

Scott County, Iowa

Technology Assessment Report

Created December 2000

Updated April 2005

TABLE OF CONTENTS

- Section 1 Executive Summary..... 1*
- Section 2 Observations and Recommendations..... 11*
 - I. Information Technology Organization11
 - II. Best Practices18
 - III. Applications30
 - IV. Technology Infrastructure.....38
 - V. Coordination of Departments.....63
- Section 3 Implementation Plan..... 73*
- Exhibit A Information Processing Organizational Charts 80*

Section 1 Executive Summary

Introduction

The Board of Supervisors at their August 17, 2000 meeting authorized a professional services contractor to perform a Computer Network Study of Scott County's computer network. Scott County is the third largest county in the State of Iowa and has been a leader in the use of technology. In fact, Scott County is to be congratulated on how well the different departments currently work together to accomplish their goals and objectives. The cohesiveness of the total organization is at a high-level when compared to most of the other governmental agencies we have encountered.

As time has passed, technology has advanced and the needs of the County have changed a great deal. There has been significant growth in the use of applications and technology that now requires a new vision and focus. It is clear that technology must be a key tool in serving, delivering and supporting Scott County's citizens moving forward.

Objectives

The goal of the assessment was to develop a vision, strategies, action items, and costs for implementing technology to meet the goals of Scott County. Specific areas of concern to be addressed include organizational structure, the technology environment, application development, networks, and Internet Access/development.

Project Activities

The professional services contractor conducted the following tasks to prepare this report.

- **Systems and Infrastructure Analysis** – The critical infrastructure components of hardware and software were reviewed and alternative technologies examined.
- **Needs Assessment** – Interviews were performed to gain an understanding of how technology is used today and the broad functional requirements of your County departments.
- **Evaluation of Alternative Technologies** – The examination of applicable technologies that will meet the current and future needs of Scott County and the evaluation of the related costs and benefits.
- **Local and Wide Area Network Design** – A new design of the networks based on the previous steps performed, our experience with other County governments and private industry.

Additional meetings were held throughout the course of the project with Scott County personnel to provide additional information, discussion of observations and recommendations, and updates on project activities.

Our Vision

The optimal use of technology in a fiscally responsible manner is a vision that demands a new philosophy regarding your technology culture at Scott County. In order to achieve this overall goal in a fiscally responsible manner, Scott County needs to follow two themes that are evident throughout this report. The two major themes to focus on are Customer Service and optimizing the return on investment in technology, commonly referred to as lowering the total cost of ownership.

Customer Service

Scott County needs to grow in its level of customer service in the information technology area. A technology customer of Scott County is defined as a County employee/department. Increased levels of customer service in technology will enable County departments to better serve its customers who are ultimately the citizens of Scott County. Customer Service requires the proper organizational mix, tools, and training in order to achieve the desired level.

Total Cost of Ownership (TCO)

Scott County must also focus on lowering the total cost of ownership (TCO). TCO helps organizations examine and integrate all technology concerns in an effort to achieve maximum benefits that are in proper relation to the costs being incurred. We recommend that an organization consider all costs associated with computing when making management decisions about PC acquisitions, upgrades, support and administration. TCO is no longer a subjective concept; it is now a science of quantitative elements that can be used to convey return on investment (ROI) results for information technology (IT) expenditures.

Core Strategies

Our vision focuses on five core strategies to achieve improved customer service and lower total cost of ownership. These strategies are further broken down into specific tasks that will need to be implemented to achieve the overall vision. The five core strategies that Scott County must address in order to fulfill your vision and key objectives are as follows:

- Information Technology Organization
- Best Practices
- Applications
- Technology Infrastructure
- Coordination of Departments

These strategies and related tasks provide the framework for Scott County to achieve high levels of customer service and to minimize the total cost of ownership.

INFORMATION TECHNOLOGY ORGANIZATION

Through our interview process of the various departments, we identified a number of issues that some departments have regarding the level of service from the Information Processing (IP) department. Several of the Scott County employees stated that they felt Budget & Information Processing (BIP) was too busy “fighting fires” to provide adequate support. Typically, most people view extensive firefighting as purely a symptom of a resource shortage, which many times is not necessarily the case. We believe that the problems may be based on an unnecessarily large number of “fires” being fought with inadequate tools by improperly aligned technical staff. Due to your current organizational mix and lack of tools, the network is administered in a purely reactive mode.

Information Processing needs to take a proactive approach to managing technology that requires a realignment of Information Processing department resources. Some of these concepts are already in place, such as the Computer Advisory Committee, but are restated again to provide the Board an overall organizational structure that needs to be implemented. Key aspects of the new organizational structure include the following:

- **Technology Oversight Board** – This board should be comprised of a representative from each of the thirteen county departments and will be in place to prioritize critical tasks and identify organizational goals and objectives to be met.
- **Information Processing Manager** – We recommend creating a position for an Information Processing Manager who would report to the Budget and Information Processing Director. This person would oversee the implementation of key technology goals and objectives, and oversee all Information Processing Professionals. If the County undertakes GIS, the second role of this individual would be the overall coordination of geographic information systems (GIS) projects and activities. The skills necessary for effective IP department management are closely aligned with the skills needed for effective GIS coordination.
- **Network Technical Support** – Assuming the proper tools, methodologies, and technology recommended in this report are implemented, we believe three network administrators could sufficiently support the County’s network. Someone would need to be assigned as the Lead Network Administrator. This person would be responsible for developing and maintaining network standards, procedures, and documentation, as well as having the foresight to keep the County’s network technology at an acceptable pace with the industry. The cross training of skills and knowledge among this group will be critical to minimize the risk to the County in the event of employee turnover. The scope of support for this group would continue to include telecommunications.
- **Help Desk Specialist** – This person would field initial phone calls or electronic mail from users experiencing computer related problems or making simple requests. The Help Desk Specialist will have fundamental computer troubleshooting knowledge, would type problems and requests into the help desk application, which would also provide knowledgebase and decision tree type tools to guide them in assisting the users. A problem requiring more advanced assistance would be prioritized and assigned appropriately. The Help Desk Specialist would report directly to the IP Manager to avoid conflict with prioritization of tasks

-
- **Webmaster** – One of the consistent frustrations we recognized through the interview process is that each department is responsible for maintaining its portion of the Scott County Web site. Individuals from the department did not feel comfortable with this role. Due to the lack of specialized Web site administration skills, many felt the County was missing an opportunity to provide a much better Web site to its citizens. Given the increased e-business needs for County government, there is a need for a dedicated Webmaster to fulfill those needs. This person would work closely with each department and will be able to provide the insight and skills necessary to develop and maintain an effective and uniform Web site.
 - **Application Development** – The Leader of Application Development needs to be the liaison between the users and the programming staff. This person would be responsible for assigning resources to development projects and program maintenance requests of existing applications. Additional responsibilities include assisting departments with any needs requirements and software selection processes. This person would be responsible for developing and maintaining application development standards, procedures, and documentation, as well as have the foresight to keep the County's technology platform at an acceptable pace with the industry.

Exhibit A provides organizational charts that show the current, transitional, and final structure that we feel should be implemented. We also recommend that Scott County recognize and budget for outsourcing when applicable. In order to support the new technology that will be implemented in the future at Scott County, there are certain number of complex skill sets and services such as Database Administration (DBA) that may need to be obtained from outside resources. Typically, it is not economically feasible for organizations such as yours to have people on staff that possess all of these specialized skills.

Training

Training for the members of the Information Processing department and access to an outside technology partner will be critical to ensure proper resolution of technology issues in a timely manner. End-user training on basic functions will also be important so that the technology is fully used to the benefit of the County and smaller, time-consuming support issues are resolved by the end-user.

Help Desk

We also recommend a formalized help desk that provides first-level support by the Help Desk Specialist who then assigns problems that they cannot solve to second and third-level technical support engineers. Software also needs to be implemented to assist the users and Information Processing department in addressing support issues, building a knowledgebase of similar support requests, asset tracking, and timeline issue reporting so users know where in the process their requests currently reside.

BEST PRACTICES

Industry accepted estimates state that best practices can lead to cost reductions of about 30 percent and increase utilization of functionality, as well as user satisfaction.

Standards

We recommend that Scott County evaluate and set standards for all users to follow which will decrease maintenance costs, ease the ability to establish interconnectivity, and reduce the time to install and test network and software upgrades. Currently, Scott County already makes purchasing decisions with standards in mind and now needs to formalize the process further to encompass written standards.

We are recommending Windows 2000 as your standard network operating system, Citrix as your thin client software, Windows 2000 professional as your desktop operating system on new purchases, and TCP/IP as your default communication protocol. All hardware should be established tier 1 brands such as Compaq, IBM, Dell, Cisco, and Hewlett Packard.

Network Management Solution

Network Management software should be implemented that provides planning tools, deployment tools, and diagnostic tools. Common solutions that this software provides are hardware/software inventory, software metering, electronic software distribution, and network monitoring.

Permissions, Policies, and Profiles

Another means to reduce total cost of ownership is to employ policies and roaming profiles. These provide standards by which user's desktops are accessible regardless of location which eases training issues and reduces support.

Antivirus

Viruses continue to invade organizations and are becoming more sophisticated. We recommend the installation of antivirus software on all personal computers and servers, which promotes the ease of frequent updates to help protect against infections that are bound to occur. Our choice of antivirus software is Symantec's Norton AntiVirus Enterprise Solution.

Policies and Documentation

Scott County already has computing policies in place that will need to be updated based upon the recommendations in this report. Documentation also needs to become a critical component of all systems to ease support and reduce the risk to Scott County in the event of system failure or staff turnover.

APPLICATIONS

Currently, the majority of applications are built using an integrated development tool called Zim from Zim Technologies International. We concur with the decision of Scott County to move toward a development tool with the flexibility and open architecture inherent with Microsoft Visual Basic and SQL Server.

Microsoft Visual Basic gives your development team the tools they need to successfully develop and deploy high quality, scalable applications. Visual Basic provides excellent performance, is easy to learn and use, and provides a complex feature set.

Microsoft SQL Server is one of the industry standards for relational databases and provides appropriate scalability for Scott County. Microsoft SQL Server utilized within the Windows 2000 environment will provide the best overall solution for developing a solid and scalable enterprise system in your organization.

Reporting Tool

Scott County is currently utilizing Crystal Reports as their reporting tool, which is used on a limited basis due to restrictions imposed by the Zim environment. With the flexible database environment introduced with Microsoft SQL Server, this product can become an effective development and reporting tool used by individual departments.

Document Management

Document management consists of storing hardcopy documents in electronic format. This helps alleviate storage issues, provides easy access to searchable content, and provides a mechanism for tracking updates to documents as they are changed.

TECHNOLOGY INFRASTRUCTURE

The technology infrastructure is a key component in determining the stability and reliability of the systems in place.

Structured Cable Design

The cable infrastructure is the most critical component of any system and is the “backbone” of your communications network. We recommend that a fiber optic ring distribution be implemented between the Courthouse, Annex, and Bicentennial Building. This will provide redundancy in case the fiber ring is broken at any point. We also recommend improvements be made to the general cable infrastructure to comply with current standards in the industry.

Operating Systems Integration

One of the main methods of reducing total cost of ownership that is highlighted in the report is the use of a software product called Citrix MetaFrame. This software allows for the options of utilizing Windows-based terminals that are more inexpensive than regular computers and extending the life of existing personal computers. Support, distribution of software, and faster access to programs from remote locations are all key benefits for implementing this technology where feasible.

We also recommended that Windows 2000 be your network operating system of choice. While Novell Netware provides similar capabilities and features, we believe that an organization of your size needs to standardize on one operating system platform.

Messaging and Remote Access

We recommend that Microsoft Exchange 2000 Server be installed and configured as your messaging server. This provides e-mail, public folders, integrated scheduling, and document workflow. All employees need to receive and learn Outlook 2000 so that the full capability of this messaging system is used to enhance County operations. We also recommend an enterprise fax solution that will integrate with your e-mail system and allow for easy faxing from any desktop. Our recommended solution, GFI's FAXmaker, can also be configured for centralized administration of in-bound faxes.

A centralized modem pooling solution is also needed which allows the County to centralize modems and modem lines to be used by any or all employees on the network. This reduces the total number of modems and modem lines needed since they will be shared and enhances security. We recommend utilizing a Cisco Router with a serial, analog modem module.

Data Integrity and High Availability

The data you maintain on your systems is critical to the ongoing operations of the County. We have observed that Scott County has an effective current backup policy in place, but we recommend consolidating the tape backup devices to ease administration. Our report also discusses detailed backup, fault tolerance, and data center facility recommendations to further enhance your current policies to provide for increased levels of data integrity.

Internet Connectivity and Wide Area Network

During the time of our interviews, many of the participants expressed their anticipation for high-speed, dedicated Internet access directly from their desktops. We recommend that the County implement a digital subscriber line (DSL) as a redundant Internet connection. DSL is more affordable than other comparable high-speed connections and would interface with your existing firewall solution.

As with any dedicated Internet connection, we recommend that you closely monitor your firewall and related security to ensure that reasonable protection is in place for Scott County. Your current firewall solution is meeting your needs, but may need to be replaced or upgraded in the future as new threats arrive or usage volume increases. Part of this security is the use of an Internet monitoring tool and access control so that the County can implement and monitor what sites are being visited, what sites should be blocked, and examine reports on Internet usage.

COORDINATION OF DEPARTMENTS

In our experience in dealing with County governments, Scott County is to be congratulated on how well the different departments currently work together to accomplish their goals and objectives. Indeed, Scott County has a remarkable track record of integrating the various departments together to accomplish technology goals. The following recommendations involve key areas of new integration opportunities that we feel Scott County needs to address in the near future.

Geographical Information Systems

Scott County has not defined a plan for how it will use or incorporate Geographic Information Systems (GIS) into the County. GIS continues to develop at a rapid pace in other governmental entities and is quickly becoming a standard throughout the country. In general, GIS provides a system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface in both graphic and report format. The ability to use spatial data, manage it, analyze it and answer spatial questions is a defining feature of GIS.

As with technology of any type, a GIS system integrates the key components of people, processes, and technology. Technology is the hardware, software, and data. With a GIS system the data is one of the most important components. A GIS system integrates spatial data with tabular data to provide information to the user. The people component of a GIS system is those who manage the system and are responsible for developing plans for applying the GIS system to situations. The processes refer to the implementation of well-designed business processes (rules) that support the operating practices of GIS technology.

We recommend that Scott County begin the development of a clear, strategic plan for how GIS could positively impact the business processes and service to citizens. As with any system, a plan should be developed prior to implementation of the system. The plan should spell out the objectives that are to be addressed by the implementation. The plan should include a description of the expectations of what the system will be able to do at each stage of implementation. Further, a realistic timeframe should be developed. A GIS system implementation typically takes two to three years to get the initial data coordinated, cleaned up and loaded and the system implemented. Further, most users implement additional data, such as digital images, collected after the initial base data is implemented.

The typical GIS plan is looking out three to five years and we recommend that Scott County begin the planning process.

Business Process Improvement

There are many business workflow processes that involve large amounts of paper being pushed throughout the organization in the form of many different documents, manuals, and handbooks. We recommend that Scott County evaluate and automate manual processes outlined in detail in the report to help reduce duplication of effort between departments.

E-Business

Scott County currently has not defined a specific e-business strategy that provides an overall direction on how the Web site will serve the citizens. We therefore recommend that Scott County begin to study the strategies, options, and priorities in relation to e-business, and how e-business will affect your operations.

We feel that proper planning before building the Web site will enhance the overall integration of the various departments and ease the way citizens communicate with the County. There are good case studies available that address the coming Internet e-commerce wave as it relates to your industry, and we encourage you to begin preparing today for what will surely be here in two to three years.

Business Continuity Plan

Scott County does not have a comprehensive, formalized business continuity plan in place covering the computers, LAN, and related PC networks. We recommend that Scott County review and discuss the importance of devising a formal business continuity plan. A business continuity plan is a comprehensive statement of actions to be taken before, during, and after a disaster to minimize the impact of that disaster on the operation of the organization's overall business operations. The plan should be documented and tested to ensure the continuity of operations and availability of critical resources in the event of a disaster.

Conclusion

Scott County is at a crossroads in determining how to best utilize and support technology within the organization. In order to reach the next level of customer services and a lower total cost of ownership, the County needs to evaluate, prioritize, and implement the core strategies defined in this report.

This report provides our recommended plan and we look forward to maintaining and growing our relationship with Scott County in the future.

Implementation Plan

Based on our observations and recommendations, we recommend that Scott County undertake the following activities:

Phase	Description	Report Reference Page(s)	Timeline
Phase I	Implement Information Processing Department Organizational Changes	11-13, 80-83	Completed
Phase II	Develop Hardware, Software, and Development Standards	18-22, 30-33	Completed
Phase III	Establish Electronic Help Desk Solution	14-17	Completed
Phase IV	Network Cable Design and Installation Project Management	38-42	Completed
Phase V	File, Print and Domain Controller Server Setups	46-48	Completed
Phase VI	Citrix MetaFrame, Thin Client Application Proof of Concept Pilot Project	42-45	Completed
Phase VII	Network Client Installations and Configurations – PCs and Windows-based Terminals	42-45	Completed
Phase VIII	Network File and Print Server Migrations	46-48	Completed
Phase IX	Wide Area Network Configuration Changes	61-62	Completed
Phase X	Electronic Mail, Scheduling, and Public Folders Optimization	49-51	2 nd Qtr-FY06
Phase XI	Centralized Fax Solution	51-52	N/A
Phase XII	Remote Access Solution	52-53	Completed
Phase XIII	Firewall Intrusion Test	59-60	TBD
Phase XIV	Firewall Upgrade	59-60	4 th Qtr-FY05
Phase XV	Internet Monitoring and Access Control Review of Current Configuration	60-61	TBD
Phase XVI	Internet Monitoring and Access Control Setup of New Configuration	60-61	TBD
Phase XVII	Citrix MetaFrame, Thin Client Application Server Entire Network Rollout	42-45	Completed
Phase XVIII	Network Documentation		On-going
Phase XIX	Basic Network Administration Training	N/A	On-going
Phase XX	GIS Strategic Planning Engagement	63-67	Completed
Phase XXI	Conduct Business Process Improvement	67-69	On-going
Phase XXII	E-Business Strategies, Options, and Priorities	69-70	On-going
Phase XXIII	Develop a Disaster Recover Strategy	70-72	1 st Qtr-FY06
Phase XXIV	Establishing Technology Partners for Ongoing Support of the Computer Network and Systems	N/A	On-going

Section 2 Observations and Recommendations

The following section provides our summary of observations and recommendations based upon the information gathered from our technology assessment. The successful organization understands that in order to be successful and efficient they must align their people, processes, and technology together to fulfill business objectives. The following section outlines our observations and recommendations based upon our assessment.

I. Information Technology Organization

1. Information Processing Organizational Structure Observation:

Through our interview process of the various departments, we identified a number of issues that some departments have regarding the level of service from the Information Processing (IP) department.

