardless, if ITS attempts to identify costs more accurately and adjust rates to be more commensurate with those costs, retained earnings should remain at a reasonable level.

Further Outsourcing Decisions Should Be Deferred

The Division of ITS currently outsources about 72 percent of all functions as measured fiscally. Of the \$40 million operation in fiscal year 1995, almost \$29 million was outsourced. However, as discussed above, sound management of functions and activities should include methods to validate costs. Without a solid basis from which costs are determined and the corresponding rates are structured, sound decisions about outsourcing cannot be made. In addition, however, a process of bench marking activities should also be completed to assist in this decision making process.

According to the Gartner Group, bench marking is the process of measuring and identifying the best practices that, when implemented, lead to superior performance. It is a process of establishing reference points as a standard for comparing or judging a given event or function. Cost analysis is a part of this process. This approach is an ongoing process by which functional areas are analyzed and contrasted with similar functions and organizations that stand out in those areas. Indeed, the underlying theme of this approach is that *"if you do not measure it, you cannot manage it"*. Furthermore, the Gartner Group suggests that before any decision is made to outsource, you must *"clean up your house"*. By that they mean that an organization must know its strengths and weaknesses, then keep the strengths in-house and outsource to cover the weaknesses. Through bench marking, decisions regarding outsourcing can be made more rationally. As one Gartner Group executive put it, *"outsourcing is a long-term proposition. It is hard to get it back once outsourced"*. That being the case, it is important that any decision to outsource be clearly in the best interest of the state.

Several months ago, ITS contracted with Real Decisions, a Gartner Group company, to conduct the first iteration of bench marking for ITS in four major areas: wide-area network;

voice network; the help desk; and the data center. To date, the bench marking findings are in the wide-area network, voice network and data center operations. According to that analysis, ITS is providing an efficient service to the state in terms of cost. As pointed out previously, however, the cost to ITS and the rate they charge their customers are sometimes not in balance.

As we pointed out above, sound management of functions and activities must include methods to validate costs. Without establishing a cost baseline, sound decisions about outsourcing cannot be made. As such, further outsourcing decisions should be delayed until the results of the ongoing bench marking analysis are complete and after ITS has evaluated and documented their cost to provide each of the currently provided services.

Recommendations:

1. We recommend the Legislature provide guidance regarding its intent as to whether ITS should attempt to fully recover costs in every functional service area or whether subsidization of functional service areas is acceptable. Depending on legislative intent, costs and rate structures should be reviewed and adjusted by the rate committee.
2. We recommend that ITS conduct a thorough and complete analysis of costs associated with every function or service provided. This analysis should be used as a management tool to improve efficiency as well as to set rates and to assist in making outsourcing decisions.
3. We recommend that ITS defer all outsourcing decisions until ongoing bench marking and cost analysis are complete.

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Agency Response