

City of Chico Information Systems Department Technology Master Plan 2005 to 2010



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**City of Chico Information Systems Department
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CITY OF CHICO
INFORMATION SYSTEMS DEPARTMENT
TECHNOLOGY MASTER PLAN
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EXECUTIVE SUMMARY

Background

The City of Chico Information Systems Department Technology Master Plan, 2005 to 2010 updates information in the first Master Plan done for 2004 to 2009. The original plan was written as a guide to address City department information technology needs and build on an initial plan that recommended the creation of an Information Systems Department done by Melody Callan and Len Fisk from California State University, Chico. The Information Systems Department was formed in to meet the increasing demand for technology services from City staff and the public.

It is important to note that the evolution of technology requires an ongoing commitment of resources to assure that hardware and software are updated and/or replaced as required. In many instances, these updates are not a matter of choice, but are dictated by software vendors. In many instances, these updates create a “domino” effect wherein new software is imposed (or desired by departments) that requires newer or different hardware, that requires different or additional knowledge from Information Systems Department staff, that requires added annual operating costs and staff time. This technology “vortex” will continue for the foreseeable future and must be addressed during budget sessions.

This five year plan includes:

- Documenting the existing Information Systems Department operations and services
- Recommendations for future Information Systems Department staffing and services
- Requirements for designing, purchasing and implementing new technology
- Evaluation of existing standards, policies, and procedures
- Recommendations for existing services and systems
- Cost estimates where possible
- Project alternatives

The Technology Master Plan is not meant to be a “shopping list” of hardware and software that is rapidly outdated. It is intended to provide guidelines and recommendations that will allow the City to logically plan and fund technology services needed by employees and people doing business with the City. The demand for information technology services is ever increasing and pressure for the City to respond to the demand for such services is also ever increasing. City Council and departmental support of this plan will be necessary during the budgetary process to continue providing a high quality level of service to the City’s constituents and staff.

Summary Recommendations

The Technology Master Plan has been designed as a roadmap for the City to manage its information technology environment by adopting a “middle of the road” philosophy. Cutting-edge technology is frequently expensive and fraught with problems requiring large amounts of staff time. The City should not engage in research and development type projects without very careful considerations for staff and budget impacts. Letting systems become obsolete and/or not maintaining software to current versions must also be avoided. Playing “catch up” is also generally very costly and limits the ability to interact with businesses and agencies using newer versions of software. Enhancements or additions to the City’s systems should focus on providing more value and functionality for the City (both internal and external users and managers), not just technology in search of a purpose.

The input and participation of all City departments during the budget process is crucial to achieving high quality and up to date technology services. Each department has specific needs that compete for funds

and Information Systems Department staff time and must be prioritized within the department as well as City wide to provide a system that can provide the services demanded by City staff and the public.

Recommendation: Purchase and use proven technology with good support services. Keep existing systems and services up to date and budget for outside support services if expertise is not available in-house. Investigate the possibility of a technology “set aside” fund for major projects that will spread costs over several years such as the upgrading of the City Financial System (IFAS).

Information Systems Department Technical Support, Personnel and Services

The number of City staff and the associated demand for technology and related services is continually increasing. Each new employee has a direct impact on the Information Systems Department as they must be provided with E-mail, Internet access, various software packages, network access, computers, telephones, cell phones, pagers, PDA's, etc. Software written by humans is not infallible and problems resulting from updates or installation of new software, or maintaining a new data-base requires resources from the Information Systems staff. **The City has added almost 300 people to the computer network system, including hourly and intern staff since December of 1999.** During this time, one Information Systems Technician has been added. Each new person as well as new computers, new software or other technology services requires additional staff time and expertise.

The Information Systems Department has been able to continue to provide high quality, cost effective service because of the continuing commitment to “work smarter” and use technology to assist in those efforts. These ever increasing demands will require additional Information Systems staff support for workstations, communications, new software and the wide area network in the near future and must be included in the annual budgets.

Information Systems Department staffing is directly affected by the addition of other City staff, upgrading existing technology, or new services. Assuming the demand continues, within the five-year period, it is anticipated that additional staff as follows will be required to continue to support demands of the City departments and the public:

- Information Systems Analyst for network administration, assist the Senior Systems Analyst in charge of the Wide Area Network, e-mail, back up systems, Internet services, updates and upgrades of network servers and related equipment.
- Information Systems Analyst for data base administration, assist Senior Analysts in charge of the Financial and Public Safety systems, integrate various data bases between legacy systems and desktop applications including PERMITS and GIS.
- Two additional Information Systems Technicians to support workstations, phone services, installation of hardware and software, repairs, user assistance and training. In order to facilitate the annual installation of systems being replaced, an hourly technician should be hired until full time staff is approved in the budget.
- One-half of an Administrative Analyst to assist with the large volume of purchasing requests, preparing Notices Inviting Bids, filing, and related tasks. This position is currently allocated, but not funded due to budgetary constraints.
- The web site and E-government services will increase in importance and visibility. This business process will likely evolve to where a management level position is allocated the responsibility to oversee the web site.
- A data base administrator to assist with the Community Development Department PERMITS system, GIS, Tree Manager, HDL, and various other small data base applications that are continually increasing.

It must be noted that any acquisition of new systems, major changes or upgrades may require expertise not currently available from the Information Systems Department and must be carefully evaluated during budget planning as these changes may require additional staff, training, and/or outsourcing of services. In particular is software changing and requiring the use of Microsoft servers. Currently, the Information Systems Department staff do not have expertise in this area as Novell Netware is the network operating

system used by the City. There are many good reasons for this choice, however many software companies use the path of least resistance and use Microsoft products thus imposing added costs for software and hardware on their customers.

Recommendation: Add staffing identified above. New technology or revisions to existing systems that are included in department budgets must also address the impact and ability of the Information System staff to provide support services.

Network Topology, Infrastructure and Bandwidth

As the City grows and demands for service increase from both staff and the public, the need for higher capacity data transmission (bandwidth) will occur. The existing Wide Area Network that is supported by "T-1" communication lines will not be able to accommodate the demand. This will certainly happen should the City implement any type of videoing for conferences or meetings.

Wireless services are becoming increasingly available and more cost effective. These services should be considered as an option to a wired network for future services. However, there are still serious security implications with wireless services and careful assessment and protection from intrusion must be included in addition to reliability and service availability when implementing any wireless project.

Recommendation: Additional bandwidth should be added when demand exists, however alternatives to provide such service should be evaluated, including wireless or fiber-optic cable, as well as standard telephone line connections. This may be required to accommodate the new phone system.