Several of the Scott County employees stated that they felt Budget & Information Processing (BIP) was too busy “fighting fires” to provide adequate support. Typically, most people view extensive firefighting as purely a symptom of a resource shortage, which many times is not necessarily the case. We believe that the problems may be based on an unnecessarily large number of “fires” being fought with inadequate tools by improperly aligned technical staff. Due to your current organizational mix and lack of tools, the network is administered in a purely reactive mode.

Information Processing needs to take a proactive approach to managing the technology, which includes following best practices and prioritization of tasks. Using our recommended methods for reducing total cost of ownership (TCO) would directly lessen the number of issues. A properly implemented help desk solution would allow for better management of the remaining issues that occur. Properly aligned technology resources would then facilitate better relationship management between Information Processing and other departments. This would also allow for properly focused technical skill sets, appropriate degrees of cross-training and improved morale.

Recommendation:

One of the necessary components that is key in achieving the necessary level of internal customer service is the realignment of Information Processing department resources. We recommend that Scott County reorganize the structure of the Information Processing department.

Exhibit A provides a current and future organization chart reflecting our recommended changes which are detailed below:

Technology Oversight Board – This team of representatives, which already exists as the Computer Advisory Committee, will help the Information Processing Manager prioritize critical tasks and establish the areas of key organizational objectives that need to be met. They would also provide input on the approval of any new initiatives and therefore create buy-in for all new projects undertaken by the IP department. This board should be comprised of a representative from each County department. The designated chairman of this board will be the Director of the Budgeting & Information Processing department.

Information Processing Manager - We recommend creating a position for an Information Processing Manager who would report to the Budget & Information Processing (BIP) Director. This person would oversee all Information Processing Professionals. This person would focus entirely on the technology of the organization as their primary job to ensure that all technology related functions are properly integrated and aligned with the business goals of the organization, and would also serve as a liaison between BIP and all departments. This person would provide more accountability in achieving the necessary level of service to Scott County's internal customers. If the County undertakes GIS, the second role of this individual would be the overall coordination of geographic information systems (GIS) projects and activities. The skills necessary for effective IP department management are closely aligned with the skills needed for effective GIS coordination.

Network Technical Support – Assuming the proper tools, methodologies, and technology recommended in this report are implemented, we believe three network administrators could sufficiently support the County's network. Someone would need to be assigned as the Lead Network Administrator. This person would be responsible for developing and maintaining network standards, procedures, and documentation, as well as having the foresight to keep the County's network technology at an acceptable pace with the industry. The cross training of skills and knowledge among this group will be critical to minimize the risk to the County in the event of employee turnover. The scope of support for this group would continue to include telecommunications.

Help Desk Specialist – This person would field initial phone calls or electronic mail from users experiencing computer related problems or making simple requests. The Help Desk Specialist will have fundamental computer troubleshooting knowledge, would type problems and requests into the help desk application, which would also provide knowledgebase and decision tree type tools to guide them in assisting the users. A problem requiring more advanced assistance would be prioritized and assigned appropriately. The Help Desk Specialist would report directly to the IP Manager to avoid conflict with prioritization of tasks.

Webmaster – One of the consistent frustrations we recognized through the interview process is that each department is responsible for maintaining its portion of the Scott County Web site. Individuals from the department did not feel comfortable with this role. Due to the lack of specialized Web site administration skills, many felt the County was missing an opportunity to provide a much better Web site to its citizens. Given the increased e-business needs for County government, there is a need for a dedicated Webmaster to fulfill those needs. This person would work closely with each department and will be able to provide the insight and skills necessary to develop and maintain an effective and uniform Web site.

Application Development - The Leader of Application Development needs to be the liaison between the users and the programming staff. This person would be responsible for assigning resources to development projects and program maintenance requests of existing applications. Additional responsibilities include assisting departments with any needs requirements and software selection processes. This person would be responsible for developing and maintaining application development standards, procedures, and documentation, as well as have the foresight to keep the County's technology platform at an acceptable pace with the industry.

Conclusion:

In order to support the new technology that will be implemented in the future at Scott County, there are certain number of complex skill sets and services such as Database Administration (DBA) that may need to be obtained from outside resources. Typically, it is not economically feasible for organizations such as yours to have people on staff that possesses all of these specialized skills.

Job descriptions would need to be developed and maintained for each position. Additionally, Scott County should cautiously monitor the effectiveness of having individuals perform dual roles with the advent of new technologies. It will be important for Scott County to evaluate the position roles, responsibilities, and skill sets as technology moves forward and openings arise. An example of a dual role would be the Information Processing Manager also serving as the GIS Coordinator.

2. Training Observation:

Training on basic computer skills for the end users and your IP professional staff is a major concern for the overall success of any implementation of technology at your Organization. This training needs to occur at the software application level for many products since many users feel that with proper training they could operate more on their own without needing IP resources on a day-to-day basis.

Recommendation:

Change is not easy for most people in any circumstance, especially in the area of information technology. Based on our observation of the skill level of your users and the opinions that were shared with us during our interviews, we feel it is critical that training and implementations of new technology be provided on a step-by-step basis. The training system must be designed to be flexible and we encourage you to implement only one product at a time.

Formal training for your IP professional staff will bring about improved results from the personnel in your IP department. This formal training can come from a number of resources including classes, onsite training, seminars, books, videos, and Internet access. This training will also give them a sense of ownership in the technology that they support on a day-to-day basis. Additionally, your technology users will experience better service, enhanced productivity and increased self-confidence in their abilities.

For end-user support and network administration training, we recommend that formal classroom training be supplemented with customized, onsite training that teaches your IP professional staff the general support details pertaining to your organization's technology.

We also recommend that the application development staff attend formal classroom training. Additionally, we recommend outsourcing constructive critiques of the Microsoft Visual Basic applications recently developed by the County's application developers. This would provide for objective, real world training that directly applies to your development environment.

For formalized classroom training, it is recommended that the IP professional staff attend classes from a Microsoft Certified Technical Education Center. Some of the training centers available in the Quad Cities and Eastern Iowa are New Horizons, Productivity Point, and Quest College.

End users need training so that minor issues are not consistently taking up IP department resources and to enable them to use the technology to become more effective at their jobs. Many users feel as if they do not know enough about the software they use on a day-to-day basis. More importantly, they feel that the lack of knowledge directly affects how efficient they are on the job.

In addition to application training, we recommend training users on how to access information made available by the organization for the purpose of self-service problem resolution. Our help desk application recommendations below offer knowledgebase modules that include answers and step-by-step guides for common end-user application questions.

Due to most individuals within most departments not having had the opportunity to utilize or recognize the value of the many features associated with e-mail, we recommend mandated training in two phases. Phase I should include basic Outlook 2000 training during implementation and Phase II should include internal training which demonstrates the use of the organization's specific resources, such as what information is available within public folders and how to access relevant information.

3. Help Desk Observation:

There is no formalized help desk function in place at Scott County and, as a result, users are forced to rely entirely on reactive best-effort support by second/third-level support technical engineers. The existing technical support staff in place at Scott County is comprised of second/third-level technical engineers – those that are capable of resolving advanced, specialized technical problems.

Several of the departments interviewed stated that when they placed help desk calls, BIP seemed to have a shortage of time and resources. It is very possible that the BIP resource receiving the calls was working on a higher priority problem, but in many cases the user felt their issues were not being given adequate attention.

Scott County does not have a formalized electronic help desk application, which could be used to better prioritize, assign, track and organize problems.

Recommendation:

We recommend implementing first-level help desk support. Second/third-level technical support engineers are typically brought into the problem resolution cycle after assignment by a Help Desk Specialist. Many problems are capable of being resolved by first-level support.

By having a qualified first-level support resource on the technical support team, the second/third-level support resources are allowed to focus entirely on advanced planning, problem resolution and administration. This would free the second/third-level support resources from the unpredictable and time consuming tasks of initial problem troubleshooting, logging, prioritization, assignment and follow-up.

It is very important that a help desk include a formalized second/third-level agreement with a qualified outsourced technical support group, which can provide specialized support in areas for which internal support is not knowledgeable or to supplement internal support during unexpected busy times.

An enterprise help desk solution should include the following characteristics:

- ***One hundred percent browser-based.*** This permits all levels of support to access the help desk application information from virtually anywhere via a standard Internet Web browser.
- ***Tight integration with common industry standard e-mail applications such as Microsoft Exchange/Outlook.*** This integration allows for features such as automatic generation of Customer Surveys, Trouble Ticket generation via end-user e-mail to the Help Desk, forwarding Trouble Tickets to technicians, e-mail-based escalation procedures, etc.
- ***Knowledgebase and decision tree integration to assist all levels of support with problem resolution.*** Knowledgebase integration capabilities should allow for third party knowledgebase modules to be “plugged in”, such as those developed for the Microsoft Office suites and should allow for an internal knowledgebase. An internal knowledgebase is automatically assembled from former internal resolutions, enabling organization specific data to be searched so that new problems can be resolved using information from similar past problems. Decision trees are task maps of definable resolutions for common problems, which allow first-level support to assist users with resolving problems. Often decision trees are developed by second/third-level support to help guide first-level support.

An example would be as follows. A first-tier technician would field initial phone calls or e-mails from users experiencing computer related problems or making simple requests. The first-tier technicians, having fundamental computer troubleshooting knowledge, would type problems and requests into the help desk application, which would also provide knowledgebase and decision tree type tools to guide them in assisting the users. A problem requiring more advanced assistance would be prioritized, assigned and dispatched appropriately.

- ***End-user self-service option.*** End users should be able to resolve simple support questions through a search engine, open new trouble tickets, or check the status of open tickets. This can be accomplished through a standard Web browser in a browser-based help desk solution. Users often call the Help Desk with simple requests or to simply inquire as to what is being done with their problem.
- ***An industry standard database format.*** The volumes of data that will be assimilated should not be within a proprietary database, which would make customization, report development, migration and third party application integration more difficult. Industry standards database formats include SQL and Oracle among others.
- ***Shadowing or remote control of end users' computers.*** Shadowing permits any level of support to view a remote user's actions, if requested, so that the user can illustrate a problem. Remote control allows for support to take control of a remote user's computer, if requested, so that support can resolve a problem or illustrate a sequence of steps.
- ***Asset tracking.*** All levels of support should be able to instantly retrieve accurate and complete information detailing the hardware and software configuration of any computer.
- ***Trend analysis reporting for the Information Technology group.*** Examples of meaningful trends would be Call Breakdown by categories such as software, hardware, phones, etc. and Average Daily/Monthly Call Distributions. These trends help with staffing decisions and assist in identifying growing problems before they become critical.
- ***Access to help desk information, data and statistics by senior management.*** Upper managers within many organizations only know what they hear from the various departments, do not have access to enough objective information to form a complete picture, and often find themselves unsure as to whether or not the technical support of their technology is acceptable. Even though there may be a general awareness of a problem, chances are there are no reporting mechanisms that allow for them to identify and assist in fixing the problems. Managers should be able to view statistics such as the number of Trouble Tickets per department, number of unresolved problems, average length of time to resolve a Trouble Ticket, average age of unresolved Trouble Tickets, etc. Additionally, all users should have an opportunity to fill out an automatic e-mail-generated Help Desk Customer Survey immediately following resolution of a problem. These could be sorted based on such categories as Overall Help Desk Experience Rating and Date. Once armed with such information, managers with little technical knowledge can understand and constructively address "big picture" issues based on meaningful data.

A poorly planned initial attempt to implement a help desk solution can backfire. The organization needs to include key members of their customer-base in all phases of the Help Desk development process to ensure commitment to its success. Users can be resilient in their quest for help, even if it means bypassing the Help Desk to get their problems resolved.

We recommend outsourcing assistance with developing an enterprise help desk solution, which would involve phases similar to those listed below:

- Help Desk Design.
- Application and Toolset Selection (included within this report).
- Application and Toolset Customization and Implementation.
- Problem and Work Management Procedures Development.

4. Change Management Process Observation:

Currently, there is not a change management process in place at Scott County.

Recommendation:

We feel that the complexity of technology and the number of technology support staff in place at Scott County necessitates the need for a change management process. A change management process affects changes made to high-availability and mission-critical systems, such as servers. Change management consists of recording/logging intended changes, reasons for intended changes, date and time of intended changes, technician(s) performing the changes, a back-out plan if things do not go as planned, and notes after the change reflecting the success/failure of the change. Most importantly, the Change Management Process includes review and approval or denial by at least one other person of higher authority. A Change management process supplements data integrity and high-availability processes and procedures, reduces system down-time, forces careful planning and review of intended changes, assigns accountability and serves as an archive of changes.

Change management processes would be used to include any major systems hardware, systems software, or application software changes.

An example of a systems change would be a network operating system upgrade in the form of a service pack on a network server. Sometimes a service pack upgrade will fix a number of issues, but may cause problems elsewhere. If the service pack upgrade is documented properly with formal back-out procedures, the overall risk to the organization decreases.

Another example of change management would be program maintenance procedures for applications. Whenever changes are made to production code, these changes should first be tested and then documented so an audit trail exists in case of problems down the road.

A change management process is a recognized best practice within the IT community.

II. Best Practices

Industry accepted estimates state that best practices can lead to cost reductions of about 30 percent and increase utilization of functionality as well as user satisfaction. For example, software tools (e.g., remote control of network workstations), groups or packages of functionality (asset management, help desk support) used in conjunction with processes and policies (change management, documentation, etc.) can reduce both cost and risk.

5. Standards Observation:

Standards, best practices and complexity all integrate to affect each other, as well as to collaboratively affect TCO. For example, the implementation of standards lessens complexity and allows for best practices to be more easily exercised.

Scott County understands the importance of standards within the IT infrastructure as is demonstrated by their purchasing decisions for server, PC and network equipment hardware.

Scott County also recognizes the importance of technology as an advantage to improving productivity of staff and services to customers. We suggest that this same commitment to technology be made within your organization to include the implementation of formal technology standards that support the operational requirement needs. All companies utilizing information technology ultimately must decide on core technology standards to be used in the course of their day-to-day activities. These core standards are critical in that they provide for consistent training, ease of data and information transfer, more efficient support, and a common thread between all departments in the sharing of electronic communications.

Recommendation:

We recommend that Scott County evaluate and set technology standards for all users to follow which will decrease maintenance costs, ease the ability to establish interconnectivity, and reduce the time to install and test network and software upgrades. Further, "client" hardware and application standards should be established based on the user's requirements. This will allow for the proper utilization of older equipment by those users who have reduced needs based on the applications they are running. This "cycling" of older equipment will maximize the investment in technology as new hardware is added.

Scott County is in a favorable position for formally implementing standards. Currently, purchasing decisions at Scott County are made with standards in mind. However, we suggest that there be a consensus formed among the technology decision makers and that the standards be committed to writing. This helps to ensure that over time, hardware and software standards are maintained through properly guided purchasing decisions. Many other organizations are faced with implementing standards after having made significant ill-considered investments in their network infrastructure and equipment. Without standards, these investments, over time, can result in a compilation of computers, servers and other networking equipment that lack Tier 1 components, contain components that differ among similar equipment, and equipment by different manufacturers that fulfill the same function. As a result, the necessary support time and dollars when there are no standards can be significant, as are the costs of an after-the-event implementation of standards.

Based upon our experience with organizations similar to those of Scott County, we recommend the following standards:

Network Operating System - Based on your current needs and future direction, we recommend that you adopt Windows 2000 Server as your network operating system of choice. There are a number of reasons driving this recommendation, which will be made evident in the Operating Systems Integration section, but primarily the driving force relates to reducing technology infrastructure complexity - a key element of TCO.

Application Server, Thin Client Software - We recommend Citrix Systems, Inc.'s application server software, Citrix MetaFrame for Windows 2000 Server. Citrix currently has more than 100,000 customers worldwide, including 99 of the FORTUNE 100 and hosts a vast array of strategic partnerships with other software and computer hardware manufacturers. Citrix Systems, Inc. is a global leader in application server software and services development.

Windows-Based Terminals - We recommend Wyse Terminals for the Windows-based terminals. Wyse is the leader in general purpose terminals and has been making them for over 17 years. Many of the Wyse terminals are still performing well after more than 10 years of being manufactured. Windows-based terminals, in affect, are similar to dumb terminals, however, dumb terminals are character-based devices whereas Windows-based terminals are graphical devices with additional built in intelligence that allows them to run today's Windows-based applications via application server computing. These devices have no moving parts, produce less heat, are built of high quality components and are considerably easier to setup, configure and maintain. As a direct result, they are less expensive to purchase and support than PCs, and have greater reliability and longevity than PCs.

Client Operating System - We recommend configuring all personal computers that you may purchase with Windows 2000 Professional as the desktop operating system. In the event that legacy systems will not run on Windows 2000 Professional desktops, Windows 98 is acceptable as a desktop operating system for backward compatibility.

Protocols - A protocol is the method used by personal computers and servers to communicate with each other and with other devices on the network, such as printers.

Currently, Scott County utilizes multiple protocols, TCP/IP and IPX/SPX. We recommend that your network be configured to run entirely and solely on the TCP/IP protocol that is the Internet and network standard protocol of today. Every network device, such as workstations and printers, require a unique and valid TCP/IP address in order to communicate. The TCP/IP addresses must be of the recommended 10.X.X.X range for internal addressing with only InterNIC registered addresses recognized by the outside world.

Currently, Scott County utilizes a mixture of Microsoft Windows NT and Novell NetWare based DHCP Management. We recommend that the DHCP Server service within Windows 2000 Server be configured to dynamically manage and assign TCP/IP addresses to all workstations. Static TCP/IP addresses should be used for file servers, routers and network printers.

Office Automation Software - Scott County has recently completed installing Microsoft Office 97 on all personal computers. Microsoft Office is the industry leader in office automation software. We recommend that you utilize Microsoft Office 2000 as your standard office automation software. It integrates well with the planned network operating system and other industry software. When a common office suite of software is used throughout an organization, as with Scott County, training time is reduced and the sharing of information, support of the software, and communication between programs becomes much easier. The importance of enforcing the organization-wide use of industry standard office automation software will become more evident as communications with clients and outside agencies increase. Additionally, it is vital that Scott County employees continue to be able to share files in a standardized format without the burden of file conversions.

Internet Browser - Microsoft Internet Explorer is our recommended choice as an Internet browser for Scott County. We view Internet Explorer and Netscape as comparable products that work well in any environment. The organization should select one product for easier administration.

Personal Computer Hardware - The personal computer hardware needs to be reliable and efficient for any network system to be successful. We have observed that purchasing practices within Scott County do focus on maintaining Tier 1 hardware standards. We recommend imposing a commitment to hardware standards through writing – a policy that describes the minimum overall percentage of similar models, the minimum number of differing model types, a hardware rotation scheme to position older PCs with users having reduced needs, minimum capacity of types of components such as processor speed and RAM quantity, minimum PC replacement frequency, etc. The written Hardware Standards Policy should be reviewed every six months. Such a policy allows for the ability to accurately budget for equipment. The focus of such a policy will need to be based on departments and functions. For example, an engineer within Secondary Roads will need to have a PC replaced more often than a clerk who relies entirely on applications served by Citrix MetaFrame. The minimum overall percentage of similar models criteria in combination with the minimum number of differing model types allows for a manageable library of images. Model-specific images, each containing a base configuration, allows for significant timesavings when rebuilding PCs. Currently, equipment purchases are based on maintaining hardware standards, however, in addition, hardware standards should be based on reducing total cost of ownership (TCO) to the greatest extent feasible.

By focusing on Tier 1 personal computers, you avoid most of the common problems normally associated with “clone” PCs. Typically, “clone” computers, those which are self-assembled or assembled by local computer resellers, are not comprised of Tier 1 components. The types of components often vary among these types of computers even though the outward appearance of the computers is the same. These factors greatly increase overall network administration support time and costs. The use of this type of computer equipment may seem like a financially sound decision at the outset, however, in the long run the amount of down time and maintenance costs outweigh the initial savings. Tier 1 purchasing standards should focus not only on manufacturer, but also on model type. Most Tier 1 computer vendors also create models that are designed more for home use and are not ones specifically designed for business networks. With Windows 95/98/NT/2000 workstations serving as the industry standard for desktop network operating systems, it is essential that the hardware in place be compatible to serve as the platform for these operating systems, as well as for networking. Tier 1 computer manufacturers such as Dell, Compaq, IBM, and others have their computers tested frequently with Microsoft and other software companies to ensure compatibility and efficiency of operations. They also have three-year on-site warranties for the repair of hardware defects, which alleviates the time spent by your IP staff in this area.

We recommend integrating Windows-based terminals wherever possible by way of instituting a phased, hardware replacement process for your organization’s personal computers.

Server Hardware - Tier 1 server providers currently include Compaq, IBM, Dell, and Hewlett Packard. Scott County currently focuses on Compaq as their standard for server hardware. Compaq is our recommended server hardware vendor. A single supplier for network file servers is important, as are minimum acceptable configurations for network components, which should be included within the written Hardware Standards Policy. All future networks should conform to this standard and existing networks should be brought into conformance with this standard, as resources permit or as obsolete systems are replaced. These standards should be monitored and changed as technology evolves.

The minimum configuration for servers should include hardware-level RAID 5 and the amount of RAM recommended for the functions they will serve.

Network Routers and Switches – We recommend the Cisco brand of equipment when selecting routers and switches. Scott County does utilize Cisco equipment throughout the organization as their standard for switches and routers. Installation of network switches that replace network hubs can greatly improve the performance of a local area network (LAN). LAN switches improve performance by employing packet switching that permits high-speed data exchanges. Additionally, switches segregate network requests so that they are sent only to the devices on the respective network segment as apposed to broadcasting the requests to all devices attached to the network. Routers serve to interconnect LANs to form wide are networks (WANs).

Network Laser Printers - Hewlett Packard is our recommended choice for laser printers.

We want to reinforce the common theme of Tier 1 equipment and components, mentioned throughout this section of the report. The Gartner Group, an independent industry consultant, states that 85% of the money spent on technology is spent post-purchase, and investing in Tier 1 equipment reduces TCO.

These standards are provided for your use as a guide in establishing policies for future technology implementations based upon need. We can consult with you on other items as necessary based upon our experience.

6. Network Management Solution Observation:

Currently, there is not a network management solution in place at Scott County.

Recommendation:

We recommend implementing a network management solution that integrates tightly with your planned network infrastructure. An enterprise network management solution is designed to supplement your technology support staff by automating many manual tasks (some of which are not occurring due to time constraints) and by extending their “reach.”

One example at Scott County in particular where a network management solution would have been an effective tool was the Microsoft Outlook electronic mail client rollout project. The time and resources necessary to implement Microsoft Outlook would have been dramatically reduced with a fully functional Network Management Solution.

Examples of the many features that a credible network management solution should encompass include the following:

Planning Tools

Hardware Inventory - Gathers accurate information automatically without requiring your IP support staff to ever visit a desktop. The IP support staff can use the data to plan hardware updates or identify machines capable of running new software and operating systems.

Software Inventory - Reports every application installed on every PC to help the IP support staff obtain organization-wide software inventory or to identify computers with software that is out of date or software that is not approved.

Compliance Checking - Compares inventory to a predefined list of hardware or software. This tool could be used for any compliance check such as Windows 2000 compatibility.

Software Metering - Tracks and controls application use based on application name, user, time of day, and quota. Software use statistics can help regulate software-licensing agreements.

Network Discovery - Discovers and maps network topology, clients, and operating systems with minimal impact on available network bandwidth. This would help the IP support staff understand the network and plan for growth.

Reporting - Includes Crystal Info reports and over a dozen built-in reports to help the IP support staff track, manage, and plan the environment. These reports can be customized to fit virtually any need.

Deployment Tools

Electronic Software Distribution - Eliminates desktop visits and human error by electronically distributing software to all desktops and servers on the network from a central location.

Integrated Inventory - Ensures only compatible systems install software by using the integrated, up-to-date hardware and software inventory. Accurate inventory makes software distribution more reliable.

Rules-Based Software Distribution - Reduces administrative overhead by dynamically adding and removing machines, users, or user groups from collections – a defined set of objects sharing common characteristics - based on criteria set by the IP support staff. In other words, software could get installed or removed automatically as users and machines are added and removed from collections.

Scheduled Software Distribution – Would allow the IP support staff to schedule application deployment to occur during a specific time of day to avoid network congestion or to distribute software after a certain date to ensure users had received training first.

Installation - Provides an installation tool that would allow the IP support staff to repackage changes and write scripts to create a package for any Windows-based application. No programming expertise is required to distribute software effectively.

Unattended Software Installation - Installs software without requiring any user interaction and can install software requiring administrator rights even if a low-rights user is logged on. This feature is ideal for off-hours distribution or distribution to physically secured servers or workstations.

Integrated Status - Reports the status of software installations and operating system upgrades so that the IP support staff would know whether or not software installations were successful.

Diagnostic Tools

Network Trace - Builds a map of network servers and devices, which would help the IP support staff understand and troubleshoot the network.

Network Monitoring - Identifies network problems such as unwanted protocols, duplicate IP addresses, and attempted Internet break-ins by monitoring network traffic.

Remote Diagnostics - Reduces the time it takes to fix problems on servers and desktops anywhere on the network by remotely running applications, electronically conversing with end users, rebooting, and even controlling the keyboard and mouse.

Server Health Monitoring - Keeps mission-critical servers and applications up and running by providing real-time performance information processes.

This is an example of a best practice that can be much more easily implemented if done so in conjunction with the other elements of the TCO model. In other words, within a less complex environment composed of standards-based equipment and configurations; a network management solution can be much more easily implemented and utilized.

Please Note: Determining whether or not to implement this recommendation is dependent upon whether or not the County decides to implement, in part or in full, a thin client application server solution such as Citrix MetaFrame. Additionally, the extent to which the County decides to utilize Windows-based terminals in place of PCs throughout the Organization also affects this recommendation. The concept and the specifics of Citrix MetaFrame and Windows-based terminals are detailed within the "Thin Client Needs Observation." The need for many of the features described in this recommendation does not exist in a fully implemented, organization-wide Citrix MetaFrame environment, such as remote control and software distribution. Depending upon the extent of deployment of Windows-based terminals, network hardware and software inventory no longer applies. Other features, such as performance monitoring, are tools bundled with Citrix MetaFrame. Within an environment similar to the one that exists now at Scott County, we would advise implementing this recommendation. If Scott County were to implement a Citrix MetaFrame solution that served only part of the Organization, the above-mentioned recommendation would continue to have merit.

7. Permissions, Policies and Profiles Observation:

Another means to reduce total cost of ownership (TCO) is to employ policies and roaming profiles, which are not currently in place at Scott County. Permissions on some network resources, specifically folders and files, are not as stringent as we would recommend.

Permissions consist of the assignment of the level of access permitted to network resources to a user or a group of users. We were informed that because user accounts are being maintained on two separate network operating systems, Windows NT and Novell NetWare, there are situations where little or no permissions are applied in order for some users to access some network resources.

Roaming user profiles are user specific settings stored on a centralized server, rather than on each individual's personal computer, thereby allowing these settings to "follow" the users when they logon to other computers using their logon account and password. This provides users with the ability to carry their user settings from one location to another, much like they would with a laptop. Many users in most computing environments are not tied to a given personal computer. This is especially the case in organizations like Scott County where there are multiple locations – users often find themselves needing to logon as themselves to another personal computer in another location, even if only momentarily, to access personal work-related resources. Additionally, roaming user profiles allow for the opportunity to standardize the look, feel and configuration of all computer desktops. With standardization being the key, technical support resources become more efficient. This standard would actually span both Windows-based terminals and personal computers running Windows 2000 Professional. Windows-based terminals run a Windows 2000 session from a central Windows 2000, thin client server. Therefore, roaming user profiles would allow users of both Windows 2000 personal computers and Windows-based terminals to move among these devices freely.

Once the profiles are defined, Group Policies are configured to automate control of roaming user profiles. Group Policies are configured to specify what changes users can or cannot make to their computer's desktop environment.

Related to both policies and permissions, currently BIP generates, distributes and keeps track of all logon accounts and passwords for all Scott County employees. Employees are unable to change their own BIP-assigned passwords. Currently, there are no automated network-based policies in effect that force organization-wide, periodic password changes among users. We were informed that it is not an uncommon occurrence for Scott County users to remember their passwords by way of post-it notes in easily accessible locations or in some cases within plain view. All logon accounts are eight characters long and are formatted as SC followed by a two-digit department number and a four-digit unique user number. Passwords are nine characters in length, consisting of eight randomly generated numbers and a single randomly positioned and randomly generated letter.

Recommendation:

We recommend that Scott County implement roaming user profiles. In combination with a phased implementation of Windows 2000 and Windows-based terminals, Scott County should define a standard Windows 2000 workstation profile by job function and utilize it throughout the Organization for enhanced security and ease of management. This profile would allow the Organization to take away the DOS prompt, network properties, games, etc. from users on a global or group basis.

We recommend that Scott County implement Group Policies. Recent studies on TCO cite lost productivity at the desktop as one of the major costs for organizations. Lost productivity is frequently attributed to user errors, such as modifying system configuration files and rendering the computer unworkable, or to complexity, such as the availability of non-essential applications and features on the desktop.

We recommend that Scott County closely evaluate the current assignment of permissions. In addition, however, effectively assigned and managed permissions serve as a relevant security barrier only if the end-user community properly conceals their logon passwords. End users should be given the ability to change their own passwords. One of the many features of Group Policies is the ability to define predetermined password formats, such as the minimum number of characters, the inclusion of at least one non-alphabetic character, etc. As a result, end users can change and assign their own meaningful, hard-to-guess passwords meeting the password-complexity requirements of BIP. We recommend that the Group Policy be configured to enforce a designated maximum password age based on a schedule matching that of a formal organization policy, which defines frequency. We recommend forced password changes occur at least every 90 days. We recommend that the Group Policy enforce a minimum password history, which does not allow users to reuse passwords that fall within the defined number of previously used passwords. We recommend that the Group Policy be configured to remember the ten most recently assigned passwords. Additionally, we recommend that a minimum password age of one day be defined within the Group Policy, which would prevent end users from consecutively assigning ten passwords within one sitting in order to retain the one they “like.” We further recommend that all Scott County employees be informed of the importance of password concealment.

In summary, by implementing standards for Windows 2000 Server on the servers and, ultimately, Windows 2000 Professional on the personal computers as the operating systems of choice, in combination with utilizing Windows-based terminals, your organization will have the opportunity to establish effective permissions, policies, and profiles. Effective permissions, policies and profiles specifically addresses TCO through managed desktop environments tailored to users’ job responsibilities and level of experience with computers.

The benefits include:

- Lower total cost of ownership at all levels by lessening complexity, strengthening standards and executing best practices.
- Enhanced security.
- Reduced complexity.
- Ease of technical support.
- Standard desktop configurations.
- User mobility.

Permissions, policies and profiles serve as an example of best practices that are more easily applied and managed within an environment with a common operating system standard, which in turn reduces complexity and overall TCO.

8. Antivirus Observation:

With today's networks that have worldwide connectivity through the Internet, antivirus software needs have become increasingly prevalent. Currently at Scott County, most workstations are running McAfee VirusScan for antivirus software.

Periodic, manual antivirus definition updates occur for some of the computers, but even for these computers the updates are infrequent.

Malicious code is comprised primarily of two distinct types – worms and viruses – although both are commonly referred to as viruses.

Worms pose an insidious threat to corporate e-mail systems—with the potential to cripple a corporate network in just hours. Over the next decade, worms will surpass viruses as the major malicious code threat to consumer and corporate computer systems. Worms self-replicate from one machine to many others, using a network medium (e.g., e-mail or TCP/IP). The goal of a worm is to infect as many computers on a network as possible. Usually, only one infected file is delivered and run on a particular machine, then the worm propagates to another machine. To prevent the downtime, lost data, and monetary loss resulting from worm attacks, network systems must provide sufficient defenses against worm threats. Examples of recently notorious worm outbreaks include Mellisa, ILOVEYOU, and Prettypark.

Viruses propagate from computer to computer through the aid of people—whether it's inadvertently e-mailing an infected document, exchanging disks or uploading files to a server. Once the infected file is opened, the virus replicates to other files or disks on the computer. A virus, as opposed to a worm, is usually designed to infect many, or all, documents on a single user's computer, but cannot spread itself to other computers automatically. Since worms are self-replicating, they can spread extremely fast compared with viruses.

It is crucial that upper management and key organization decision makers understand and respect the impending threat of worms and viruses. A single unfettered outbreak can cripple an organization for days or weeks while they recover through the assistance of a scrambling IT support team. Computer viruses are one of the most frustrating challenges faced by IT staffs today. They rob workers of productivity, divert IT personnel from other strategic concerns, and can even jeopardize an organization's information security. It is important to understand, however, that there is no way to keep viruses out of your organization's computers – although proactive measures can be implemented which limit the risk. Viruses are written to take advantage of newly discovered, common weaknesses and, as such, the antivirus community is forced to be reactive. Once detected at an entry point of the organization, be it via an e-mail, a floppy disk or an Internet file download – an effective and properly configured antivirus solution should immediately detect and eradicate the occurrence before it spreads. In most cases, an infected file can be cleaned of the detected virus, in other cases the file must be deleted. Nevertheless, it would be a quickly eradicated single incident that does not spread.

With more than 53,000 virus threats existing today and with the development of new viruses occurring at an exponential rate, an enterprise antivirus solution for any business network is a must.

Recommendation:

We recommend the installation of antivirus software on all personal computers and servers.

We recommend Symantec's Norton AntiVirus Enterprise Solution.

With the rapid proliferation of new viruses, periodic manual updates by IT technical support staffs are no longer considered to be sufficient protection. We recommend implementing a solution from a single vendor that provides for the following features:

- Automated virus definition downloads to a single distribution point.
- Automated virus definition distribution.
- Real-time and schedulable file scanning.
- Centralized client antivirus policy configuration.
- A central console that allows for viewing the status of all clients enterprise-wide.
- E-mail virus scanning.
- A manufacturer that is an industry leader with a proven track record for rapid development of resolutions for new aggressive, fast spreading malicious code.

9. Organization Computing Policies Observation:

Scott County has the following written computing policies:

- Scott County Information and Service to Customers.
- Internet/Intranet and Online Services Use.
- Computer Advisory Committee/County Computer Network policy.
- Internet Code of Conduct.

Recommendation:

We have reviewed the existing policies and recommend that they be updated to reflect all recent and planned technology changes. We also recommend that they be reviewed biennially. Additional issues that should be addressed include security, equipment and software purchases, disaster recovery, electronic mail use, general computer use guidelines, and other relevant information technology concerns.

10. Documentation Observation:

The documentation for all facets of information technology at Scott County is very limited and leaves the organization at risk in the event of system failures, personnel turnover, and theft.

Recommendation:

Steps need to be taken to ensure that documentation occurs for all areas of existing information technology in addition to the development of documentation in tandem with the implementation of new technology at Scott County.

Essential elements in this area include:

- Local/wide area network Infrastructure.
- Network server/workstation hardware/software specifications and inventories.
- Network server/workstation software and operating system configurations.
- Operating system and application software licensing and configurations.
- Application development.
- Procedures.

III. Applications

11. Application Environment Observation:

Currently, the majority of applications are built using an integrated development tool called Zim from Zim Technologies International (ZTI). Scott County has used Zim for twelve years and there are approximately 75 Zim applications running in this environment. Zim is a unique language that tightly integrates the application with a proprietary database tool. These systems have evolved as the Zim product's functionality has been enhanced from a DOS, character-based environment to a Microsoft Windows graphical user interface (GUI) environment.

Additionally, documentation for these applications is very limited.

Because of the unique nature of Zim and the limited penetration of this product in the technology marketplace, it is very difficult to identify resources that have adequate experience developing and supporting systems in this environment. Consequently, Scott County has begun converting these systems to a state-of-the-art platform using a Microsoft development toolkit and database.

John Neth, a Senior Programmer Analyst, developed and supports most of these systems. John is retiring in January of 2002. For this reason, it is important that the County aggressively pursue the conversion of the "mission-critical" programs to the new operating environment in the shortest possible period of time. This will enable the County to take advantage of a resource very knowledgeable in the County's operations and ultimately minimize the conversion time required to move key systems to the new environment.

Recommendation:

We concur with the decision of Scott County to move toward a development tool with the flexibility and open architecture inherent with Microsoft Visual Basic and SQL Server. Our recommendation is based on the need to create high performance three-tier enterprise applications using the most effective products available. The components of the three-tier enterprise application are the data, the application that acts on the data, and the client. When determining the needs for an enterprise system, consideration should be given to the following:

- Platform
- Pricing
- Scalability
- Performance
- Application requirements
- Upgrade capability
- Ease of use
- Support

12. Microsoft Visual Basic Development Language Observation:

The majority of all applications are based on Zim.

Recommendation:

We recommend that Scott County utilize Microsoft Visual Basic as their standard development platform. Microsoft Visual Basic gives your development team the tools they need to successfully develop and deploy high quality, scalable applications. Visual Basic provides the most powerful enterprise development platform. Visual Basic provides excellent performance, is the easiest to learn and use, and provides an unmatched feature set.

Newly introduced development tools give Microsoft Visual Basic some of the fastest data access methods in the industry. New database options give it the strongest database programming tools of any development tool on the market.

Visual Basic is outstanding in the following areas:

- Ease of use.
- Data access/database development.
- Documentation.
- Web design/scalability (Internet support).
- Three-tier application development (server-based computing).
- Stored procedure support (database access programming).
- Component development (development of re-useable objects).
- Code repository (program libraries).