Exploit opportunities to install fiber-optic lines if and when local cable or communications services provide opportunities.

The demand for data storage and retrieval is expanding exponentially. Storage area networks and network attached storage devices can provide large amounts of space for data and will be needed in the near future, especially if the City proceeds to further expand the Geographic Information System. Hardware technology can provide the physical space for very large amounts of data, but as indicated in the e-Visory report, "Improving Document and Records Management, Report to the City of Chico, California" for a document storage and retrieval system to be successful, file management is critical to keeping good records and a workable system. City staff must learn to purge, consolidate and eliminate duplicate files on an ongoing basis for both paper and electronic files. A full copy of this report is attached as Appendix D.

Recommendation: As new projects are proposed and existing services increase demands for storage, include additional storage devices and/or systems in annual budgets. Purchase servers that are scaleable and with storage space adequate for a four to five year period.

GIS projects will demand ever increasing amounts of storage space. This will require a re-assessment of how data is stored for City departments. Storage area networks (SAN) or network attached storage (NAS) systems will be required to accommodate this ever increasing data base.

While storage space is readily obtainable, file management and retrieval is a human process. City staff must diligently purge and delete unnecessary files to manage and organize City files, keep network servers operating at optimum efficiency and to reduce requirements to purchase additional storage space for junk.

Website and E-Government Services

The City web site is currently utilized primarily to provide information to City staff and the public. At present, the web site is hosted by Computer Logistics and is maintained by City staff using a proprietary software package developed specifically for this purpose by

³ Budgetary practices vary and may or may not include capital items in annual budgets as well as operating costs.

Matson & Isom Technology Consulting. As the site evolves and begins to provide more interactive and/or on-line forms, this will be moved in house as the current software is very limited.

The City currently has a web site users group that meets with the Information Systems Department staff to review content and processes for the web site. It is recommended that this continue and City department staff be responsible for posting information that is department specific with oversight and assistance from the Information Systems Department staff.

The City currently does not accept credit cards for payment and that has precluded implementing any type of on-line transactions. It is recommended that this service be provided in the near future and the City Finance Department is attempting to resolve issues with credit card payments. Developing electronic forms, the required review and approval process, and payment will require participation from each department. Most City forms must be re-designed to be done electronically and will require significant staff time, however the resulting time savings and improved customer service should more than offset the cost.

The City website is currently managed by City staff using the "Manager Console" software developed by Matson and Isom Technology Consulting. The website is hosted by Computer Associates located in Redding.

Recommendation: Continue to develop on-line e-government services including the ability to accept credit cards. Begin the process of moving the City web site in-house and purchase the hardware and software in the 2004-05 budget.

Recommendation: As the web site evolves with more information and e-government services, this system should be brought in house as the software is very limited and not able to accommodate future needs.

Recommendation: If staffing is not increased to meet other demands, funds should be budgeted for outside consulting services to assist in this project.

Geographic Information System

The Geographic Information System (GIS) currently used by the City is based on the industry standard ESRI Arc View software. Several departments currently use the GIS system for specific purposes, however the most visible use is for City Council maps and displays particularly for the Planning and Public Works Departments. GIS systems are extremely powerful with the ability to track, display and organize data for virtually any City need. However, the data collection, input and updating of these systems require significant staff time or outsourced services. Exporting and importing data from other systems such as the City's IFAS financial system, PERMITS or HTE public safety system is also problematic at this time. GIS systems also require the most advanced technology in terms of workstations and Microsoft servers resulting in added costs. It is recommended that prior to expanding the existing GIS system or adding services or features, budget and staff impacts should be carefully evaluated.

Two GIS analyst positions have been created and filled by existing staff with expertise in the Environmental Systems Research Institute (ESRI) Arc View program. These positions are assigned to the Planning and Public Works Departments as their specific job tasks are for those respective departments. In addition, Police and Fire Department have one staff person responsible for specific departmental tasks requiring the use of the GIS system. New hardware and two servers have been budgeted for this purpose in the 2004-05 budget. Should the demand for information from the GIS system continue to increase, additional staff, hardware and software will be required.

Recommendation: Annually review the GIS system and services during the City budget process to determine if it is financially feasible to add to this system or retain outside consultants for specific tasks. Should a GIS system be implemented, determine if it should be incorporated into the Information Systems Department.

Financial Management System

The City currently uses SunGard Bi-Tech's Integrated Financial and Administrative Solution (IFAS) software to manage the financial, personnel, payroll, asset management and budget information for the City. The Finance Department uses the IFAS system to manage the City's general ledger, accounts payable, accounts receivable, payroll, fixed asset inventory and budget information. In addition, the Personnel Department uses the Human Resource Module to process and track employee-specific information. IFAS is also used citywide, by all departments, to access financial and budget information. The software for this system is becoming outdated but due to budget constraints and problems with converting from the current system to a Windows type environment have not been done.

At present, the City does not use any Microsoft based servers, therefore the Information Systems Department does not have staff expertise required to support this platform. Since the Financial system is critical to City operation, support services will have to be provided by the vendor or other third party until staff can be added.

Recommendation: Budget for a phased implementation of the new IFAS version 7i software and purchase required hardware when funds are budgeted. Funds must also be included for support services for the new Windows server environment.

Document Imaging and Records Management

The City previously retained the consulting firm of e-Visory Consulting in 2002 to do an analysis of the City's document storage and retrieval system, and evaluate the possibility of implementing a document imaging, storage and retrieval system. The resulting report is attached as Appendix D. The report identified some options and costs, however a detailed implementation and funding plan is recommended prior to installing such a system. It also appears that the funding estimates and the impact on the City's existing network will need to be updated and re-evaluated. A phased approach may be possible and reduce the budget impact. As previously indicated, adding major services will have an impact on the City's WAN and Information Systems Department staff.

Recommendation: Re-evaluate the e-Visory report to update information in the event a document storage and retrieval system is implemented. Clean up existing paper and electronic files to eliminate superfluous items.

Information Systems Department Disaster Recovery Planning

The City of Chico has an Emergency Plan that is maintained by the Fire Chief. This plan provides information to various City departments on several types of emergencies. The City has retained a consultant, John Dougherty, to update the City Disaster Plan and the Information Systems Department should be included in this plan.

Recommendation: Include a formal disaster recovery plan and incorporate appropriate provisions in the master Emergency Plan being developed in 2004-05.

Security Assessment and Security Policy

Network systems today are under virtually continual attack by unwanted or undesirable elements including viruses, worms, spam, and other types of attacks that have the ability to cause serious disruption of services. The City currently uses several layers of protection against intrusion and e-mails transporting program code. However, employees are currently not prevented from downloading program files from the Internet. Although the practice is prohibited in the City Administrative Policies and Procedures, it is recommended that security measures be put in place to prevent this practice.