13. Microsoft SQL Server Database Manager Observation:

Currently, the majority of data associated with most applications resides in Zim application databases.

Recommendation:

We recommend that Microsoft Visual Basic be used to develop all applications and that all the data be hosted within Microsoft SQL Server databases.

The differences in database servers primarily revolve around price, ease of use, and integration. Microsoft SQL Server automates functions like memory management and disk space allocation. When tables expand or shrink, SQL Server automatically allocates or de-allocates the space it needs. As memory requirements change, SQL Server will use the memory on the machine in the optimal manner. Statistics are kept internally on the data objects, which enable the database engine to determine the quickest way to return the requested data using the existing tables and indexes. SQL Server also provides for 25 wizards to assist in areas that cannot be automated.

When using Microsoft Windows NT or Microsoft Windows 2000, SQL Server can be integrated to provide single-user login access to database applications. An e-mail or a page

can be automatically dispatched via the Event Viewer to alert appropriate resources should any database issues arise. Services like Data Transformation Services (DTS) can help you quickly import or export data from a variety of sources such as Oracle, spreadsheets, and flat files.

Microsoft SQL Server provides the best performance on the Windows NT platform and has delivered record setting results on the industry standard benchmarks. SQL Server is the price/performance leader.

Microsoft SQL Server provides the following features:

- Self-tuning wizard.
- English query language.
- Data transformation services.
- Data warehousing tools.
- Low transaction cost.

We believe that a combination of Microsoft SQL Server and Microsoft Visual Basic utilized within a Windows NT/2000 platform environment will provide the best overall solution for developing a solid and scalable enterprise system in your organization. The tools work very well together to achieve excellent scalability, ease of use, and implementation.

14. Seagate Crystal Reports - Reporting Tool Observation:

Currently, the County uses Seagate's Crystal Reports as their reporting tool, which is used on a limited basis due to restrictions imposed by the Zim environment.

Recommendation:

We recommend that Seagate's Crystal Reports be utilized throughout the organization as a standard. Seagate's Crystal Reports is the recognized leader in the development and reporting tool industries because of its flexibility, power and ease of use. With the flexible database environment introduced with Microsoft SQL Server, this product can become an effective development tool, as well as a reporting tool used by individual departments. In conjunction with the database, adequate security is provided throughout the system.

Some of the features that make Seagate's Crystal Reports the acknowledged leader among the community of Windows report writers - business users, IT professionals and application developers - include:

- A comprehensive Web reporting solution.
- Powerful tools for integrating reporting into Web and Windows applications.
- The ability to build presentation-quality reports from virtually any data source.
- Seamless reporting integration with Microsoft Office.
- Fast report processing.
- Flexible report distribution.

15. Recorders Office (Zim for Windows) Database Observation:

The Recorders Office Database is accessed by credit bureaus, attorneys, abstractors and others, who must query multiple indexes separately, in order to obtain information relating to such things as real estate property, refinancing, etc. As stated by the Recorders Office, "It would be helpful if one request would allow access to all indexes and provide the requested information; on the current system each index must be searched."

The Recorders Office Database consists of the following indexes:

- Recorder Boat/ATV/Snowmobile System.
- Recorder Articles of Incorporation.
- Recorder Affidavit & Power of Attorney.
- Recorder Birth Certificate System.
- Recorder Bookkeeping (Grantor/Grantee Index).
- Recorder Death Certificate System.
- Recorder Index to Liens.
- Recorder Military Index.
- Recorder Marriage License System.
- Recorder Optical Index.
- Recorder Plat Book Index.
- Recorder Trade Name Index.
- Recorder Vitals Account Receivables.

Each index represents a different database, all of which are hosted within a single container.

Currently, there is not an efficient or a scalable system in place that permits remote, public access to the various indexes. A scalable system is one that is easily expandable or adjustable without major modification as time and resources require, allowing its functionality to grow with an organization's needs. United Title is the only organization configured to dial into Scott County and remotely control a computer – in the Data Center – allowing access to the Records Office Database. All others accessing the database do so from within the Vault. The Vault is a collection of several computers, set aside in a separate room within the Records Office for the sole purpose of providing the general public, abstractors, auditors, attorneys, etc. access to the database. The Vault becomes very busy at times.

The current method is considered inefficient because public users must either purchase a computer, which would reside in the Data Center, to serve as a dedicated remotely controlled PC or they must physically come to the Vault. Additionally, the current method is not considered to be scalable because of obvious resource limitations such as insufficient space within the Data Center and the Vault for housing dedicated PCs and the corresponding additional IP support time that would be required.

Information results derived from each of indexes are in the form of an image. As of the time of this writing, a printer driver that would permit users remotely accessing the database to print to their personal printers was not installed. A printer driver is software designed for a specific printer that properly formats and renders printable information to the printer. According to our conversations with the Records Office, a new Windows-based printer driver was available and was being installed, which would permit anyone, anywhere, accessing the system to print the images.

Recommendation:

We recommend that the Records Office (Zim for Windows) Database be rewritten in Visual Basic and that all data be stored within a Microsoft SQL Server Database. Additionally, we recommend Web-based access via the Scott County Web site, so that the general public can query the indexes – only those deemed publicly accessible – from any location having Internet access. If desired, certain indexes – not considered to be public records - can be restricted so that only those having a proper logon account and password can gain access.

According to our discussions with the Records Office there are common data fields, which are consistent across all indexes. Therefore, the goal of having a single dialog box that provides the option for searching all indexes simultaneously is realistic if considered during the development stages.

16. Vermont Systems, Inc. Observation:

The Conservation and Parks Department of Scott County underwent a system selection process for an application that would automate their business processes. The software application decided upon is actually a suite of applications, comprised of specialized modules, which can be purchased in any combination of one or more. The manufacturer of the application is Vermont Systems, Inc. (VSI).

VSI specializes in developing and supporting Recreation & Parks application software and is considered the national leader. Several hundred municipal and county recreation and parks operations, as well as all U.S. Army and Air Force bases worldwide, many U.S. Navy bases, and Montgomery County in Auckland, New Zealand, are using VSI application software. Additionally, the U.S. Marine Corps is in the process of installing the RecTrac V2 and GolfTrac POS software at all Marine bases worldwide.

The Recreation & Parks applications offered by VSI include:

- RecTrac v2 (campsite, pavilion and activity tracking).
- GolfTrac (integrated POS system for golf courses).
- MainTrac (maintenance tracking system).
- FinTrac (financial management system).
- PerForm (performance standards and measures system).

Scott County has elected to implement RecTrac v2, GolfTrac and MainTrac.

RecTrac V2 is primarily for campsite, pavilion and activity tracking. Add-on modules that the Scott County Conservation and Parks Department are purchasing include the GolfTrac module, the POS Equipment Rentals/Check-Out module, and the Pass Management Photo module for pool and beach passes.

Training for and installation of RecTrac v2 has occurred.

GolfTrac, a module of RecTrac v2, is an integrated POS system for golf courses, which includes a member and non-member database with cash register control, inventory control, sales distribution by single or multiple golf courses, local handicaps, and operator entered tee-times.

MainTrac v2 is a maintenance tracking system. Add-on modules that the Scott County Conservation and Parks Department are purchasing include the Planning, Budgeting & Depreciation module and the Maintenance Scheduling module. The MainTrac v2 base module provides for the ability to log actual labor, equipment, material, and outside contract costs used to maintain facilities, equipment, vehicles, trees, and landscape areas for routine and preventive maintenance by Resource, Fixed Asset, and Activity. The Base System also includes work requests, work orders, leaves, and weather processing functions, as well as integration with the RecTrac v2 software. A maintenance request originating in RecTrac v2 can automatically create a work request in MainTrac v2. Historical data for work completed includes labor, equipment, and material costs by item, as well as total hours and usage.

Currently, training for and installation of MainTrac has not yet occurred.

VSI has discussed using the Progress Report Writer for developing customized reports. As reliance upon the VSI application data, stored within Progress databases increases, so will the need for the development of reports tailored to the needs of Scott County.

The Conservation and Parks Department is looking into touch screens for their point-of-sales (POS) equipment. This would permit the use of either a mouse or a touch screen monitor as a means for data entry and navigation within the system.

According to VSI representatives, “performance is poor at best” when accessing the VSI applications via dialup, especially when interacting with data. Our conversations also revealed the fact that a number of their clients have elected to deploy VSI Recreation & Parks application software via Citrix MetaFrame. This would further improve performance on the wide area network, as well as extend the potential for the applications to be used effectively and efficiently via dialup for such locations as Buffalo Shores. Citrix MetaFrame is a VSI certified network operating system.

There have been four updates to the VSI application software this year alone. The representatives of VSI stated that at least two updates yearly would be distributed to all VSI clients. This typically involves applying the update to both the server, as well as to all clients.

Recommendation:

We recommend that Scott County use Seagate’s Crystal Reports for the development of custom VSI application-based reports. With the purchase of an ODBC driver for Seagate’s Crystal Reports, which would allow Crystal Reports to interface with the Progress databases, Scott County would be able to maintain its standard for a single, common reporting tool.

An additional module that we recommend considering is the TeleTrac module. There are no immediate Scott County plans to purchase the TeleTrac module. An example of the relevance would be the automation of tee-times via telephone. Currently, all tee-times are managed manually. According to VSI representatives, this module has proven to be a time saver among their clients by promoting better organization and freeing up resources. Implementation would include the installation of a dedicated PC with a dialogic (modem) board.

We recommend that the VSI application software be deployed via Citrix MetaFrame. This would further enhance performance and provide for efficient and effective access via dial-up. Additionally, this would greatly lessen the degree of effort required to update the client software – the update would need to occur at a single location rather than to all client workstations.

17. Juvenile Detention Scheduling Needs Observation:

The Juvenile Detention Department currently struggles with the need for properly scheduling staff. They feel as if a shared software application fulfilling this function would noticeably improve their scheduling efforts, reduce scheduling time and maintenance, and eliminate confusion.

Recommendation:

We recommend identifying an application that at least provides the following features:

- At a glance picture of staff availability and scheduled responsibilities.
- Integration with your elected standard e-mail solution.
- Management reporting and access to statistical data.
- Easy to use and maintain.
- The ability to pass data to third party databases.

Please Note: If an easily identifiable scheduling application does not exist which meets the needs of the Juvenile Detention Department, we recommend developing one, within Microsoft Access for example, that is customized to the scheduling requirements of the Department.

18. Document Management Observation:

Document management becomes an interest worth considering when the volume of hardcopy documents causes extensive time to be spent filing, retrieving and routing and when idle time is spent waiting for routed documents.

Document management consists of storing hardcopy documents in electronic format. This allows for faster and easier document retrieval and allows for documents to be safeguarded by relocating backup tapes off-site.

Scott County should consider the implementation of a document management system.

Recommendation:

We recommend that the organization examine possible uses of storage and management of all documents in a universal format that would be accessible by all authorized users throughout the organization. Storing electronic images of documents and reports can provide for enhanced communications to Scott County citizens and employees.

Through the use of Citrix MetaFrame, document management software could be hosted on the application server and provide for real-time delivery of electronic documents to all personal computers and Windows-based terminals throughout the organization.

IV. Technology Infrastructure

A. *Structured Cable Design and Related Equipment*

The infrastructure of a network is the most critical component of any computer system. It is indeed the "backbone" of your communications network.

We want to convey our recognition of the commendable achievements made by the Budget & Information Processing and Buildings & Grounds departments to provide Scott County with a high-speed data cabling and network equipment infrastructure. The cooperation of the staffs of these departments lead to productive discussions, which allowed us to provide our detailed recommendations for improving administration, organization and communications integrity, in addition to other recommended, proactive best-practices. It should be noted that some of the reasons that the recommended changes below have been delayed is because of the overall remodeling project that has been in the works for some time.

Some of the noted observations and their corresponding recommendations relate specifically to requests for information concerning the upcoming remodeling projects.

19. Outside Cable Plant (exterior cabling) Observation:

Currently, there are two 12-strand, multimode fiber optic cables that extend from the Courthouse to the Annex and on to the Bicentennial Building. One cable simply passes through the Annex, whereas the second cable is fully terminated at the Annex, with one pair used to serve the Annex and the remaining five pairs patched through to the Bicentennial Building. Each of these two sets of cables resides within their own conduit. The two are buried side-by-side within the same trench. Both conduits would likely be damaged simultaneously in the event of a "backhoe fate" type occurrence. The necessary resulting repair work for the damaged fiber cables could take three to seven days depending on cable delivery.

Currently, there are two 12-strand, multimode fiber optic cables that extend from the Courthouse to the Jail. These two sets of cables pass through the adjoining ceilings and walls, allowing the Jail to be treated no differently than another floor of the Courthouse.

Currently, a composite fiber cable, 6-strand single-mode/6-strand multimode, extends from the Courthouse to the Kahl Education Center, to provide the County with a connection to the Iowa Communications Network (ICN). One pair of the fiber strands is in service.

Currently, a composite fiber cable, 12-strand single-mode/12-strand multimode, exists between the Courthouse and Davenport City Hall to provide the Sheriff's Department with computer aided dispatch (CAD) and records management. Two pairs of fibers are in service.

The two sets of fiber cables mentioned previously, which extend from the Courthouse to Davenport City Hall and from the Courthouse to the Kahl Education Center, are buried side-by-side within the same trench for a short distance to a junction box where they are "broken out" into two separate directions. These Fiber cables appear to be in good condition.

Test data on fiber cables are on file with the Director of Building and Grounds. Type of fiber testing and test results are unknown.

Recommendations:

During the remodeling phases, all risers – vertical shafts used to route cables between floors – will have to be moved. As a result, all fiber cables will need to be replaced. In our opinion, it is critical during these remodeling phases that strict consideration be applied to ensuring adequate capacity and performance characteristics, in addition to adequate expansion capacity of the new fiber.

We recommend establishing a fiber optic ring distribution between the Courthouse, Annex, and Bicentennial Buildings, which would entail the addition of new underground conduits directly between the Courthouse and the Bicentennial Building to provide for redundancy. We recommend that this new connection from the Courthouse to the Bicentennial Building consist of 24-strand multimode and 12-strand single-mode fiber cabling.

We recommend adding a minimum of 12-strand single-mode fiber cabling to the existing fiber route from the Courthouse to the Annex and on to the Bicentennial Building to provide for additional capacity. The additional capacity would allow for currently undefined high-speed future expansion needs such as video transmission.

We recommend the testing of all fiber cables for optical power loss and optical time domain reflectometry (OTDR). OTDR is a superior measure of a fiber link's characteristics in a graphical format. We also suggest establishing a central record for fiber test results in both hardcopy and electronic format.

20. Data Center Cabling Observation:

Network racks for the fiber main distribution frame (MDF) and the 3COM CoreBuilder are not secured to the floor.

Loose cables under the raised access floor are not labeled, which makes tracking and troubleshooting more difficult and time consuming.

No apparent cable color-coding scheme is in use and cable identification is inconsistent and missing in some cases.

Cable management and cable support for network equipment racks does not adequately support or secure the copper or the fiber cables.

Cables are strung across the top of the raised access floor without protection.

Overall, the data center is cluttered with new equipment boxes, paper records, manuals, and older style server support shelving unit. Poor layout leads to inadequate housekeeping, equipment access, and workflow.

Recommendations:

We recommend securing the network equipment racks to the concrete floor beneath the raised access flooring.

We suggest rerouting or protecting the exposed cabling that is currently lying across the raised access floor.

We recommend adding proper cable management and support to network equipment racks for both copper and fiber cables.

We recommend labeling all cables by function and location.

We recommend maintaining detailed layout documentation of network equipment, including port assignments.

To the extent possible, within the data center, we suggest revising the layout of the room to reduce clutter and exposed cabling and to improve workflow.

21. General Cable Infrastructure Observation:

Installation, termination and testing of the fiber cables are outsourced to a third party, certified cabling vendor. The copper voice cable installation, termination and testing are also outsourced to a third party, certified cabling vendor. The data cables are installed by the Buildings & Grounds department and terminated and tested by the Budget & Information Processing department. According to our interviews, data cables are tested for continuity only. Cable certification testing in accordance with Electronic Industries Alliance/Telecommunications Industry Association (EIA/TIA) standards is not being conducted.

There is no apparent, consistent Cat-5 color-coding scheme in use. Cable colors of red, green, blue, and yellow were observed.

Standard Cat-5 rated cables, jacks, and patch panels are used. Panduit Cat-5 materials are currently used.

Data cables routed above lay-in ceilings lack adequate support.

Data cables routed above lay-in ceilings lack adequate spacing from sources of electromagnetic interference and radio frequency interference (EMI/RFI).

Primarily, the network outlet in each work area consists of a single data port, which is consumed by the occupying workstation or laptop. As a result there are insufficient, readily available, future expansion ports for unforeseen needs.

Documentation and diagrams indicating network outlet locations and fiber cable risers are not available. Copper and fiber cable identification labels are inconsistent and missing in some cases.

12-strand multimode fiber cables are used for the premise fiber distribution. Fiber optic riser cables extend to first floor, second floor, and the Jail building.

Wall mounted network cabinets are located in the major county department offices. The network cabinets include a fiber optic termination shelf, copper patch panel, network switch and UPS. There are situations where network switches, in some locations, are “daisy chained” – interconnected with each other and sharing a single fiber link back to the data center. We were informed that each of these locations having multiple, “daisy chained” switches will receive new switches having larger numbers of ports so that a single fiber link supports only one switch. The replacements are expected to occur by year-end as the 3COM network equipment is replaced with Cisco network equipment.

All networking equipment utilizes some type of UPS device to protect from AC power dips and surges.

We were informed that there are a few locations, where the Cat-5 cabling is not terminated at a patch panel, but rather connects directly into switches. Proper cabling standards include termination of data cables at a patch panel. We were informed that there are plans underway to have the cabling in these locations properly terminated at patch panels.

Test data on fiber cables are on file with the Director of Buildings & Grounds. Type of fiber testing and test results are unknown.

Recommendations:

We recommend applying a standard cable color-coding scheme to all future work. We suggest blue cables for network data, yellow cables for the ICN, and gray (slate) cables for telephone. Color-coding is very important as multiple internal staff members and a variety of vendors interact with cables which are typically only associated with their respective areas of expertise. For example, fire alarm system cabling is typically red, whereas within Scott County, some of the Cat-5 data cabling is also red. Since many cables serving different purposes follow many of the same passageways, this would allow for easier troubleshooting and would assist in eliminating confusion.

Establish a voice and data identification labeling method for cables, outlets, patch panels, and voice 110-blocks.

Upgrade the fiber optic equipment selection to a Tier 1 supplier for fiber optic cabling, connectors, patch panels, and hardware.

Upgrade Cat-5 data cabling to either enhanced Cat-5 (5e) or to the current draft standard of the proposed Cat-6 based on a Tier 1 connectivity supplier.