Information Systems staff keep software maintained and up to date, however it is recommended that an outside security audit be included in a future budget to detect potential threats and provide a risk assessment. This will be more important as the City begins to use credit card transactions for e-government services over the Internet.

The City IFAS financial system operating on an HP 9000 is not connected to the Internet or accessible by non-authorized persons. The same is true of the IBM I SERIES's used by public safety. While these systems are quite secure at this time, it is recommended that as more data integration is needed and processes over the Internet increase, the security of these systems must be considered a priority.

Recommendation: Conduct a thorough security and intrusion detection assessment prior to implementing on-line financial transactions and make revisions to the systems if needed. Prohibit downloading of executable files on City workstations to minimize virus and other threats to City systems. This should be conducted by an outside third party specializing in network security.

Basic Hardware and Software Standards

Hardware

The basic workstations are generally used by clerical and non-technical staff and generally do not require cutting edge systems, however annual updates to specifications should be done to assure the central processor, disk drive, memory, video, and other components are not outdated.

Computer Aided Drafting (CAD) and/or Geographic Information Systems (GIS) systems require higher technology for the extensive calculations, video, and storage demands from this type of software. As with the standard workstations, specifications should be updated at least annually.

Recommendation: It is recommended the City continue to purchase two standard workstations. One designed to easily run the standard word processing, spreadsheet, and data base software used by the City; and a second designed for GIS and/or CAD use.

Network servers should be designed and scaled for specific purposes to allow the most cost effective use of funds. As servers reach the limits of their capacity, an assessment should be made to either replace the server or re-assign systems to less demanding tasks. For example, the large network server located at the Municipal Center will eventually become obsolete as the primary server for the building, however it may be perfectly adequate to replace another system that is also older and more outdated but performing a lower level function. Additional technology services requiring additional servers, particularly those not operating in a Novell Netware environment must be carefully evaluated in terms of capital cost for hardware and software, and added staff resources required to maintain them.

Recommendation: Continue to purchase brand name, high quality servers that are scaleable and meet the need of a specific service.

The City's Wide Area Network (WAN) equipment is an integral and critical part of the hardware that supports all the technology services offered by the City. A diagram of the entire network is shown in Exhibit A. As service demands increase, this system of phone lines, routers, switches, and hubs will also require new equipment and additional capacity. This equipment is included in the existing equipment replacement fund, however it is anticipated that the WAN will have to expand to accommodate more connections. Funds for this incremental increase will have to be included in future budgets. Service demands should be monitored to determine when additional communications lines, fiber-optic lines, and/or wireless services are required. Since this part of the Information Systems Department is virtually transparent to users (unless it stops working), it is easily forgotten.

Recommendation: As demand increases, it is recommended that the cost of updating and expanding this equipment be included in any analysis of service increases. New equipment should be able to accommodate projected expansion for four to five years.

Copy machines are currently under the purview of the Information Systems Department and consist of Canon IR 400 and 600's leased in 1998 for a five-year period. Due to budget concerns this lease was extended for two years.

Recommendation: Replace existing copy machines during the 2005-06 fiscal year.

Telephone System, Cell Phones, Pagers, FAX's, and PDA's

The City is currently replacing the SBC Centrex system currently used by all City offices. A Mitel phone system will be installed during the 2004-05 budget year and could potentially save significant amounts of money. Because Information Systems Department staff will require training to become completely

knowledgeable, maintenance and support services from the vendor will be provided for at least three years.

Cell phones and pagers have become indispensable tools and can save significant time by providing quick, convenient access to staff not at their desks. These services are provided by several vendors, and selection of a service is based on the coverage characteristics needed by the individual. At present, the Information Systems Department has an inventory of all cell phones and pagers, however it is very simple for departments to purchase units without the requisite approval.

Recommendation: It is recommended that an annual audit be done of all cell phones and related billings to assure correct accountability and control cost by obtaining the most cost effective plans.

Personal Digital Assistants (PDA's) are becoming common in the workplace along with demands to connect to workstations. The City has purchased several Compaq IPAQ's for various departments. Since these are actually small computers in their own right, it will be imperative that a single standard be maintained to reduce the support required for more programs and operating systems. PDA's and the new "tablet" computers could allow City staff in the field to perform tasks without making trips into offices potentially saving staff time. As this technology becomes more readily available and cheaper, it is recommended that an assessment be done particularly for field personnel to determine if this is a cost effective measure that improves productivity and customer service.

Several of the new phones, pagers, and other portable devices have the ability to connect to the Internet though various wireless services. While this technology can be very valuable for specific purposes, at this time it can be quite costly and any Internet connection can be a security problem since these units are synchronized with workstations to transfer data and other information. Requests for this type of service should be evaluated carefully by departments and security controls implemented by the Information Systems Department to prevent possible unwanted intrusions and/or downloads.

Recommendation: Continue to utilize one standard PDA (currently Compaq IPAQ's). Evaluate the use of wireless PDA's by field personnel for various purposes when the opportunity exists.

Software

Software used by the City can be categorized into legacy systems and desktop applications. Legacy systems include the SunGard Bi-Tech IFAS accounting system used by the City Finance Department, the SunGard H.T.E. Public Safety System used by the Police and Fire Departments for dispatching and records, and the Accela Corporation PERMITS system used by the Building Division. While these systems all have limitations and are the most costly, removing them and installing new systems is very cost prohibitive. Data integration will continue to be a problem unless respective companies provide and support interfaces to other programs such as the GIS system.

Recommendation: Identify methods to transport data between legacy systems that will save staff time and facilitate processes.

Recommendation: Implement E-government services for building permits.

SunGard Bi-Tech has released a new version of the IFAS accounting system that provides additional functionality, uses a Windows environment, and greatly improves the ease of use of this system. The new software requires the installation of Microsoft servers and adds a new platform for the Information Systems Department to support. The upgrading of this system will be costly, however the existing system is becoming outdated and will not be supported in the near future.

Recommendation: Purchase and implement the new IFAS version 7i as soon as possible with a phased implementation to spread the cost over several years if necessary. The installation of a new platform for this service will require the addition of a Microsoft server expert to the Information Systems Department staff or a maintenance service contract.

City desktop applications for workstations primarily use Microsoft Windows NT or 2000 for Workstations as the operating system with a Novell Netware client that provides connectivity to the network. The Information Systems Department is in the process of migrating to Windows 2000 and all new systems are being purchased with this operating system.