Establish a common telecommunications room for each floor. These rooms should be stacked from floor-to-floor to facilitate the routing of copper and fiber cable through risers. The telecommunications rooms would house the following:

- Fiber cable terminations serving their respective floors.
- Free-standing network equipment racks.
- Termination of data cables, serving their respective floors, onto rack mounted patch panels.
- 110-blocks to terminate telephone riser cable and stations cables from user outlets.
- A central riser space for fiber optic, telephone, fire alarm, video, security, and CCTV cabling.
- Equipment for fire alarm, video, security, and CCTV serving their respective floors.

We suggest providing a telecommunications outlet with two network data jacks and one telephone jack for each staff member or open office cubicle.

We recommend maintaining documentation and diagrams for voice and data network outlet locations, outlet labels, cable routing paths, cable identification labels and cable termination at patch panels and voice 110-blocks. Documentation and diagrams should be held in both hardcopy and electronic file format. We further suggest establishing procedures for updating the documentation and diagram information with moves, adds, and changes to the cable infrastructure. We also suggest that Scott County consider the possible use of a software-based Cable Management System (CMS).

We recommend outsourcing the installation, termination and testing of all copper voice and data cables in accordance with EIA/TIA standards by a certified cabling vendor. We recommend having the vendor perform continuity, wiremapping and performance stress tests and any other relevant tests that may be specific to the category-level of cables selected. We suggest maintaining cable test reports in both hardcopy and electronic file format. Cable test reports can be integrated into a Cable Management System (CMS).

We recommend 100MB throughput performance/stress testing of all existing Cat-5 cables.

B. Operating Systems Integration

22. Thin Client Needs Observation:

Scott County is comprised of multiple locations hosting relatively few personal computers. Most of these locations are interconnected via dedicated leased lines, while others dial-up to achieve network connections. Your organization, like most others, is faced with cost constraints and the ever-increasing need for speed. In order to keep pace, business environments similar to yours are being forced to continually upgrade their infrastructures or spend inordinate amounts of time and money on implementation and technical support.

Most of the employees at Scott County have a need for only a few basic applications, such as a single departmental specific application, faxing, e-mail and word-processing.

Recommendation:

We recommend fully implementing Citrix MetaFrame. The current version of Citrix MetaFrame is designed for Windows 2000 Server. Citrix MetaFrame is a server-based, thin client application developed by Citrix Systems, Inc. Citrix MetaFrame is software used to accomplish thin client application server computing. Application server computing means that applications are managed and supported 100 percent from a server or large central computer, and users anywhere using either personal computers or Windows-based terminals access the applications. This computing approach delivers key business benefits including faster time to value for implementing new applications, updating existing applications, cost savings and greater technical support efficiency.

We also recommend implementing Windows-based terminals wherever possible within the organization. Windows-based terminals, in affect, are similar to dumb terminals, however dumb terminals are character-based devices, whereas Windows-based terminals are graphical devices with additional built in intelligence that allows them to run today's Windows-based applications via application server computing.

The benefits of Citrix MetaFrame are:

- It provides for the ability to increase the life cycle of your existing PCs. Virtually all organizations possess a collection of nearly obsolete PCs that are in use as production PCs on the network - typically about 20% of the organization's overall PC inventory. Most organizations retain PCs beyond their ability to adequately host current applications, resulting in insufficient performance, erratic problems such as "frozen screens" and end-user frustration. Additionally, many organizations find that there is a need for replacing approximately one-third of their production-PC inventory annually in order to keep pace with technology, though most organizations do not for obvious budgetary reasons. The Citrix MetaFrame client can be installed on these PCs, allowing for a "transfer of information processing" from the PC to the centralized thin client application servers, hence virtually eliminating reliance on the otherwise obsolete components. Please keep in mind that, although the Citrix MetaFrame client can be installed on PCs as a way to leverage your existing investment and to eliminating performance constraints, the potential for component failure is higher than that of Windows-based terminals. Therefore, we recommend phasing in Windows-based terminals overtime, as dictated in the course of case-by-case discoveries of declining equipment reliability and increasing support costs.
- It allows for the option of utilizing Windows-based terminals, which are considerably less expensive and easier to install, configure, maintain and repair than personal computers.
- Lower cost of end-user training and ongoing technical support. Desktop interfaces can be easily tailored to specifically match the needs of an end-user, which in turn reduces complexity and eliminates nonessential options.

-
- Less impact on network traffic. Currently, some users at Scott County are running the Microsoft Office 97 suite as a workstation install – in other words, some of the application suite is installed on the server with the remaining parts of the application suite installed on the workstations. There has been a common trend in recent years to move away from this type of installation whenever possible in order to eliminate unnecessary bandwidth consumption or throughput of your data lines. Currently, workstations configured in this manner are ones that do not contain a large enough local hard drive to host the application. By utilizing Citrix MetaFrame, the entire Microsoft Office 97 suite is installed on a centralized server and performance is improved over that of a workstation install.
 - Less time spent upgrading applications and deploying new applications. We were informed that application upgrades consume an inordinate amount of BIP resources' time. Microsoft Outlook 2000 took nearly two hours per computer and approximately six months to deploy to nearly 75% of the organization. Within a fully functional Citrix MetaFrame environment, this deployment could have been accomplished in a few days time without having to interact with end users' desktops. By the same token, Microsoft Office 97 took nearly one full year to deploy, whereas within a fully functional Citrix MetaFrame environment the same task could have been accomplished in a few hours. Unfortunately, time lost to the incessant need for upgrades and installations, easily calculated by multiplying configuration hours times numbers of end users affected, is never-ending within a network environment such as yours. Many times upgrades, due to the complexity and time consumption associated with installing them across a large user-base with limited resources are delayed for too long. In addition to the length of time of each major upgrade project takes, a never-ending cycle is revealed. For example, by the time Microsoft Office 97 was fully deployed among all users at Scott County, Microsoft Office 2000 was emerging as the standard business office application suite.

Please Note: There are a couple of extenuating reasons why Microsoft Office 97 took so long to deploy. One reason was because the deployment was concurrent with the rollout of Windows as the new desktop operating system. The second reason was related to the deployment of new hardware and hardware upgrades to existing systems that was necessary to support the new software.

The benefits of Windows-based terminals verses personal computers are:

- Greater reliability and longevity. The mean time between failures (MTBF) for Windows-based terminals is approximately 170,000 hours, whereas for personal computers it is approximately 30,000 hours. This is due in part to the fact that they have no moving parts, are composed of high quality components, and generate less heat.
- They are less expensive to purchase and operate.
- They result in less user-caused problems since there are no floppy drives, hard drives or CD ROM drives. Problems often introduced by the user include configuration changes, adding personal software and unknowingly introducing viruses.

The benefits of Citrix MetaFrame and the benefits of Windows-based terminals, combined, verses traditional personal computer networks, constitute considerably lower total cost of ownership (TCO). Peter Lowber, a Gartner Group Datapro Analyst, stated in the June 1, 1999 issue of InternetWeek, "The staffing required to support fat client PCs is at least five times greater than for Windows terminals or PCs that are configured as Windows terminals."

There are a few employees within Scott County who have become accustomed to using a personal computer and would probably prefer it to a Windows-based terminal. Personal computer software, from Citrix, can be installed which would allow the personal computers to access the Citrix servers as if they were Windows-based terminals. This would allow these individuals the ability to access applications hosted by the Citrix servers while also having their desired local, personal computing needs met. Engineers would be an example of a need for personal computing in combination with Citrix MetaFrame due to the necessity for running 3D rendering graphics applications, such as AutoCAD 3D, locally.

We recommend integrating Windows-based terminals everywhere possible. We recommend at least supplying Windows-based terminals to all users having minimal, basic needs. We also recommend hosting Microsoft Office 2000, the e-mail client and the fax client as the initial base applications on Citrix MetaFrame.

Please Note: We recommend that the initial introduction of Citrix MetaFrame into your network environment be in the form of a proof-of-concept pilot. A pilot project is critical for the following reasons:

- Proper identification of application resource requirements of the applications selected for Citrix MetaFrame. This is crucial, as it allows for calculations that can be performed to extrapolate numbers of servers and processors needed to host a given set of applications for a given set of users.
- Ensuring that DOS and legacy applications function properly when deployed by way of Citrix MetaFrame.

We recommend that the pilot server(s) publish the organization's most commonly used applications to a sampling of your organization including the segments that would experience the greatest degree of short-term benefit, such as the remote dial-up locations like the Wapsi Education Center, the General Store, Buffalo Shores, the Secondary Roads Maintenance Shop, etc. In addition to proving the concept, the results from a properly implemented pilot would serve as the cornerstone of a detailed design and implementation plan, which could be used to extend the thin client solution throughout the organization. The plan would identify which of the existing servers would be used as Citrix MetaFrame servers, how many servers would be needed, the number and configuration of supplemental new servers if needed, application migration timeframes, etc.

23. Network Operating Systems and Related Observation:

Currently, Scott County utilizes a mixture of Novell and Windows NT servers as their network operating systems (NOS) to host their various departments' mission-critical applications and to also provide for basic file and print needs.

There are currently several different versions of Novell NetWare – 3.11, 4.11, 5.0 and 5.1. Our observations revealed varying versions of updates and patches among the Windows NT servers and among the like-versions of Novell NetWare servers.

Windows 2000 Active Directory (AD) and Novell Directory Service (NDS) each provide for the ability to meaningfully organize network resource objects such as address books, directories of shared files, printers, etc. As computer networks began to evolve, the importance of directory services became obvious through the voiced frustrations of end users struggling to locate resources strewn throughout their organizations' technology infrastructures. The number of network resource objects contained within a directory service can become very large and, as a result, thoughtful planning needs to be performed in initially designing the hierarchical structure of the directory service. Scott County currently uses NDS. Most of the network resource objects reside within a single NDS container – in other words, a flat directory structure lacking a meaningful hierarchical structure. There is a 1,500-object limit per NDS container. BIP is planning to develop a department-based hierarchy within NDS and then to move the various objects into their corresponding, respective containers. While this is a good concept, it may not be the best hierarchical structure for Scott County. Many resources typically pertain to more than one, if not all, departments. In summary, investing up-front time in the design phase can relieve many headaches later.

Operating system support skills, based on our observations, appear decidedly specialized with little mandated concentration in cross training. For example, Novell specialists seem to defer practically all Windows NT related issues to their Windows NT counterparts and vice versa.

Several of the departments of Scott County, such as Parks and Recreation and the Assessors' Office are implementing third party applications which are Windows-based, some of which must be hosted on either Windows NT or Windows 2000.

There is an expressed desire, among those having tenure, to retain Novell even though the internal application development direction and the majority of all third party application compatibility is geared toward Microsoft Windows networks.

Currently, the majority of data and applications reside on a single Novell NetWare Server, FS8. The components most prone to failure are redundant such as the power supplies and hard drives. However, there are other critical components, any one of which can cease server operations should they malfunction, such as memory, the motherboard, CPUs, etc., which are not redundant in the sense of fault tolerance. A majority of the organization's operations rely on the FS8 server, which could conceivably be down for days in the time it could take to identify and isolate a failed component, obtain a replacement and have it installed.

There are multiple protocols, TCP/IP and IPX, currently in use. A protocol is the method used by personal computers and servers to communicate with each other and with other devices on the network, such as printers. IPX is native to Novell. TCP/IP is the Internet standard protocol, which has also become the business network standard protocol and is commonly used on most networks.

Each network device requires its own unique TCP/IP address, which has to be a valid address within a finite range of addresses. The TCP/IP protocol, in recent history, was managed manually causing administrative headaches with respect to maintaining databases to keep track of which TCP/IP addresses were available and which were in use. Today, for the most part, TCP/IP addresses are automatically managed using a process called Dynamic Host Configuration Protocol (DHCP). Currently, at Scott County, TCP/IP addresses are managed using DHCP from two different sources – Microsoft Windows NT Server and Novell NetWare Server.

With the introduction of the initial Windows NT Servers into the Scott County network infrastructure, the significance of their potential future role within the network was possibly overlooked. The two initial Windows NT domain controllers currently authenticate user logons and resource access, manage domain computer accounts, host the only existences of the security accounts manager (SAM) database and regulate all domain related server-to-server communication. In relation to their importance, these two initial Windows NT servers lack adequate fault tolerant components and configurations, as well as adequate performance capabilities.

There are many aspects of the Scott County organization that dictate the apparent need for a thin client application server solution, including the geographic distribution of users, human resource constraints, a heavy reliance on dedicated leased lines, small isolated remote groups of users and an unmanageable volume of “fire-fighting.” Also, infrastructure features already exist that would smooth the progress of installing a thin client application server solution, such as centralized technical support and centralized hardware and software resources.

Recommendation:

We recommend implementing a single network operating system (NOS) standard. It is very difficult for any accomplished technical support analyst to become proficient in supporting more than one NOS. Standards and infrastructure complexity are key elements affecting TCO, as was discussed earlier in the TCO section. A single, standard NOS contributes significantly to a less complicated network infrastructure particularly in environments with limited numbers of technical support staff. All technical support analysts would share common, core NOS administration skills, thereby eliminating one of the most prominent resource divisions among your technical support analysts. With only four technical support analysts supporting a network relying heavily on two NOS solutions, one or two at most will be NT experts and one or two at most will be Novell experts. In the event that the only expert for a given NOS is unavailable, problems will quickly escalate into a crisis and resolutions will be delayed.

We recommend that Microsoft Windows 2000 Server represent the standard NOS platform for all servers within Scott County. We recommend migrating all existing servers to Microsoft Windows 2000 Server. Microsoft Windows 2000 Server, in combination with Microsoft Windows 2000 Professional on the desktop, would fulfill all of the networking needs required by your organization and scales well in your type of environment.

We recommend implementing Windows 2000 Active Directory. We recommend that the Scott County IP support staff invest pertinent time in properly designing a hierarchical structure that best meets the resource identification needs of the end users.

We recommend installing a new server that fulfills the hardware performance and fault tolerance requirements of a Windows domain controller. This server should initially be configured as an NT 4.0 domain controller, promoted to primary domain controller and then upgraded to Windows 2000 Server. This root domain controller would fulfill the primary server role associated with a Windows 2000 domain. Essentially it would serve as the “traffic cop” among all servers, while sharing with other domain controllers the responsibilities of authenticating users, enforcing security and ensuring fault tolerant communication among all servers. This will allow you to retain your entire domain configuration and would set the stage for upgrading all of your Windows NT servers to Windows 2000 servers.

We recommend the use of TCP/IP as the sole network protocol throughout your wide area network. Additionally, we recommend that TCP/IP addresses be managed and disseminated solely via DHCP from Windows 2000 Server. There are a variety of parameters that can be modified, enabled or disabled in the configuration of DHCP, which if hosted on a single network operating system can help to ensure consistency of TCP/IP configurations across all network devices. This further eliminates the need for any technical support analyst, which may be troubleshooting TCP/IP configuration problems, from having to maintain an in-depth understanding of each system.

We recommend configuring a cluster of servers configured as Windows 2000 Citrix MetaFrame thin client application servers, which would publish applications to the entire organization. The number of servers needed to fulfill this function would be based on the assessed results and the outcomes of the proposed pilot project mentioned in the “Thin Client Needs Observation” section. Additionally, the adequate number of servers, as derived from the pilot project, could also provide for fault tolerance or continued operations even in the event of a failed Citrix MetaFrame server. Applications should be distributed across multiple servers. If a non-redundant component critical to the operations of the FS8 server were to fail, it could constitute a crisis in the eyes of parts of the organization.

Additionally, we recommend configuring Citrix MetaFrame to perform load balancing - dynamic sharing of the application workload among the multiple servers, whose published application configurations would be the same. In other words, this feature of Citrix MetaFrame technology routes each workstation requesting a published application to the least busy server.

C. Messaging and Remote Access

24. Electronic Mail Observation:

Scott County recently implemented an electronic mail solution using Microsoft Exchange Server version 5.5, which provides for both in-house and Internet e-mail communication. Additionally, it provides for the ability to attach files to messages in order to route them electronically from one employee to another, or to predefined distribution groups. Microsoft Exchange Server is the e-mail solution that we recommend in environments similar to yours.

Your organization has applied for and received a free upgrade for Microsoft Exchange 2000 Server.

We were informed during our interviews that department heads were given the responsibility to determine whom within their department should receive Microsoft Outlook 2000. Outlook 2000 is the Microsoft e-mail client of choice to be used for sending and receiving e-mail within a Microsoft Exchange environment.

Until recently, the majority of departments associated with Scott County have suffered from the lack of ability to perform the essential basic functions associated with e-mail. Our interviews revealed the fact that most are unaware of the significant features available within Microsoft Exchange Server aside from the ability to simply message other e-mail users.

Based on our interviews, there have been no definite plans for implementing document workflow or collaboration. One of the many examples of this attribute would include the ability to have employee's performance reviews online, which could be restricted to only those having appropriate permissions. Once a review has been filled out online, it would then be submitted electronically through the proper channels, ultimately being stored for ease of viewing at a later date. Additional examples include most of the HR forms, as well as requisitions between HR and Payroll, Buildings & Grounds' Work Orders, Secondary Roads' Work Orders – complete with indexed contact name, description, history, prioritization, assignment, etc.

Based on our interviews, there are no definite plans for extensive review of the many resources that could be hosted within centralized and shared "public" folders that respective employees can easily edit, access or post electronically. Examples of the usefulness of this feature within your organization, as revealed to us by your employees, is truly without end; manuals, handbooks, policies and procedures, electronic forms, department specific information, etc. Basically, any important organization-wide or department specific information could be posted publicly in a central location so that all or designated employees could easily access the available data.

There are no definite plans for making the best use of centralized group scheduling. Having group scheduling as an integrated part of your messaging infrastructure allows for the acceptance or rejection of electronic meeting requests that are automatically posted to schedules, the booking of conference rooms and audio/video equipment, or other shared resources. All employees' schedules would be in electronic form with predetermined levels of permissions and could be accessible from anyone having authority from anywhere on the network. Permissions could be assigned so that specific individuals or groups could either view, edit or have no access.

Recommendation:

From the simple standpoint of anyone in your organization being able to e-mail others within your organization or around the world, as well as send and receive important documents in the form of attachments, employees of Scott County fully understand the importance of e-mail and recognize it as a true means of efficient communication.

It is our recommendation that Microsoft Exchange 2000 Server be installed and configured on a separate centralized Windows 2000 Server. Microsoft Exchange 2000 Server has a virtually unlimited message store and seamlessly integrates internal e-mail with Internet e-mail. Microsoft Exchange 2000 offers all of the functions and benefits of Microsoft Exchange 5.5, plus more. Microsoft Exchange 2000 is capable of keeping pace with the technological advancement of your organization, such as including video conferencing capabilities that would reduce travel costs associated with training and meetings, as well as increase productivity.

In addition to offering basic e-mail functions, Exchange also provides for the functionality of shared public/private folders, integrated scheduling, and document workflow. As stated in the above observations, there are no extensive plans to fully utilize these functions of Exchange within your organization. In order to truly harvest the benefits of an enterprise e-mail solution, these features should be implemented to improve communication and scheduling, as well as to centralize, disseminate and maintain control of information within your organization. However, implementation with the intent to utilize these features is only part of the battle. Users must be trained to use these features and the organization must convey their expectations that users rely on these features as a means for more efficient and effective organizational communication.

Currently, Microsoft Outlook 2000 has been decided upon as the standard e-mail client to be used within Scott County. We further recommend that Microsoft Outlook 2000 be hosted on a Windows 2000 Server running Citrix MetaFrame, which would be accessed by both the Windows-based terminals and the personal computers running the Citrix client.

We recommend that all employees receive Outlook 2000. There are a number of features within Microsoft Exchange, as discussed throughout this observation, that demonstrate the need for all employees to have Outlook as their means for accessing organization and department information in addition to basic e-mail functions. Once e-mail is introduced into an organization and the previously unseen communication barriers are eliminated, denying communication via e-mail is touted by many information experts as being no different than taking away an employee's telephone.

Additionally, we recommend implementing Symantec's Norton AntiVirus for Microsoft Exchange, which is a component of the complete antivirus solution suite that we are recommending. Please see the "Antivirus Observation" for more details. This would allow for automated scanning of e-mails and attachments.

25. Centralized Network Faxing Observation:

Most proficient networks incorporate the ability to fax electronic documents directly from each user's workstation. This is made possible by software and a special device that acts as a fax machine. The difference between a standard fax machine and this method is that it is accessible via the network without the need for managing hardcopy files or first printing a document in order to fax it.

Several individuals referenced the timesavings and efficiencies that would be afforded by a centralized network faxing solution. These benefits were primarily identified as part of the day-to-day tasks performed by the Accounting and Credit Departments, but it was also seen as a way to improve member services and cross-selling through the Tele-Service Department staff; practically any electronic report or electronic informational document could be faxed to members, or e-mailed as mentioned in the "Electronic Mail Observation."

Recommendation:

An enterprise fax solution should be one that includes world-class support, certification by industry-leading fax board manufacturers, and proven integration and compatibility with popular industry standard applications.

Our recommendation is the implementation of GFI's FAXmaker for Exchange 2000 Server, which is a Windows 2000 compatible, true enterprise fax application for PC networks. Microsoft Exchange 2000 Server is discussed in the Electronic Mail Observation.

FAXmaker is a full Microsoft Exchange Server connector, which permits complete configurations of all fax related user settings from within the Exchange Administrator. In other words, this feature provides for a single, central console for managing e-mail and fax users.

Although tightly integrated with Exchange, FAXmaker allows for anything created within a Windows application to be faxed by simply printing to the FAXmaker printer from any workstation on the network. FAXmaker will even automatically open and fax any Microsoft Office 95/97/2000 documents attached to e-mail messages that are faxed.

FAXmaker can be configured for centralized administration of in-bound faxes, or it can take advantage of direct inward dialing and line-routing features to deliver faxes to a specific recipient's workstation.

Faxes could be sent from either Windows-based terminals or personal computers.

Instead of installing a standard fax modem, we recommend installing a true fax board, such as those manufactured by Brooktrout Technologies. These boards have the built-in intelligence of a fax machine and are renowned for their level of stability, efficiency and support by other software manufactures.

Specifically mentioned examples of needs to directly fax from the desktop verses first printing hardcopies and then manually faxing them include, Property Record Cards within the County Assessors Office and Moving Permits within Secondary Roads. Other departments specifically mentioned that they would benefit from desktop faxing.

Given the information above, we recommend implementing FAXmaker for Microsoft Exchange 2000 Server. This will provide you with the ability to fax and e-mail from within a pure Windows 2000 network environment.

26. Remote Access Service Observation:

Currently, there are approximately ten workstations in the Courthouse computer room configured with some sort of virtual network connection application such as Windows VNC or pcANYWHERE. These PCs are dedicated to providing remote dial-in services for the General Store, Buffalo Shores, the Wapsi Education Center and others in order to provide faster response for applications such as the Tax System. This configuration allows these dedicated PCs to be remotely controlled.

There are modems and modem lines for specific individuals for dial-out needs unrelated to Internet access.

There is not an effective, standard way for remote users, such as those at the General Store, Buffalo Shores, the Wapsi Education Center, office employees at home, laptop users, technology support staff, etc., and the deputies at Pleasant Valley High School, Park View, Buffalo Police Station, Blue Grass Police Station to dial into the network and utilize all available LAN resources. This would permit, for example, a Scott County deputy at the Blue Grass Police Station to dial-in via the existing PC and access all relevant network resources, such as the new Jail Management Solution. Additional examples of the need for remote access include electronic mail, Internet access, access to various files and other resources and remote technical support. By integrating Citrix MetaFrame, the range of accessible network resource types, via dial-up, is greatly expanded.

Recommendation:

We recommend implementing a modem pooling solution such as an analog modem module, which can be installed in one of the routers that you currently own. Dial-in via this device is more stable, secure and scalable. The existing dial-in solution mentioned above requires dedicated PCs - one per dial-in user. In affect, with each connection, a user is using two PCs – the one that they are dialing from and the one they are dialing into – to facilitate resource access. In fact, each individual General Store user has a dedicated dial-in PC. Leading up to this resolution was the fact that performance of the Tax System over the wide area network was unacceptable and a quick remedy was needed.

In affect, a remote access solution would allow your organization to centralize modems and modem lines to be used by any or all employees on the network, which reduces the total number of modems and modem lines needed since they are shared. This solution also affords more enhanced and centralized security.

We recommend utilizing a Cisco Router with a serial, analog modem module. This will allow for modem pooling with integrated Cisco security that authenticates dial-in users against the Windows 2000 user accounts database.

The Cisco modem pooling solution permits your Organization's employees to also dial-out via the same centralized modem pool. Within many organizations there is typically a need for employees to access various external, analog-based resources that are not accessible via the Internet. Security and dial-out access permissions can be applied.

To reinforce our earlier statements, a modem pooling solution, coupled with Citrix MetaFrame, would permit any user forced to dial-in for network connectivity to launch and utilize practically any network-based application with acceptable performance.

D. Data Integrity and High Availability

27. Backup Observation:

The data you maintain on your systems is critical to the ongoing operations of your business. We have observed that Scott County has an effective current backup policy in place, which conforms to the recommended industry standard for protecting mission-critical systems.

Currently, there are two concurrent two-week sets of daily tapes for full backups, which are rotated accordingly. There are five Friday tapes, twelve end-of-month tapes, and end-of-year tapes are also used. Tapes are stored off-site and end-of-year tapes are not recycled.

There are a total of five external tape backup devices of varying capacities in use within the Scott County computer center, each of which is physically connected to a different server. Each server hosts its own copy of ARCservIT backup software and each one is configured independently to backup its select portion of the organization's data.

All Novell NetWare servers are backed up completely every night using four of the five external tape backup devices. The Novell servers utilize the tape backup scheme described above. The Windows NT servers tape backup scheme is less extensive, but is currently being expanded to match that of the Novell servers.

The Windows NT servers are backed up using one of the five external tape backup devices. We were informed that servers NT1, NT2 and NT6 are each backed up nightly by NT2, which hosts the backup device.

Off-site backups of the 911 CAD system are performed by a Novell 3.11 server, which is housed in the Bicentennial Building.

Based on our conversations with BIP, we estimated that an approximate total of 100GB of data or more is backed up nightly. Based on the current solution, as the data and the number of servers and the storage capacity of the servers continues to increase, additional devices will probably need to be added which will increase the overall complexity and administration time.

Recommendation:

We recommend consolidating the tape backup devices into as few devices as possible to improve ease of administration by implementing a backup and tape automation system that is designed for a small to medium size network of mid-range servers. This would provide for greater overall backup capacity within a single central device; other typical benefits include faster backup speeds, fewer manual tape rotations, automatic drive cleaning and easier overall administration. According to Exabyte Corporation, if your organization is like most, the amount of data you have to manage nearly doubles on an annual basis. Perhaps the most difficult problem to solve is determining how to back up the expanding volume of data.

We further recommend that the backup device for all data be located off-site, much like the backup device at the Bicentennial Building used for backing up the 911 CAD system. This would provide for real-time off-site data storage in the event of a disaster. The infrastructure in place at Scott County provides for the opportunity to perform remote backups, outside of normal business hours, due to the existing high-speed fiber connection between the Bicentennial Building and the Courthouse.

We recommend using VERITAS Backup Exec as a standard backup application to be used on servers. VERITAS Backup Exec is the original creator of the Windows NT integrated backup application for Windows NT Server and Windows 2000 Server.

Our recommended tape rotation system matches the one currently in place at Scott County. There are 21 tapes used in the backup rotation. The tape rotation system uses a Monday through Friday scheme with the use of multiple (5) Friday tapes. Month-end and year-end tapes serve to preserve infrequently accessed files that become corrupted or deleted and to thwart time sensitive viruses that are so prominent today.

The tapes are utilized as follows:

Monday	1 Tape
Tuesday	1 Tape
Wednesday	1 Tape
Thursday	1 Tape
Friday	5 Tapes
Month-End	11 Tapes
Year-End	1 Tape
	<hr/>
	21 Tapes

28. Fault Tolerance Observation:

We have observed that virtually all of the servers at Scott County are configured to use a combination of Disk Mirroring for the system drives and RAID 5 for the data drives. We would like to compliment the organization for this server configuration standard, which is an important recommended best practice.

NT0, the Windows NT 4.0 primary domain controller, is not configured to use any form of disk fault tolerance.

Recommendation:

We recommend that you continue to adhere to your disk fault tolerant server configuration standard.

Additionally, we recommend that measures be implemented to improve the overall fault tolerant status of the Windows NT domain controllers. As reliance upon Windows NT continues to increase, the overall role fulfilled by the domain controllers will become even more important as will the resource demands upon these servers.

The following information is provided to further clarify the disk fault tolerance types mentioned above:

Disk Mirroring – A configuration consisting of duplicate hard drives, one active and one backup that are written to simultaneously. If a crash occurs with the active drive, the network operating system automatically begins to use the backup drive and notifies you of the switch.

Disk Duplexing – A configuration that not only mirrors the drives, but also includes redundant disk controllers. Disk controllers are the adapter cards that send commands to the disk drive. With disk duplexing, you have redundancy of most of the critical moving parts within your server.

RAID 5 - A fault tolerant storage solution in which disks are organized so that one stores parity for data on the others. RAID 5 is more space efficient than the above strategies. It also allows the ability to change drives while the server is running, if hot-swap drives are installed, so that network services can continue in the event of disk failure. Even without hot-swap drives, RAID 5 greatly increases the degree of high-availability – the percentage of time during production or business hours when the server is available over an extended period of time, such as months or years. Without hot-swap drives, should a drive fail, the server would continue to run until off-hours when maintenance can be performed and the drive reconstructed. There is also a performance boost to the system, which is why RAID 5 is now the standard for most database and network servers. Based upon a study done by Adaptec, Inc., RAID 5 configurations proved to be 28% faster than disk mirroring. Moreover, reconstruction of a RAID 5 drive was 60% faster than disk mirroring. (Benchmark reports are available directly from Adaptec, Inc.)

The need for additional disk space is also more cost effective under RAID 5. For example, if you wanted your useable hard drive space to equal 8GB, you would need two 8GB drives for disk mirroring and duplexing. When you were ready to add additional space in the future, you would be required to buy two additional drives of the same capacity. With RAID 5, you would need three 4GB drives to give you 8GB total. When you would need to add space in the future, you simply add another 4GB drive to give you 12GB total. A single RAID 5 configuration supports up to 32 hard disks. Therefore, incrementally adding storage as you need it would be more economical and flexible.

Based upon the performance boost and ease of future expansion, we recommend that you continue to utilize RAID 5 as your fault tolerant strategy. All of the above procedures would greatly increase the protection of your data.

29. Data Center Facilities Observation:

The data center is both climate and humidity controlled.

The data center is equipped with a durable raised floor, entirely accessible via removable panels.

The data center is physically secure and accessible through a keypad, combination door lock. Our observations revealed strict adherence to physical security, which included locking the door when no one was present even for short periods of time. We were informed that the keypad combination was safeguarded and shared only with those previously authorized to have access.

The data center is currently equipped with a heat/smoke detection alarm system, which is configured to dispatch a 911 alert in the event of a fire.

An enterprise-level uninterruptible power supply (UPS), EPS 3000, provides battery power for all of the servers in the data center in the event of a power outage. Currently, there is no communication means established between the UPS and the servers that would allow for proper shutdowns of the servers if the UPS battery life were nearly depleted during an extended power outage. When a server is automatically signaled by the UPS to shutdown properly, it commences saving and closing open data and system files and instructing background services to stop prior to shutting down. Without such communication the servers simply lose power when the UPS battery life is depleted, which can result in corrupt data and/or system files.

The estimated battery life based on current load can be determined by pressing the Battery button on the EPS 3000 Monitor Box. This would indicate, all things being equal, the length of time the battery could sustain the servers in the data center in the event of an extended power outage. Since servers can be instructed sequentially at different times to shut down, this can extend battery life for the most important servers. Listed below is the estimated amount of battery life in minutes based on load, which assumes a sustained load on new batteries, which would be a best-case scenario:

<u>% Load</u>	<u>Battery Life</u>
75	45 Minutes
50	74 Minutes
25	150 Minutes

Based on our conversations, Buildings & Grounds had been led to believe that the length of time of uninterruptible power supplied by the batteries in the event of an extended power outage was considerably longer than the numbers quoted in the table above.

Currently, a backup generator does not exist for redundant power in the event of depleted UPS battery power.

Recommendation:

We suggest that Scott County consider the installation of a fire suppression system within its data center. In addition to heat/smoke sensors and automatic 911 notifications, a gas-based fire suppression system with separate fire zones below the floor and above the ceiling can preserve weeks and months of restoration efforts within minutes.

We strongly recommend coordinating with your UPS service provider to configure the UPS to allow for automated system shutdowns in the event of an extended power outage. MGE, the makers of the EPS 3000 UPS, provide a software package entitled Solution-Pac/WAN, which can be configured to perform automated system shutdown procedures, warn system managers of any power related problems, as well as provide for remote monitoring and controlling of the UPS.

Once the Solution-Pac/WAN application is configured, the UPS is capable of communicating with a single, designated server (agent), which in turn communicates with all other servers (clients). Configuration of the agent is very flexible, allowing for certain events, such as amount of remaining battery life to trigger the automated shutdown of a particular server. Additionally, the software can be used to send an e-mail or an alpha-numeric page to, perhaps, an on-call technical support analyst. The application can communicate with the designated agent through a direct serial cable connection or through the network.

We further recommend that Scott County review the importance of additional sustained power in the possible event of an extended power outage, such as through a backup generator as is currently supplied for 911 Dispatch.

Should Scott County decide to complement their UPS with a backup generator we recommend that it consist of locating a stationary automatic standby generator unit outside the building and permanently wiring it to an automatic transfer switch. This type of system must be installed by an electrician and may require pulling the electric meter. The transfer switch is a double throw switch permanently wired to the building service entrance or sub-panel.

Operation is generally as follows: When power is lost, after a brief delay, the standby generator automatically starts. When it reaches rated speed and voltage, the automatic transfer switch connects the building electrical system to the running generator. Various engine and generator parameters are monitored, along with the utility feed, and if all remain within specified ranges, the building will continue to be powered. When the utility feed is restored, the automatic controls will switch the building back to the utility source after a preset time delay. The generator is then automatically shutdown after a brief period of no-load operation.

E. Internet Connectivity and Wide Area Network (WAN)

30. Internet Access Observation:

The dedicated Internet connection in place at Scott County provides for increased potential capacity. In other words, you have the ability to increase the data-rate over time, if needed, so that it is in line with your future Internet bandwidth needs without having to replace equipment due to the scalable nature of the equipment.

Users throughout the Organization have a need for persistent and dependable Internet access at an acceptable speed. Currently, Scott County is providing selective Internet access via a dedicated T1 line.

During the time of our interviews, many of the participants expressed their anticipation for high-speed, dedicated Internet access directly from their desktops.

With so many employees finding information and services available to them on the Internet which assists them in performing their jobs, the question many organizations are faced with is not who should receive access to the Internet, but rather how can we permit access for all employees while controlling and monitoring the access to ensure that it is productive.

Recommendation:

As the Scott County on-site Internet Information Server becomes more depended upon by Scott County residents, attorneys, realtors, etc., it is recommended that Scott County implement a digital subscriber line (DSL) Internet connection as a redundant Internet connection. DSL represents one of the latest technological innovations used for high-speed Internet access, which also happens to be more affordable than other comparable high-speed Internet access methods. DSL is relatively new to the Davenport and Bettendorf locations and, though not available in all areas, it has recently become an option in the area of your Davenport locations. This connection would interface with your existing firewall solution, along with your existing T1 connection.

This dual, high-speed, dedicated Internet connection solution would serve all bi-directional Internet access needs for all employees, in all locations, as well as for inbound Scott County residents, simultaneously, while providing redundancy in the event of a line failure.

Additionally, the equipment that we are recommending allows for connections to the Internet to be monitored and access to be controlled so that only those with permission can gain access.

31. Firewall Needs Observation:

Scott County has recently implemented a dedicated Internet connection solution. The firewall solution that was implemented does meet minimal industry standards.

Recommendation:

As with any dedicated Internet connection, to ensure that your internal network is properly secured from intruders, we recommend implementing a state-of-the-art firewall solution that will provide security for your network.

According to Gartner Group, Inc. (NYSE: IT and ITB) research, by 2003, 50 percent of small and midsize enterprises (SMEs) that manage their own network security and use the Internet for more than e-mail will experience a successful Internet attack, such as Web site hacking and the spreading of viruses. More than 60 percent of those enterprises will be unaware that they have been attacked.

According to Gartner, SMEs should consider the following four steps to strengthen their network security.

1. **Security Checkup:** SMEs connected to the Internet should consider contracting with a security firm to conduct an audit and risk assessment of their networks. The effort should include an internal network security audit and an external penetration test. That should take place whenever an SME makes major changes to its Web site or firewall, and at a minimum of once a year.
2. **Firewall Configuration:** Ensuring that a proper firewall is installed is crucial. SMEs should focus on firewall appliances that provide a base level of security without requiring detailed security knowledge. SMEs should request quotes for managed firewall and intrusion detection services from Internet service providers. Those types of services usually cost less than the equivalent salary of a half-time firewall administrator.
3. **Boundary Services:** Scanning incoming e-mail for viruses is a crucial security measure. SMEs can use either desktop or server-side antiviral protection. SMEs should take immediate action to disallow relay and halt the entry of spam into their environments.
4. **Consolidated Remote Access With Strong Authentication:** SMEs that provide dial-in access to e-mail and other enterprise systems should eliminate desktop modems and use consolidated modem pools and remote access servers. SMEs should require the use of hardware tokens to authenticate remote users.