The City has currently adopted the use of the Corel Office Suite with Word Perfect, Quattro Pro, and Presentations as the official City standard. There is also a need for many people to have the Microsoft Office package consisting primarily of Word, Excel, and Power Point. Since there is a demonstrated need for both packages and passionate loyalty to certain software by employees, it is unlikely that a single standard can be imposed.

Recommendation: Continue to allow departments to purchase and use Microsoft Office products in addition to the standard Corel Suite, and continue to install Microsoft Windows 2000 as the desktop operating system.

The City standard Novell Netware network operating system is cost effective, functions well, and provides a significant level of protection from viruses, worms, and other unwanted intrusions. The use of "open systems" such as Linux and Open Office is rapidly evolving. These software packages are initially free of charge, however, programming experts and support services must still be provided. In the future, these systems may be a potential cost savings, but the City must consider the impact of converting the extensive collection of existing documents and operating systems to non-standard systems that may not be compatible with other agencies and businesses when reviewing the inherent costs associated with such a change.

Recommendation: At this time, it is recommended Novell Netware continue to be the standard as changing network operating systems would be very disruptive and costly. Other operating systems such as Linux should be considered on an individual basis for specific purposes.

The GroupWise e-mail system is the City standard and is a very powerful, functional e-mail system that also provides calendaring, task management, junk mail handling, and other desirable features. Since this system is compatible with all other major e-mail systems, its continued use is recommended. No other e-mail programs should be running on City systems to avoid potential conflicts and virus exploitation.

Recommendation: Continue using the GroupWise e-mail system exclusively.

City departments use a large collection of software packages for specific purposes. This obviously leads to increased demand for support from Information Systems Staff. Software also evolves and adds features and functionality to respond to user requests, however that also generally leads to more complex installation and update requirements. Of particular note are software packages that require a Microsoft network server and operating system, which is problematic for the Information Systems department staff because it potentially conflicts with the current network environment of Novell Netware.

Recommendation: It is recommended that any budgetary and interoperability concerns be evaluated prior to implementing any software packages requiring a Microsoft server. The number of software packages should be minimized to enhance reliability and reduce support calls. In accordance with the adopted policy, non-essential and/or non-authorized software loaded on City systems should be removed.

Intra-Departmental Data Exchange

The City legacy systems, IFAS, H.T.E., PERMITS and the ESRI GIS system are all separate data bases that do not exchange information easily. This requires multiple and redundant data entry on the part of City staff. Custom interfaces, generally done by outside specialists, can be written to allow transporting data between applications, however care must be taken to clearly define what is needed and also how the programming will be maintained.

Recommendation: As pressure increases to provide "end-to-end" tracking, data base management, financial services, and E-government services, it is recommended the City explore methods to integrate the various data bases.

Recommendation: The Police Department staff should continue to standardize data input to the H.T.E. system to assure accuracy of reporting, correct the existing data as much as possible, and institute internal policies to assure consistent data entry.

Information Systems Department Policies and Procedures

The current Administrative Policies and Procedures (AP&P's) were adopted in 2001 and are reasonably comprehensive and current. A copy is attached in Appendix A. The AP&P's provide City employees information regarding the use of City equipment, e-mail and Internet services. This information has been distributed to all employees and is given to all new employees when they are hired.

Recommendation: It is recommended that the AP&P's be reviewed periodically to assure they are up to date and any new provisions incorporated.

At present, there is no "cyber-cop" enforcement to assure employees comply with the requirements and it should be noted that the ability for anyone to access the Internet and download programs can be problematic. The demand on technical support staff to repair systems that have been corrupted by downloaded software is increasing and is taxing the Information Systems Department staff resources.

Recommendation: It is recommended that the ability to download and run executable programs be blocked on workstations to enhance the reliability of the systems.

Equipment Replacement Policy and Funding

The City currently has an equipment replacement fund for all equipment including computers and related equipment. This does not cover the leased systems for Finance (HP 9000), the Police or Fire Departments (IBM I SERIES's). The amount of funds required is based approximately on an inventory of equipment, the original cost, and the expected life span. In general, replacement of workstations and servers is based on the technology needed, not just age. For example, higher end workstations for CAD or GIS purposes are re-assigned within departments to clerical people using older, slower systems. The slower systems are subsequently surplus as they are no longer useable. While this practice requires additional staff time from Information Systems, it has been a cost effective practice that should be continued.

The equipment replacement fund addresses replacing existing equipment at the original purchase price. Circumstances where equipment must be replaced with larger, more expensive units, or where software cost increases are not included in this fund. This must be done as part of the regular City budget process. As a result, major upgrades such as the IFAS system or significant service additions,

It is anticipated that the City budget will be seriously affected for the near future by the State legislators attempting to take local revenues from the City General Fund. The City currently has an excellent equipment replacement program for all City equipment including technology items.

Recommendation: Continue the current replacement funding and policy, future budgets should identify systems and equipment needing upgrading or replacement that can be funded from non-general fund sources, consider establishing a set-aside fund for major technology purchases to reduce the budget impact.

Wireless Services

Wireless services are currently used by the City Police Department patrol cars, however, this service, CDPD, currently provided by AT&T will be discontinued in the near future. An alternative system is being proposed by AT&T, however, there are limitations and funding remains an issue. The Information Systems Department is currently evaluating alternatives with the Police Department to provide this service in the most cost effective manner.

A City wide wireless network may be within the realm of possibility in the near future that may provide the services needed by the Police Department and also provide services to City staff, other public agencies, and potentially the general public.

Recommendation: It is recommended the Information Systems Department investigate alternatives and costs to install a wireless system that could be used by City staff, other agencies and/or the public.

Recommendation: It is recommended the Police Department and Information Systems Department evaluate systems and develop a detailed plan to provide wireless connectivity to laptops in patrol vehicles including but not limited to the A.T.&T. system, City owned wireless system, including the use of a Citrix based system.

Police Department Services

The Chico Police Department is currently collaborating with several other local city and county law enforcement agencies in an attempt to improve communications and data exchange between agencies. Cities and counties participating in this effort have approved a Memorandum of Understanding (MOU) authorizing a consulting firm to apply for grant funds and/or lobby legislators to install a wireless communication system that will allow data sharing between multiple law enforcement agencies. The MOU does not make any commitment of City funds. In the event grant funds are obtained, a steering committee and formalized agreement will be required to implement the project.

Recommendation: It is recommended the City Police and Information Systems Departments continue to participate in this project and provide input and/or assistance to obtain funding. Should funds be obtained, a formal agreement among participating agencies must be done and approved by the respective governing bodies. Any system implemented should also be able to accommodate services to the Fire Department.