According to Gartner, those four security measures will protect more than two-thirds of SMEs that are connected to the Internet. SMEs that must manage more highly sensitive environments — such as law firms, regional banks, independent insurance agencies, and state and local government agencies — should plan for additional precautions or outsource their security operations to an experienced managed service provider. Gartner recommends the following actions:

- Use virtual private networks for secure remote access over the Internet.
- Deploy intrusion detection to alarm the enterprise of internal and external attacks.
- Use firewall log analysis and e-mail content filtering to detect misuse of the Internet connection by employees or business partners.

With the ever-increasing occurrence of successful Internet attacks, The professional services contractor, highly recommends the installation of a properly configured and reputable firewall, such as a Cisco PIX, for any business network directly connected to the Internet.

The Cisco PIX is a dedicated firewall that is fast, safe and easy to manage. Because the Cisco PIX is a hardware-based system it allows for a higher throughput than software-based firewall systems. It performs an inspection of all data to and from the Internet and will safeguard your network devices and data. Cisco is a world leader in firewall and router technologies. Cisco has the advantage of having both software and hardware experience – rarely found within the firewall vendor community. The Cisco PIX model that we are recommending is scalable which allows for the implementation of future Internet applications, accessible by both internal employees and the Internet while safeguarding your internal network. The Cisco PIX also allows thoroughly tested virtual private network (VPN) connections. A VPN encrypts data at both ends of a connection before sending it across a common carrier, such as the Internet, thus insuring the security of the data being transferred and allowing for sensitive data to be accessed from remote locations.

32. Internet Monitoring and Access Control Needs Observation:

Scott County has implemented a dedicated Internet connection solution.

This solution offers many benefits and serves as an excellent asset for those who choose to use it in an effort to improve job performance. However, unlimited Internet access also carries with it the opportunity for misuse, which is an issue facing the management of many of today's organizations.

Recommendation:

We recommend using Websense Enterprise as a means for monitoring and controlling Internet Access. Websense Enterprise will integrate tightly with the Cisco PIX firewall solution that we are recommending.

Websense filters Internet content by working in conjunction with the Websense Master Database of more than 1,100,000 sites (comprising more than 150,000,000 Web pages). This database is organized into more than 65 categories, including MP3, gambling, shopping and adult content. You can choose to block or permit access to individual categories by user, group or time of day.

Websense consistently refines its Master Database of sites using Web crawlers and Internet analysts. New sites are added to the database daily, and Websense automatically downloads updates to the database every night to ensure that you're keeping up with the rapid evolution of the Internet.

Basically, Websense provides management with the centralized capability of globally denying access to certain types of Web content, denying access to only specific Web sites, denying access to all Web sites except for only specified sites, and even denying various types of access by workstation.

33. Wide Area Network Leased Line Connections Observation:

Currently, Scott County is interconnected among all locations for which it is feasible to allow access to network resources.

The current connections between the locations provide sufficient bandwidth for many present and future data communications. However, when using applications which are not client/server-based – those designed for wide area networks – or when accessing large centralized files, performance will continue to be an issue. By utilizing Citrix MetaFrame, which consumes only 10% of the bandwidth otherwise needed, applications that are designed for WANs run faster, applications not designed for WANs run acceptably fast and large file access becomes possible. These benefits are extended to dial-up users as well.

Additionally, voice traffic is not being managed over the current wide area network configuration. It is our belief that a telecommunications assessment would more than likely cost-justify a Voice-Over-IP (VoIP) solution.

VoIP allows phone systems to be integrated with data networks to allow for the passing of voice and phone system communications via the wide area network. This can allow for reduced ongoing monthly costs on phone bills, as well as an integrated phone system which would appear as a single central phone system among all users.

Recommendations:

Current leased line connections appear to be well thought out and provide the necessary connections between outlying buildings and the data center at the County Courthouse. The Cisco routers on these lines appear to be properly configured as well, with the exception that default passwords are still being used. As such, a curious or vindictive employee with virtually any knowledge of Cisco products could bring the wide area network down quite easily. Encrypted passwords should be implemented immediately. Additionally, copies of the router configurations are not currently kept at the data center. These configurations would prove essential in the event of equipment failure or a router crashing. A central repository for WAN information, including all router configurations, should be created at the data center.

Though leased lines currently provide adequate connectivity, there are no provisions for redundancy. If Scott County should decide upon a Voice-Over-IP solution, such redundancy would be essential, lest an outlying building be left without phone service. Even without a VoIP solution, DSL or Dial-on-Demand Routing (DDR) through modem backup should be considered. Both DSL and DDR solutions are relatively inexpensive and would provide an added layer of network integrity that is currently lacking.

V. Coordination of Departments

34. Geographic Information Systems Observation:

Scott County has not defined a plan for how it will use or incorporate Geographic Information Systems (GIS) into the County. GIS continues to develop at a rapid pace in other governmental entities and is quickly becoming a standard throughout the country.

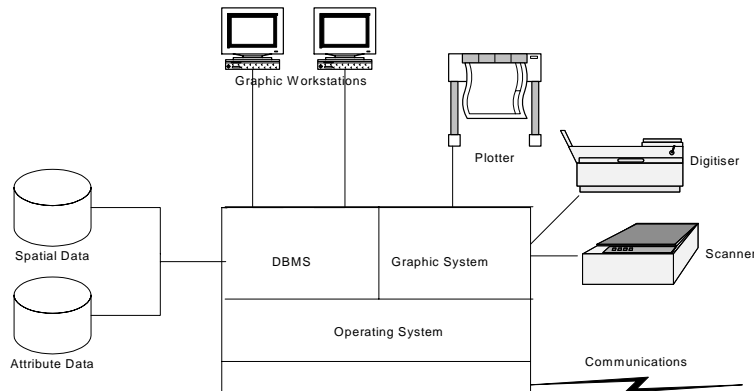
A Geographic Information System (GIS) is, by definition, an integrated computer-based system for mapping and analyzing geographic phenomenon that exist, and events that occur, on Earth. GIS technology integrates common database operations (e.g., query and statistical analysis) with the unique visualization and geographic analysis benefits offered by maps. The value of GIS to organizations is the ability to explain events, predict outcomes, and plan strategies.

In general, GIS provides a system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface in both graphic and report format. The ability to use spatial data, manage it, analyze it and answer spatial questions is a defining feature of GIS.

As with technology of any type, a GIS system integrates the key components of people, processes, and technology. Technology is the hardware, software, and data. With a GIS system the data is one of the most important components. A GIS system integrates spatial data with tabular data to provide information to the user. The people component of a GIS system is those who manage the system and are responsible for developing plans for applying the GIS system to situations. The processes refer to the implementation of a well-designed business processes (rules) that support the operating practices of GIS technology.

For a successful introduction of any new technology into an organization, it is key to integrate this technology into your business strategy and operation. This requires the commitment of the sufficient resources, human and financial, organization at all levels.

The below graphic depicts the typical physical components of a GIS (from the Association for Geographic Information).



The general consensus in the GIS community is that 60%-80% of the cost to implement GIS technology occurs during the data acquisition, data compilation, and database development phases. Further, 60%-80% of the time required to complete a GIS implementation is involved in the input, cleaning, linking, and verification of the data. (*The GIS Primer*, by David Buckley).

A system for data manipulation and analysis allows the user to define and execute spatial and attribute procedures to produce derived information. A GIS system is able to transform and integrate spatial and attribute data. This is the part of a GIS system that distinguishes it from other database systems and CAD (computer-aided drafting) systems.

This system allows for the integration of data to provide answers to complex spatial questions. There are multiple layers of information that need to be brought to bear in determining a solution. This typically involves bringing multiple maps together to form a new map that displays the information needed.

Recommendation:

We believe that Scott County should begin the process to identify and implement a GIS system. There are a number of vendors that have GIS software systems available. As with any software selection, the selection of a GIS system should be based on the organization's requirements. These requirements should include potential needs and requirements along with current requirements.

A GIS is a complex system and once an organization has selected a software package, a proven implementation methodology should be followed. The implementation methodology should include all the affected areas of the County. From a technology standpoint, there is an investment in the hardware and software to acquire the system along with the ongoing system maintenance and upgrades. The financial implications of a GIS implementation include not only the technology acquisition, but also the investment in the data capture, data cleansing, and personnel training. The organizational commitment to the project is critical, as the implementation of a GIS impacts the entire organization.

As with any system implementation, it is important to address the following tasks:

- Identify and involve all system users (stakeholders).
- Match system needs with software capabilities.
- Identify total costs, including ongoing costs.
- Conduct a system pilot.
- Give responsibility for the project to a project team consisting of stakeholders and the technology staff.
- Ongoing training and knowledge transfer.

Uses of GIS

A GIS system is useful to a municipal authority due to the ability to store various layers of data, including streets, parcels, houses, etc., and be able to provide information to a user about that area, including cultural features, natural physical features, utilities and water/wastewater for each parcel within a defined area.

This information can then be compiled into a report (map or textual) for the user to provide required data. Users of GIS systems typically include:

- Engineering
- Schools
- Assessor
- Utilities Boards
- Parks & Recreation
- Police and Sheriff Departments
- Library System

-
- Finance Department
 - Solid Waste Department
 - Election Commission
 - Planning Commission

The greatest need for GIS typically is to improve efficiency. Many hours are spent in auditors, assessors, and other County administrative offices researching information. Further, there is a real need for intelligent mapping and a need to have a complete and accurate map of the entire County that is updated in one location for all departments. A complete map includes a map of all aspects of a county, or municipality that are important to the users, including the ability to produce on the map such items as townships, land parcels, land use, and utilities.

Once a municipality has determined to go forward you need to determine what data your GIS system will be built upon. This could be parcel boundaries, center line data, or infrastructures, such as roads. This initial data is used as the basis for which all other data will be layered upon. As an example, if you were looking to get all parcels in the County on a GIS system, you may wish to start with all your parcel boundaries and use state plane coordinates as the tie between text and the graphic data. With all parcel information contained and maintained on a GIS system, maps and legal descriptions can be produced in minutes instead of hours that it takes to perform these tasks manually.

Further, as a County accumulates a history of ownership of land parcels, this information is easily reported upon. Once initial data is collected and maintained, a county could chose to integrate additional data from other county or city sources to produce other maps. An example of this would be if parcel data and tax information are joined together, a GIS system could produce tax maps for the county. An assessor's office can use this information to produce the routings for the assessors. Using GIS, the routing can be put together so as to efficiently plan the assessor's day, scheduling the sites to be assessed and estimating the distance and travel time to each site.

Every ten years, a new census is taken. Based on the census data, a county is faced with the redesign of precinct boundaries. This process typically can take weeks to manually produce a preliminary redesign of the precincts. With a GIS system, taking into consideration such factors as current precinct location, balancing, maintaining the same number of precincts and the census data, a preliminary redesign is possible in minutes.

With the addition of digitized images of the county, an auditor's office could produce maps with GIS that could be used for a variety of reasons. Digital images are typically aerial digital photographs that contain coordinate information. An example of this would be to produce maps that combine land parcel information, tax information and the digital images to determine if there are buildings on land parcels that are not being assessed.

For the planning board, a GIS system can assist in the development of the county use plan and in the channeling of land use within a county. By using maps generated to show the land use in the county, the planning board can work to meet its land use goals. GIS systems can also produce maps using information from DNR to reflect flood plain information that can be used by the planning board.

Steps to Implement

- Development of a clear strategic plan.
- Sufficient resources, human and financial.
- Determination of the base data.
- Cooperation between county and city offices.
- Change in processes (covered in previous document).

As with any system a plan should be developed prior to the implementation of a system. The plan should spell out the objectives that are to be addressed by the implementation. The plan should include a description of the expectations of what the system will be able to do at each stage of implementation. Further, a realistic timeframe should be developed. A GIS system implementation typically takes two to three years to get the initial data coordinated, cleaned up and loaded and the system implemented. Further, most users implement additional data, such as digital images, collected after the initial base data is implemented.

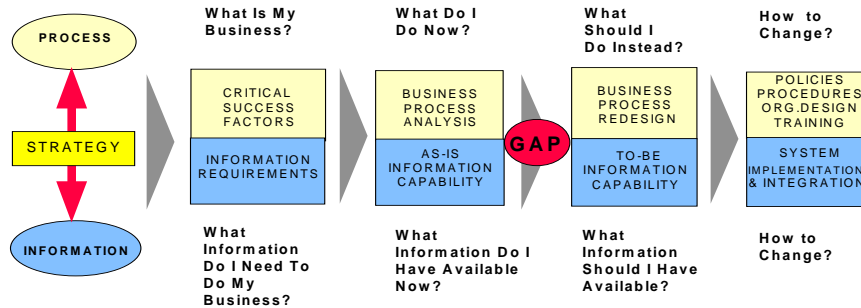
The typical GIS plan is looking out three to five years and we recommend that Scott County begin the planning process.

35. Business Process Improvement Observation:

We have identified the need for improvements in the design and implementation of the network infrastructure that will support the efficient flow of information throughout your Organization. With the infrastructure in place, Scott County has the opportunity to assess the flow, storage, and retrieval of information within and between departments.

The professional services contractor recognizes that in order to obtain the greatest benefit of implementing information technology, it is critical to closely tie technology improvements to the business processes. Simply implementing technology that automates existing practices may not provide the best results. We do not believe in applying technology for the sake of technology. Applying current best practices with little or minimal cost can fulfill major productivity improvements. The following graphic explains the link between strategy, process, and information technology upon which our approach is predicated.

Business Process Improvement (BPI)



Our discussions with your key people identified a number of existing manual, paper-intensive processes that may benefit by business process redesign. We have found other companies that have redesigned and automated previous manual processes, and this has resulted in reduced workload, more timely and accurate information, while providing a higher level of service to the customers.

We recommend that Scott County conduct BPI on a department-by-department basis since we have found great success in these projects in helping companies become more profitable.

Areas where technology could improve business processes include:

Business Process Observation:

There is a large amount of paper pushed throughout the organization in the form of many different documents, manuals and handbooks.

Recommendation:

Most of the documents passed throughout Scott County could be written and stored in electronic format. All electronic copies could be stored and organized in public folders on the Exchange server. This would be a central repository for all the different departments to access only the particular files they need. This improvement in efficiency would allow for more timely and accurate service among the employees and to the residents of Scott County.

Other business process improvement opportunities:

1. According to our interviews, the lack of ease of information sharing causes a significant amount of duplicate effort in the sense of “reinventing the wheel.” An example of this is the severed electronic communication means between Secondary Roads – Courthouse and Secondary Roads Maintenance Shop. Apparently, there is duplication of information due to the inability to efficiently share information. Also, there are significant time-consuming tasks, which could be better distributed among the department’s employees if all were capable of accessing all network resources at acceptable speeds.
2. Organization, prioritization and effective communication are a challenge within Buildings & Grounds due to the manual processes associated with the current hardcopy Work Orders. Integrating the Work Orders into an electronic document workflow process would prove more efficient. They specifically cited timesavings and improved customer service as benefits of being able to quickly look up Work Order histories, contact details, work assignments and responsibilities, etc.
3. Our interviews revealed that there are historically grounded processes within Payroll of the Auditors Office that directly affect the timely completion of tasks. An unproductive sequence of roles and responsibilities are split between Payroll and HR causing idle time and delays while each waits for the other to complete their respective piece of a job.
4. With the previous election system and processes there was much duplication of effort and a time-consuming verification process. We understand that Scott County has implemented a new election system. We simply recommend analyzing the processes and procedures to ensure efficiencies.

In the short time that we were on-site, these were a few of the prospective business process improvement opportunities that we identified. By making a serious commitment to applying the BPI model on a department-by-department basis, many manual processes can be overcome.

36. E-Business Observation:

Scott County currently has not defined a specific e-business strategy that provides an overall direction on how the Web site will serve the citizens.

Recommendation:

Given the explosion that has occurred on the Internet, citizens are increasingly expecting to be able to utilize your Web site for informational viewing and gathering, communications, and other interactive applications to assist them in doing business with the County. We are recommending that all of our clients begin formulating an e-business strategy since it is very likely that over 90% of all business to business transactions will eventually occur over the Internet. While we are not suggesting that all of our clients “jump” into e-commerce now, we are recommending that you position your Organization for the e-business future. This means aligning current systems, software, and activities with the coming integration that will be needed, and most likely demanded, by e-commerce.

We therefore recommend that Scott County begin to study the strategies, options, and priorities in relation to e-business, and how e-business will affect your operations. We feel that proper planning before building the Web site will enhance the overall integration of the various departments and ease the way citizens communicate with the County. There are good case studies available that address the coming Internet e-commerce wave as it relates to your industry, and we encourage you to begin preparing today for what will surely be here in two to three years.

37. Business Continuity (Disaster Recovery) Observation:

Scott County does not have a comprehensive, formalized business continuity plan in place covering the computers, LAN, and related PC networks.

Recommendation:

We recommend that the executives of Scott County review and discuss the importance of devising a formal business continuity plan. A business continuity plan is a comprehensive statement of actions to be taken before, during, and after a disaster to minimize the impact of that disaster on the operation of the organization's overall business operations. The plan should be documented and tested to ensure the continuity of operations and availability of critical resources in the event of a disaster.

Please Note: While disaster recovery planning has been traditionally associated with data processing operations, the type of service our firm provides is geared toward overall business recovery planning from a broader, organization-wide perspective.

Most organizations depend heavily on technology, communications and automated systems, and their disruption for even a few days could cause severe distress. The continued operations of an organization depend on management's awareness of potential disasters, their ability to develop a plan to minimize disruption of critical functions, and the capability to recover operations expediently and successfully.

The probability of a disaster occurring in an organization is highly uncertain. A disaster plan, however, is similar to liability insurance: it provides a certain level of comfort in knowing that there is a plan in place, which would enable recovery if a major catastrophe were to occur.

Diagnostic Questions:

- Does the organization depend heavily on technology and automated systems?
- How long can the organization function without critical systems and operations?
- Does the organization have a high exposure to natural, human or technical threats?
- Has the organization established adequate disaster prevention measures?

A business continuity planning strategy should take a structured approach that includes a combination of PC software (i.e., Business Recovery Planning System) along with consulting assistance. The key objectives of such a methodology is outlined below:

- Obtain top management commitment.
- Establish a planning committee.
- Perform a risk assessment.
- Develop testing criteria and procedures.
- Prioritize processing and operations.
- Develop written agreements.
- Perform data collection.
- Organize/document a written plan.
- Evaluate critical needs.
- Test the plan and evaluate results.
- Update and finalize the plan.

The deliverable is a comprehensive disaster recovery plan that addresses all the critical operations and functions of the organization. Typical sections of the written plan include:

- Executive Summary.
- Risk Assessment.
- Emergency/Evacuation Procedures.
- Business Recovery Teams Structure.
- Management Team.
- Administrative Recovery Team.
- Departmental Recovery Teams.
- Technical Recovery Team.
- Long-Term Interruption Procedures.
- Testing.