Recommendation: It is recommended that issues with the existing H.T.E. system previously evaluated by Matson & Isom Technology Consulting continue to be addressed and improved by the Police Department and Information Systems staff including standardization, validation and clean up of the existing data base to provide better, and more consistent reports. Police Department staff should receive added and continual training on the use of this system to maximize the use of this system.

Recommendation: It is recommended that technology to allow field reporting by police officers be continually evaluated and tested including the use of an Internet based or CITRIX server type application. Funds for this system were included in the 2004-05 budget and will be implemented by a consultant. This system should provide faster access to mobile units, and standardize workstations in the Police Department.

Information Systems Technology Fee

The Information Systems Department is an "internal service" provided primarily for other City departments. The department costs for personnel, hardware, software, and other related items are allocated based on the number of computers in each department. The demand for newer and additional technology services will continue to increase as will the cost for these services. As California cities including Chico experience serious revenue reductions due to the State deficit, alternative funds will be required if the City is to merely maintain the existing technology environment. New implementations will be significantly delayed or cut due to lack of funds in the existing budget.

Recommendation: It is recommended an analysis be done to determine the feasibility and legal requirements to implement a technology fee for services for departments that could legally and logically impose fees for such services. In addition, State and Federal funds may be used for purchasing hardware, software, or other required items and directly allocating staff time and

expenses. It may be possible to reduce the amount of City General Funds required by implementing either or both of these recommendations.

The Community Development Department "PERMITS" system serves the building community and should be included in the fees that support this department. This should include hardware and software costs, any outsourced services and Information Services Department staffing.



The first Technology Master Plan was developed to document the current services provided by the Information Systems Department, consolidate standards and policies into a single document, and identify the technology systems and services needed from 2004 to 2009. This update to the Technology Master Plan continues the previous practice of “middle of the road” technology services for City departments. The plan is not meant to be a “shopping list” of hardware and software that would be rapidly outdated. It is intended to provide guidelines and recommendations that will allow the City to logically plan and fund technology services needed by employees and people doing business with the City. The demand for information technology services is escalating and pressure for the City to respond to the demand for such services is also increasing. The plan also includes the Information Systems Department’s policies and procedures to maintain high quality support services to City departments and their respective public customers.

Information Systems Department Mission

The Information Systems Department’s mission is to provide City departments with technology services to conduct business in the most efficient and effective manner possible and provide convenient, ready access to information needed for business processes for City staff and the general public. To accomplish this mission, the Information Systems Department will provide services and support to City departments including:

- Feasibility analysis and planning for proposed technology projects
- Business process evaluation
- Budget preparation assistance
- Purchasing of hardware, software, peripherals, etc.
- Installation and maintenance of computer hardware and software
- Provide network connectivity to City offices
- Application and operating system software maintenance and support
- Telephone, pager and cell phone services
- Fax and PDA service and support
- Peripheral installation and repair

By implementing recommendations included in this plan, the City can continue to provide high quality services to City staff and the general public, improve current services, and manage information technology expenditures. Some benefits that may be expected include:

- Organization-wide coordination and support of information technology projects that improve government services.
- Cost effective investment in information technology systems and services.
- Improved efficiency and quality of information service delivery.
- Management of information technology expenditures that enables the City to take advantage of technological efficiencies as they become available while preventing costly obsolescence.
- Improved access to City information by all citizens, staff, and third party partners.
- Savings of time for City staff and others.
- Contain cost by evaluating “beta testing” or special application scenarios that might require added staff support and/or program costs.



EXISTING RESOURCES AND EXPENDITURES

Information Systems Department Annual Budget, 2004-05

The 2004-05 annual budget for the City of Chico's Information Systems Department is \$1.273 million dollars of which \$780,000 is for employee salaries and benefits. A copy of the adopted budget is included in Appendix B. The annual budget for the Information Systems Department includes funding for seven and one-half staff positions, annual software maintenance costs for several systems, lease and maintenance expenses for three large systems, communications costs for the City Wide Area Network, professional and consulting services for special projects, and general office expenses. In addition, funds for hourly services were included to assist in deploying approximately sixty new systems included in the budget.

The Information Systems Department is an "internal service" and the cost is apportioned to other City departments based on the number of computers in the department. In general, this is a fairly equitable and simple method of apportioning costs however it does not take into consideration the public safety departments that are staffed twenty-four hours per day. Service requests are also proportional to the number of staff in each department, not just the number of workstations.

Capital items for computers, printers, software, etc. are budgeted separately by each department and funded by the City Council if appropriate. The purchase and installation of software or equipment is done by the Information Systems Department. The capital budget also includes an annual appropriation to replace outdated equipment that is approximately \$70,000 for 2004-05.

Existing Information Systems Department Staff and Resources

The Information Systems Department provides a variety of computer, communications, and other related services to other City departments. Presently, the department has seven and one-half staff members to serve approximately 350 workstations connected to a wide area network with 17 network servers, two IBM I SERIES's, an HP 9000, various peripheral printers, scanners, copiers, cell phones, FAX's, voice mail, laptops, routers, switches, hubs, and personal digital assistants (PDA's), etc. The Information Systems Department provides service and support for all City owned equipment for all City departments and at all City Locations.

The Information Systems Department is also responsible for purchasing virtually any equipment associated with computers or communications, installing and maintaining systems, printing and copying, and assisting with various multi-media presentations and training programs. Purchasing is done in accordance with City procedures and varies from obtaining verbal or written quotes, or conducting an extensive Notice Inviting Bids process for projects over \$10,000 such as purchasing several computers, servers, or other capital projects.

The Information Systems Department current staff is as follows:

- Information Systems Director
- Three Senior Information Systems Analysts with one assigned to manage the HP 9000 IFAS system, one to the IBM I SERIES's H.T.E. Public Safety systems, and one assigned to administer the City Wide Area Network.
- One Information Systems Analyst is responsible for network connectivity (switches and routers), communications services including cell phones, and resolving workstation problems.

- Two Information Systems Technicians are responsible for resolving workstation problems, installing new systems, printers, and equipment, assisting with software problems, and managing the City web site. Technicians also assist analysts as needed as well as Analysts assisting with other tasks.
- One-half of an Administrative Secretary position (shared with the City Budget Officer) for purchasing, researching equipment specifications, obtaining quotes, filing, inventory control and reporting, and general office work. The second half of this position is allocated but has not been funded due to budget constraints. This position is currently being re-evaluated to determine if it should be elevated to an Administrative Analyst position.

Existing Information Systems Department Services

In addition to general knowledge of computers and software, each member of the team has specialized responsibilities that provide computer and data processing services to City departments including:

- City financial and accounting system, IFAS, operating on an HP 9000 in the City Finance Department.
- Wide Area Network services (including access to the Internet and E-mail), to all City facilities including Police, six fire stations, Municipal Services, Water Pollution Control Plant, the Municipal Center downtown, the Fire Training Center, and the Police substation in the parking structure downtown.
- Computer aided dispatching and reporting for the Police and Fire Departments on two IBM I SERIES systems located at the Police Department and Fire Training Center.
- Design, revise and update the City web site (www.ci.chico.ca.us) and assist other departments with posting information as required.
- Phones, cell phones, cabling, wireless and communications services.
- Assisting other departments with training, visual presentations, software use questions, inventory control, purchasing and budgeting, etc.
- Preparing departmental administrative policies and procedures for computer use including Internet access, E-mail, etc.
- Replacing outdated and old equipment including computers, printers, plotters, network servers, etc. on an annual basis.
- Installing and updating security services on the City network to detect viruses, etc. that are transmitted from the Internet, E-mail, floppy disks, CD-ROM's, etc.
- Installing, maintaining, and setting all spam blocking software at the e-mail system level.
- Preparing annual department budgets.
- Information technology planning for all departments and the City as a whole, including communications systems.
- Business process review and recommendations for departments wanting to evaluate using technology to accomplish specific tasks.
- Information technology needs analysis and justification as requested by departments.
- Inventory of hardware and software, phones, pagers, laptops, PDA's and software.
- Workstations, network servers, and peripheral hardware and software installation, upgrades, maintenance, repairs and technical support.
- Telephone, cell phone, FAX, voice mail, telecommunications, PDA's, software and hardware repairs, maintenance, and technical support.
- Provide and coordinate training classes.
- Special data base updates, modifications (in some instances), including the IFAS, H.T.E., Permits, HDL, Tree Manager, Time Card, etc.
- Computer system administration, such as backups, security, E-mail and VPN's.
- Needs assessment for capacity planning for network servers and other devices.
- Continual upgrades, patches, and support of existing software packages.
- Development and support of the "Readerboard" in the Council Chambers building.
- Anti-virus and anti-spam controls.

In accordance with City Council policies, the Information Systems Department also provides certain services to the City Council, Boards and Commissions. City Council members are provided with an E-mail address on the City system, access to a computer in the City Council office, and if necessary, a computer is loaned to them for their term of office. The Corel Suite of software (Word Perfect, Quattro Pro, Presentations, and Paradox) is the City standard on all systems used, and under provisions in the licensing agreement, this software can be installed free of charge on City Council members' home computers. Council members are also entitled to the use of a City provided cell phone, or a \$50 monthly stipend for use of personal cell phones for City business.

An increasingly important part of the Information Systems Department is the City web site. This service is relied on by staff and the general public and is becoming indispensable for posting minutes and agendas. The site is continually being enhanced to provide more convenient access, additional information, and more features for the general public. "E-government" features will be added in the near future that will allow certain City processes to be completed and paid for on-line.

The City web site is located at <http://www.ci.chico.ca.us> and is hosted by Computer Associates in Redding. Updating, posting information including agendas and minutes is done by City staff using custom software, "Manager Console", written by Matson & Isom.

The Information Systems Department annually purchases hardware, software, phones, and any related computer items for all City departments including replacing computers and printers that are no longer useable. Purchasing decisions regarding replacements are based on technology needs, not simply age of equipment. Computers that are determined to be unusable for City purposes, but still operational, are offered to schools and local agencies in accordance with a policy approved by the City Council.

The City Municipal Building, Police Department, six Fire Stations, Water Pollution Control Plant, Municipal Services Center, Fire Training Center, and the downtown parking structure are all connected via a wide area network (WAN) that allows sharing of data, printers, E-mail, Internet services, etc. This system was designed to allow access to all servers from a single point to facilitate updates, software additions, etc. As the City grows, this system will become increasingly complex and the demand for more and faster connections will increase.

Communications technology is rapidly evolving and the City uses several communications services including ISDN and analog phones, voice mail, wireless connections for Police patrol vehicles (frame relay), DSL lines for Internet service, T-1 lines for WAN connectivity, cell phones, pagers, PDA's (Compaq IPAQ's), and satellite phones. It is anticipated that phone and computer services will become increasingly integrated, and network connection services for field personnel will be demanded. Communication services currently include:

- Voice Mail
- Phones, ISDN, analog, cell phones on three systems, pagers, satellite phone, wireless connection for Police Department laptops, circuits for sewer lift stations, emergency ring down circuits, fire station tone-out, etc.
- DSL lines for Internet connections.
- T-1 lines between Municipal Center, Police and Fire Departments, Fire Stations, Municipal Services Center, and Water Pollution Control Plant for the WAN.
- ISDN connection to the Police sub-station at the parking garage downtown.
- Frame relay for communications to Police patrol vehicle laptops.
- Network computer and printer cabling.
- Wireless connection at the Municipal Services Center garage.
- Wireless connection services for the Police Department patrol cars.

The public safety systems must be operational virtually 100% of the time and currently consists of two IBM i series with one being the primary system, the second being a back-up. The back-up system is used when the primary system is being updated or repaired. The software used for Police and Fire reporting

and statistics is from SunGard HTE, Inc. with multiple modules for specific purposes as shown below. Police and Fire also have a large number of workstations connected to the WAN to access this system with a variety of software packages. Recently, computers were also installed in the sub-station located in the downtown parking structure to facilitate officer reporting. A second sub-station with a computer is located in the Fire Station at Wildwood and Manzanita Avenues. The Police BINTF north unit also has a separate system for their use.

All of the six City fire stations are equipped with computers that have connections to the IBM I SERIES system for dispatch purposes as well as E-mail, Internet connection, and standard City software. The HTE software operating on the AS-400's also serves the Fire Department reporting requirements. The California Division of Forestry Fire Stations located in Chico and Oroville also have the ability to receive and print messages from the City of Chico dispatch center at the Police Department.