The consulting firm assisting you should have several strategic alliances for disaster recovery planning services, such as with trade organizations (e.g., BAI and HFMA) and large computer software vendors and service centers.

The benefits of developing a comprehensive disaster recovery plan include:

- Minimizing potential economic loss.
- Decreasing potential exposures.
- Reducing the probability of occurrence.
- Reducing disruptions to operations.
- Ensuring organizational stability.
- Providing an orderly recovery.
- Minimizing insurance premiums.
- Reducing reliance on certain key individuals.
- Protecting the assets of the organization.
- Ensuring the safety of personnel and customers.
- Minimizing decision making during a disastrous event.
- Minimizing legal liability.
- Complying with regulatory requirements.

Section 3 Implementation Plan

Based on our observations and recommendations, we recommend that Scott County undertake the following activities:

Phase	Description	Report Reference	Timeline
		Page(s)	
Phase I	Implement Information Processing Department Organizational Changes	11-13, 80-83	Completed
Phase II	Develop Hardware, Software, and Development Standards	18-22, 30-33	Completed
Phase III	Establish Electronic Help Desk Solution	14-17	Completed
Phase IV	Network Cable Design and Installation Project Management	38-42	Completed
Phase V	File, Print and Domain Controller Server Setups	46-48	Completed
Phase VI	Citrix MetaFrame, Thin Client Application Proof of Concept Pilot Project	42-45	Completed
Phase VII	Network Client Installations and Configurations – PCs and Windows-based Terminals	42-45	Completed
Phase VIII	Network File and Print Server Migrations	46-48	Completed
Phase IX	Wide Area Network Configuration Changes	61-62	Completed
Phase X	Electronic Mail, Scheduling, and Public Folders Optimization	49-51	2 nd Qtr-FY06
Phase XI	Centralized Fax Solution	51-52	N/A
Phase XII	Remote Access Solution	52-53	Completed
Phase XIII	Firewall Intrusion Test	59-60	TBD
Phase XIV	Firewall Upgrade	59-60	4 th Qtr-FY05
Phase XV	Internet Monitoring and Access Control Review of Current Configuration	60-61	TBD
Phase XVI	Internet Monitoring and Access Control Setup of New Configuration	60-61	TBD
Phase XVII	Citrix MetaFrame, Thin Client Application Server Entire Network Rollout	42-45	Completed
Phase XVIII	Network Documentation		On-going
Phase XIX	Basic Network Administration Training	N/A	On-going
Phase XX	GIS Strategic Planning Engagement	63-67	Completed
Phase XXI	Conduct Business Process Improvement	67-69	On-going
Phase XXII	E-Business Strategies, Options, and Priorities	69-70	On-going
Phase XXIII	Develop a Disaster Recover Strategy	70-72	1 st Qtr-FY06
Phase XXIV	Establishing a Technology Partner for Ongoing Support of the Computer Network and Systems	N/A	On-going

Implementation Plan Detail

Phase I: Implement Information Processing Department Organizational Changes

This first phase involves implementing the organizational changes that are spelled out in Section 2-I of the report and are illustrated in the organization charts in Exhibit A. It should be noted that there is an organization chart which represents a transitional step that needs to take place before the final recommended organizational structure is implemented.

Phase II: Develop Hardware, Software, and Development Standards

Enforcing standards for most computer hardware (e.g., server, personal computers, Windows-based terminals, hubs, network cards, etc.) and software (e.g., word processing, spreadsheets, electronic mail, database, etc.) will promote the sharing of information and reduce the cost of operations. The establishment of standards will also provide for more efficient communication, training, reduced support costs, and create the opportunity for Scott County to allocate resources based on how the equipment is used. Standards also include management of software versions and software updates so that the same version of all software is used throughout the Company.

As stated earlier in our report, we recommend that Scott County standardize on Microsoft Windows 2000 Server, Microsoft Office 2000, Microsoft Outlook 2000, and Microsoft Internet Explorer. For all existing personal computers, we recommend either installing thin client software, replacing them with Windows-based terminals, or replacing them with new Windows 2000 Professional computers running thin client software.

Phase III: Establish Electronic Help Desk Solution

- Help Desk design.
- Application and toolset selection (included within this report).
- Application and toolset customization and implementation.
- Problem and work management development.
- Testing and transferring of applications into production.

Phase IV: Network Cable Design and Installation Project Management

- High-level cable design.
- Coordination with cabling vendor.
- Installation review.

Phase V: File, Print and Domain Controller Server Setups

- Hardware assembly and testing, including RAID 5 fault tolerance for hard drives.
- Windows 2000 Server operating system installation for two servers.
- Windows 2000 Server network configuration.
- Configure Active Directory services, policies, user accounts, share points and security.
- Remote administration configuration.
- Tape backup configuration and testing.
- Uninterruptible power supply (UPS) configurations and testing.
- System recovery.
- Centralized antivirus deployment.

All of the above work steps cover two separate servers.

Phase VI: Citrix MetaFrame, Thin Client Application Server Proof of Concept Pilot Project

- Install and configure Windows 2000 Server on the application servers.
- Install and configure Windows 2000 Terminal Services on the application servers.
- Install, configure and test Citrix MetaFrame on the application servers.
- Test and optimize end-user software applications.

Phase VII: Network Client Installations and Configurations

This work step includes 10 units.

- Configure regular network workstations and printers for optimal connectivity to the network.
- Configure designated thin client personal computers for connectivity to the Citrix environment.
- Configure Windows-based terminals for connectivity to the Citrix environment.

Phase VIII: Network File and Print Server Migrations

- Inventory current NetWare servers (physical and logical locations, environment, purpose, usage).
- Determine migration path choices (gradual or direct, automated or manual).
- Determine infrastructure services migration (NDS, Network Security, DNS, DHCP, LDAP, Authentication, ZenWorks, NDPS).
- Establish solid network connectivity between Novell Network and new Windows 2000 Servers.
- Synchronize client services and authentication.
- Synchronize and/or migrate Novell Directory Services tree to Microsoft Active Directory.
- Migrate file and print services to Windows 2000.

Phase IX: Wide Area Network Configuration Changes

- Change router configurations as necessary, including protocol configurations.
- Test WAN configuration changes at every remote location.

Phase X: Electronic Mail, Scheduling, and Public Folders

- Review and evaluate electronic mail server configuration parameters.
- Implement performance optimization and best practices.
- Provide suggestions for optimal use of Exchange application features.

Phase XI: Centralized Fax Solution

- Install and configure fax board hardware in server.
- Install and configure FAXserver software.
- Configure FAXmaker client for designated employees.

Phase XII: Remote Access Solution

- Install and configure the router-based analog modem module.
- Configure and test off-site workstations and laptop computers.
- Configure and test dial-out modem pooling needs.

Phase XIII: Firewall Intrusion Testing

- Perform initial intrusion attempts with limited detail information of security configuration.
- Examine the current network infrastructure at Scott County.
- Examine the current configuration parameters of the existing firewall.
- Conduct testing of the security systems (external) to determine the operational effectiveness.
- Provide a report stating our findings and recommendations.

Phase XIV: Firewall Upgrade

- Implement recommended firewall.
- Test Internet applications to confirm proper firewall configuration.

Phase XV: Internet Monitoring and Access Control Review of Current Configuration

- Examine existing monitoring software that is currently in place.
- Test and provide feedback on effectiveness of existing solution.

Phase XVI: Internet Monitoring and Access Control Setup of New Configuration

- Develop understanding of existing Internet use policies.
- Install and configure recommended employee Internet management software.
- Set parameters in software consistent with organization policies.
- Provide reporting mechanism to management.

Phase XVII: Citrix MetaFrame, Thin Client Application Server Entire Network Rollout

- Install and configure Windows 2000 Server on the application servers
- Install and configure Windows 2000 Terminal Services on the application servers
- Install, configure and test Citrix MetaFrame on the application servers
- Test and optimize end-user software applications

Phase XVIII: Network Documentation

- Provide detailed documentation of entire network including schematic drawings and narratives.
- Establish procedures for keeping documentation current.

Phase XIX: Basic Network Administration Training

This Phase consists of hands on training for the basic network administration duties listed below.

- Server operating system installation, configuration, and testing.
- Backup operations.
- Electronic mail and centralized fax administration.
- User and group administration with an Active Directory.
- Remote access services administration.
- Antivirus solution administration.
- Employee Internet monitoring tool administration.
- File and directory structures administration including security.
- Establishing and maintaining policies, profiles, and permissions.
- Network printer creation, definition, and ongoing administration.
- Basic troubleshooting techniques.

Phase XX: GIS Strategic Planning Engagement

Phase XXI: Conduct Business Process Improvement

Phase XXII: E-Business Strategies, Options, and Priorities

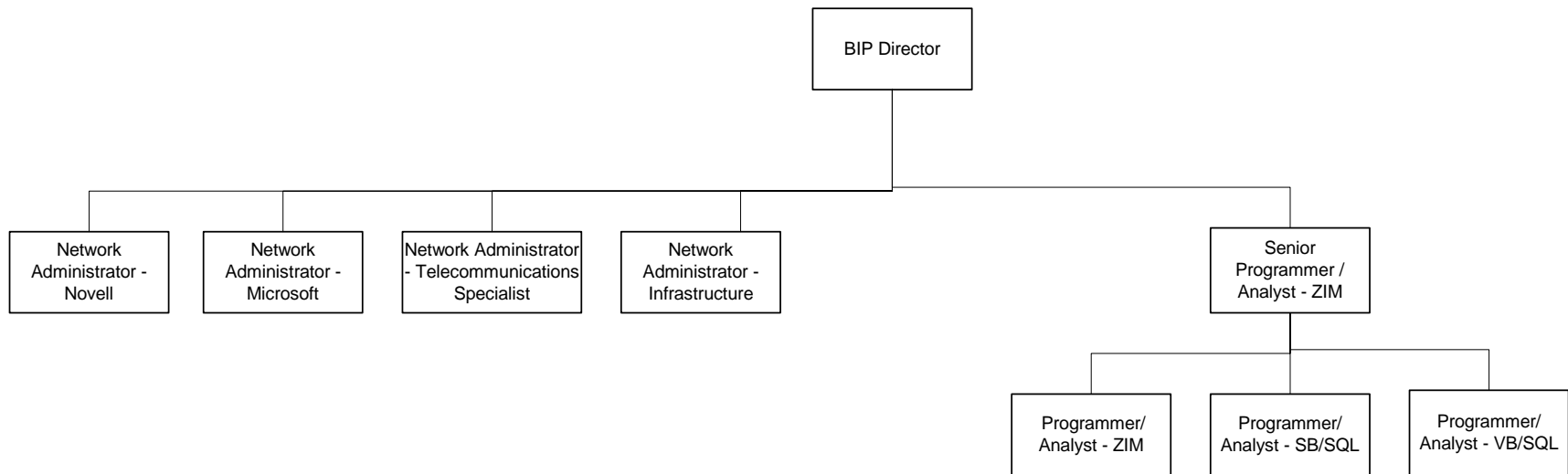
Phase XXIII: Develop a Disaster Recover Strategy

Phase XXIV: Establishing a Technology Partner for the Ongoing Support of the Computer Network and Systems

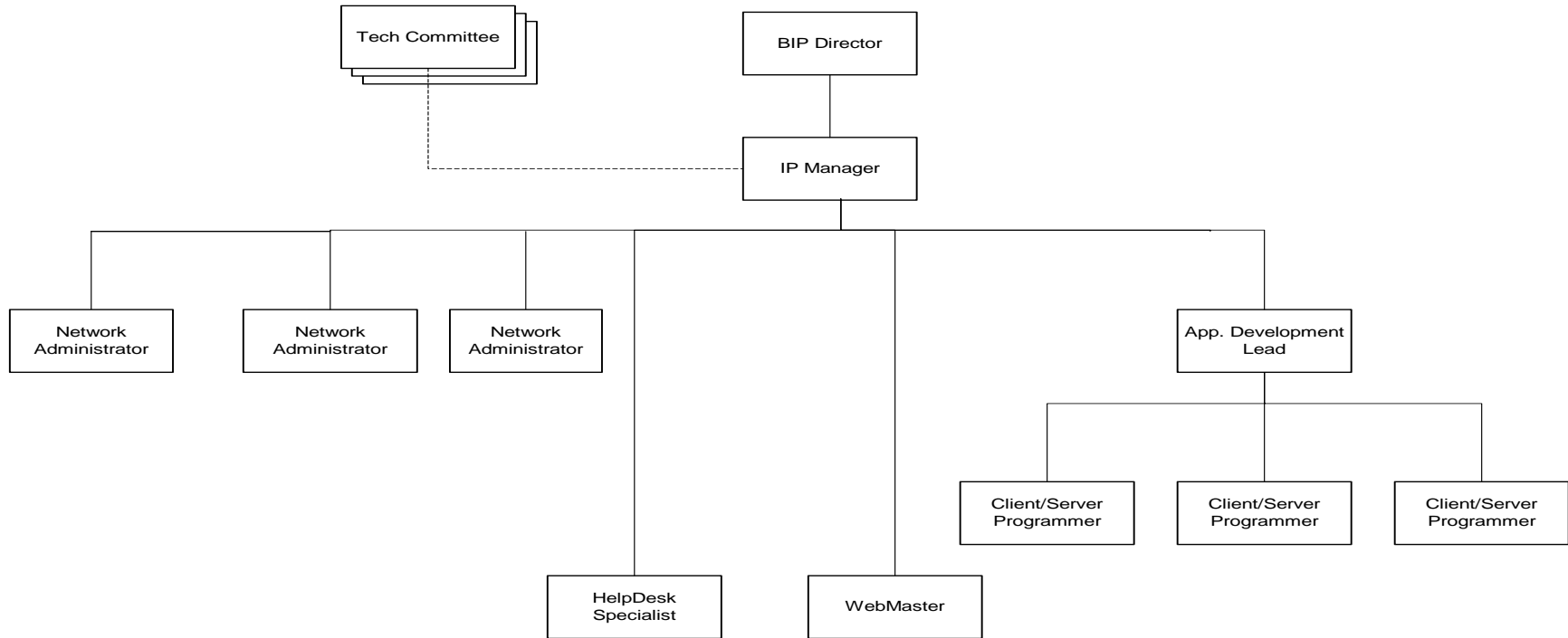
Support of the computer network and systems is an ongoing process to help you manage your system. You must choose a vendor that has the multiple skills needed to serve a network of your size. The network support firm should be able to provide support of your network and related applications by phone and on-site, assist in problem cause determination, and work with the hardware and software vendors on any related problems. They should also provide information on new technologies for better utilization of your system and assistance in implementation of new software or upgrades.

EXHIBIT A INFORMATION PROCESSING
 ORGANIZATIONAL CHARTS

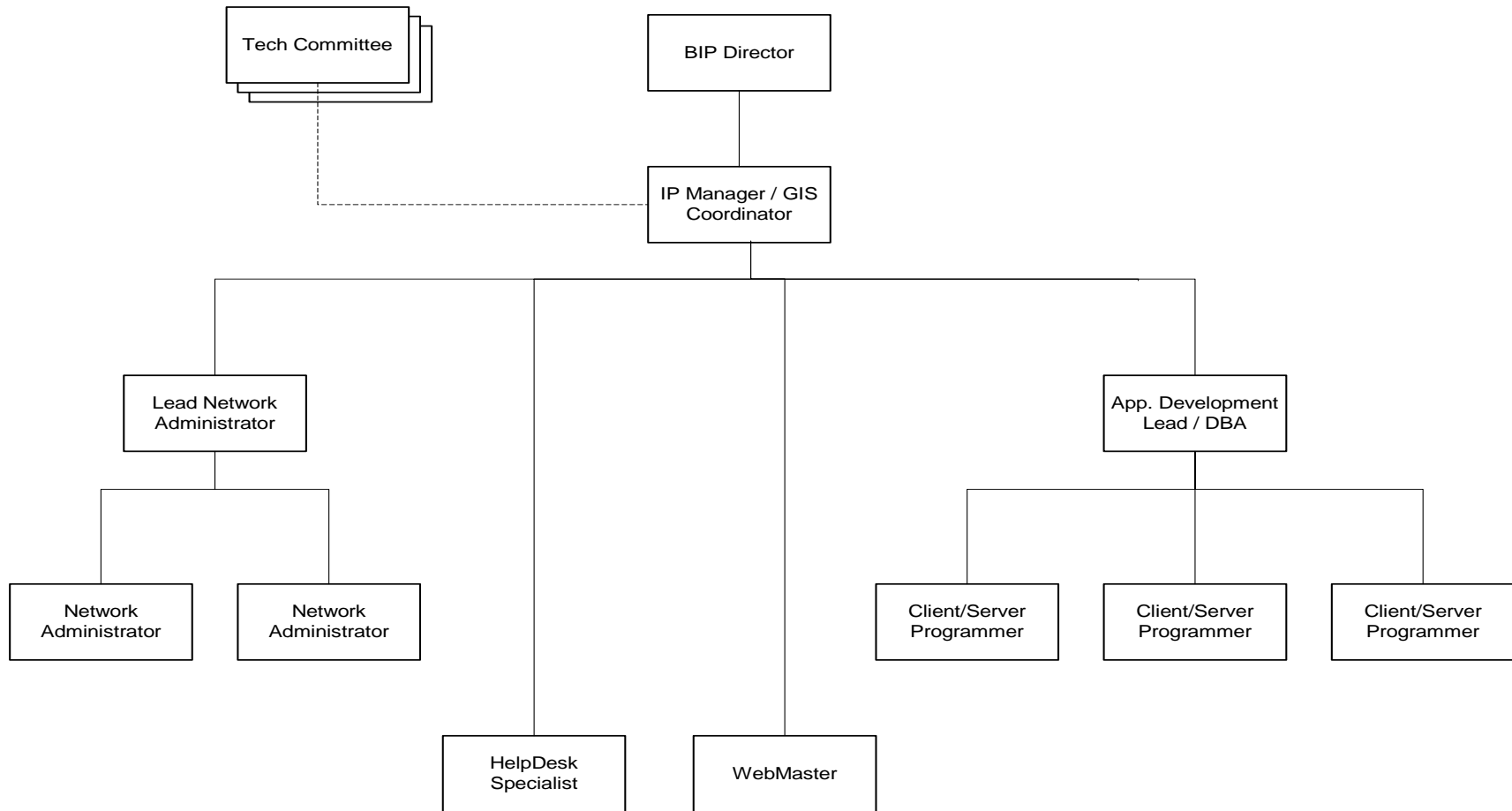
Scott County
Budget & Information Processing Dept.
Organizational Chart
(Current)



Scott County
Budget & Information Processing Dept.
Organizational Chart
(Transitional)



Scott County
Budget & Information Processing Dept.
Organizational Chart
(Recommended)



Scott County
Information Technology Dept.
Organizational Chart
(Implemented)