Public safety services currently include:

- HTE system Barcode, Computer Aided Dispatch (CAD), Crime Records management (incidents, property, warrants, etc), Cognos, Qrep, CK Crackdown, E-911, Fire Management, CAD redundancy, SCA (laptop connections in patrol cars), NCIC interface.
- California Law Enforcement Technology System (CLETS) connection to Department of Justice.
- "Cal Gang" program.
- Program Temporary Fixes for I SERIES's as required by IBM to keep systems up to date.
- Updates and revised reports for HTE installed on a regular basis.
- Statistics and data from I SERIES for various required reports for the Police Chief, City Council, public information, state and federal reports, etc.
- Fiber optic connection to back-up I SERIES at Fire Training Center installed and maintained.
- Connect City HTE system to Butte County system in Oroville and CDF stations in Chico for print outs as part of the automatic aid agreement.
- Communications line for CLETS (California Law Enforcement Technical System) connection.
- On-line crime-report on web site.
- Assist in evaluating work and data processes for PD to improve report accuracy and make data input simpler.
- Bar code system for evidence.
- Connection to Enloe hospital and First Responder ambulance services that allows them to receive dispatch notices for accidents, etc.
- Computers for the Emergency Operations Center. These systems are currently available immediately in the event of an emergency.
- IBM "Client Access" software for telnet connections to the I SERIES's.
- RPG and CL programming for required reports.
- Multi-user environment with multiple accesses at the same time.
- Support and maintenance of the I SERIES integrated relational data bases with millions of records.
- Services from the Information Systems Department are required by Police and Fire twenty-four hours a day, every day of the year.

The Community Development Department (CDD) includes the City Building Division that uses the "PERMITS" system from the Accela Corp. to track and issue building permits and related information. This system operates on a separate network server that is part of the City WAN. The Information Systems Department recently completed a major upgrade to this software to use the Microsoft Windows operating system. The data base is backed up on a regular basis, and "scripts" are written for custom reports. Information Systems staff install updates and correct problems with this software for the Building Department.

The Planning Division is also included in the Community Development Department and uses ESRI "Arc View" software and database to prepare maps and related Geographic Information System (GIS) type information.

The Parks Department maintains a tree inventory with "Tree Manager" software that requires updating and/or repair on a frequent basis. Field personnel have attempted to use a tablet computer for data input, however this was not entirely successful as the computer was not reliable.

Engineering applications generally require high-end systems capable of processing Computer Aided Design (CAD) and GIS software including AutoCad 14 and 2002, plus added "plug-ins" from Softdesk, etc. installed and customized for users. Public Works also uses several special applications such as "T-Model" traffic model, project tracking, specialized Microsoft Access data bases including maintenance districts, traffic counting programs, GIS, etc.

The City Finance Department uses an HP 9000 UNIX system with the Informix-based "Integrated Fund Accounting System" (IFAS). This system processes all the billings, tracks personnel information and payrolls, keeps a fixed asset inventory, processes all required state and federal reports including Internal Revenue tax information and audits. Some of the specific functions and services are:

- Payroll processing and reporting.
- Issuing and printing checks.
- IFAS, updates from Bi-Tech and resulting required repairs to custom reports requested by Finance.
- Informix data base maintenance and reporting.
- "Reflections" software for telnet connection to IFAS.
- "Openlink" software for IFAS.
- Click Drag and Drill (CDD) reports for budget and financial purposes.
- Custom reports for City purposes (extensive maintenance).
- 4GL programming.
- Budget Item Detail input for annual budget process.
- Payroll and calculations supporting union agreements with varying requirements, special processing for unusual circumstances such as unusual payroll periods or negotiations are frequently required.
- Business penalty notices.
- Business and dog license renewal notices.
- CDD report for employee months of service.
- Macro/overlay to print logo on business licenses, dog licenses, etc.
- Electronic Funds Transfer.
- Position Budgeting (Personnel).
- Internal Revenue Service forms, reports, 1099's, W-2-s etc.
- HDL property reports on CD's to update assessors and other information used by City staff.
- "Time Card" and interface with IFAS.
- Repairing corrupted data base's for the General Ledger.
- Time Card to Payroll interface to put time card information into IFAS payroll.
- Reports to extract information for various purposes, custom programming required.
- PERS calculations and required reports.
- Fund balance reporting for budgets.
- Fund summary reports for various fiscal years and budget categories.
- Create budgeting reports.
- Payroll charges to various funds/departments, capital projects, etc.
- Integrated processes and accounting including General Ledger, Job Ledger, Payroll, License and Permits, Accounts receivable, Accounts payable, Encumbrances, Fixed Assets, Budgeting, and Human Resources.
- Posting and reporting – General Ledger and Job Ledger.
- License and permits integration with general ledger including tracking information, payments, printing notices/permits and posting to general ledger.
- The IFAS data base has millions of records that are necessary to meet various requirements for governmental agencies.
- Various programming languages to access IFAS data for reports, calculations, updates, etc.

- Multi-user environment with multiple accesses at the same time.
- IFAS uses a sophisticated and robust data base engine – Informix.
- HDL data base information and program installed and updated frequently for City and County assessor information.

In general, the staff of the Information Systems Department must keep all the computers, network servers, hardware and software running all day, every day. Management staff are on call after hours in the event of an emergency, particularly with the Police or Fire Departments, or if repairs must be done during non-working hours. The acquisition, update and/or upgrade of technology for City departments creates an additional requirement for service and support from the Information Systems Department staff.

Third Party Support

Some of the products and services in the Information Systems Department are provided directly by, or enhanced by, third party vendors. This includes the H.T.E. Public Safety system, IFAS financial system, PERMITS building department system, various data bases including Time Card, HDL and Tree Manager, and hardware that is covered under maintenance and/or warranty contracts. In some cases, it may be necessary or even required to seek resolution to problems from the product provider. In these instances the Information Systems staff help evaluate and determine the course of action, and assist the support efforts as necessary.

Existing Hardware

The City of Chico has a significant amount of equipment including three larger legacy systems, seventeen network servers, over three hundred workstations, over one hundred eighty-five peripherals such as printers, switches and routers, sixteen copy machines, hundreds of telephones and phone lines, almost two hundred cell phones, one hundred pagers, eighteen PDA's, fifty lap tops, and other technology devices. The Information Systems Department supports, manages and maintains this large collection of equipment. A detailed inventory is maintained for equipment and updated on an annual basis. A summary of City hardware and software is as follows:

Workstations

Workstations fall into two categories – standard and CAD/GIS (Computer Aided Design or Geographic Information System). The CAD/GIS workstations are purchased with high-end components to allow users the processing power required to run the large CAD/GIS software packages. As the CAD/GIS systems become obsolete for the CAD or GIS applications, the systems are then redistributed as standard workstations. This has been an effective practice to keep costs reduced and use equipment to the maximum possible without impacting employee productivity.

Applications software is currently loaded on workstations not network servers. This practice is the standard for a Novell Netware network and allows workstations to be used in the event a server is not available for some reason. In addition, some packages such as the GIS software currently in use do not operate on a Novell network and other applications such as Auto Cad would be prohibitively slow.

Table 1
Workstation Configurations for 2004-05

Standard Workstation

Asus P4T-E or approved equal mother-board with 400 MHz front side bus
 Pentium P4 CPU operating at a minimum of 2.0 GHz
 512mg RAM, PC800/PC600 RDRAM on a maximum of two - 256 Meg chips
 Read/Write CD
 Floppy drive: 1.44 Meg 3 ½"
 Minimum of 40 G hard disk drive
 Video card with minimum 64 mg RAM.
 Intel pro 10/100 Network Interface Card
 350w power supply, with 90-120v range

Keyboard
 Mouse: Optical mouse or track ball
 Display: 17 inch, .25 pitch, flat screen or thin panel LCD
 Battery backup: APC 350 UPS
 Operating System: MicroSoft Corp. Windows 2000, XP, or Linux

CAD/GIS Workstation

Asus P4P-8x or approved equal mother-board with 800 MHz front side bus, Intel 865 chipset
 Pentium P4 CPU operating at a minimum of 2.66 GHz with hyper-threading
 1 GB, Dual Channel DDR SDRAM at 400 mhz on a maximum of two – 512mg chips
 CD-Read/Write
 Floppy drive: 1.44 Meg 3 ½”
 Minimum of 80 G hard disk drive, SATA , 7200 rpm
 128MB DDR ATI RADEON™ 9800 Graphics Card or equal
 Intel pro 10/100 Network Interface Card
 Medium tower case with minimum 450w power supply, with 90-120v range
 Keyboard: Logitech standard
 Mouse: Optical mouse or track ball
 Display: 21 inch, .24 pitch, flat screen, Sony model CPD-E540 or equal
 Battery backup: APC 650 UPS
 Speakers and sound card
 Operating System: MicroSoft Corp. Windows 2000 or XP

Wide Area Network

The City’s network infrastructure provides access to critical resources for all departments and over 300 computers. The Information Systems Department manages several communication lines, routers, switches and managed hubs to connect the various City facilities and provide the infrastructure layer for the Wide Area Network (WAN). All WAN connectivity is provided with Southern Bell Corporation (formerly Pac Bell) “T-1” telephone lines. Although the demand for added bandwidth is increasing, installing fiber optic cabling is cost prohibitive, given the geographic spread of the locations, and wireless service technology is generally not satisfactory. See Exhibit A for a graphic diagram of the Wide Area Network. This equipment requires special expertise to assure that all systems can connect in a reliable and secure manner, and allow the sharing of data files between departments, E-mail, and Internet Service.

Network Servers

There are 17 Novell Netware servers and one stand alone Microsoft Windows server utilized within the City of Chico. The following table indicates the servers currently in use.

Table 2
City of Chico Network Server Inventory

Vendor	Date Purchased	Location
HP	2000	Municipal Center, Main City network server
HP	2004	GIS, Municipal Center
Compaq	2001	PD, Main network server
HP	2003	PD, Microsoft NT Server, Motorola Messaging
Compaq	2001	Municipal Center, E-mail
Compaq	2001	Municipal center, Groupwise Post Office
Compaq	2001	Municipal Center, Border Manager, DHCP
Generic	1999	Fire Training Center
Compaq	2001	Municipal Center, DNS
Generic	1999	Municipal Center, Backup
Generic	1999	Municipal Center, Data Storage
Generic	1999	Municipal Center, Data Storage
Compaq	2001	Municipal Center, PERMITS

Compaq	2003	Municipal Services Center
Generic	1999	WPCP
Compaq	2003	Fire Station 1
Compaq	2001	Police Dept., Backup, Border Manager
Generic	1999	Municipal Center Intra-net

Hewlett Packard 9000 L Class System

This system was leased in November of 2002 for a five-year period and is utilized by the Finance Department for the City's accounting system. This system is a mission critical system that must be available virtually at all times. The HP9000 runs an HP-UX Unix version 11i operating system with SunGard Bi-Tech's IFAS system using an Informix data base that provides the ability to generate requisite financial reports, payrolls, and other accounting services.

IBM I Series

Two IBM I Series using the IBM OS 400 operating system are used by the Police and Fire Departments for dispatching and records management. These systems are physically located at the Police Department and the Fire Training Center with one being a back-up system. These servers also perform mission critical functions and provide various types of reports for public safety agencies including those mandated by State or Federal agencies. These systems are integrated with laptops in Police Department patrol vehicles and the 911 emergency system.

Peripherals

The City uses a variety of peripheral devices for printing, plotting, copying, faxing, etc. Some are connected as network devices and some are stand-alone. All are supported by staff from the Information Systems Department. As software and operating systems are installed and/or updated, drivers for peripherals must generally be updated also.

There are also a large number of telephones, cell phones, pagers, PDA's, and voice mail services that are used by City staff that require Information Systems Department staff time for purchasing, installing, training users, repairing and/or replacing.

Existing Software

The City installs a standard package of software on all systems. This includes the Corel Office suite of products, Word Perfect, Quattro Pro, and Presentations; Group Wise E-mail, Internet Explorer, Windows NT or 2000, Adobe Acrobat Reader, Novell Netware Client and various printer drivers. There is a significant number of other applications being used for a wide variety of purposes as shown in Table 2. Due to the ever-evolving nature of software, it is a continuing and increasing demand on Information Systems Department staff to support, update and maintain this large number of software packages.

At this time, City systems are not restricted in terms of user level or ability to load programs. Since virtually all systems are connected to the Internet, downloaded programs are relatively common. While people desire to have "their own" computer and be able to customize it, this generally causes reliability problems and requires more service calls. Information Systems staff report such unauthorized downloads and subsequently remove them. As indicated in the recommendations and in accordance with existing policy, workstations should be configured to prevent downloading of software.

ESRI Arc View Geographic Information System (GIS)

The City of Chico uses a Geographic Information System (GIS) as a tool to link and display graphical (spatial) data with tabular data. The link allows for the management and analysis of large sets of information, as well as the creation of products and services that would be difficult, if not impossible to produce by other means. The Geographic Information System in use at the City of Chico has been developed collaboratively with GIS users in Butte County including the City of Chico (primarily the Public Works and Community Development departments), the Geographic Information Center (GIC) at the California State University, Chico, the Butte County Association of Governments (BCAG) and the Butte

County GIS department. They have collaborated to create, update and maintain a “base layer” consisting primarily of address, parcel, and road centerline data for all of Butte County. The GIS base layer also includes recently-flown color aerial “orthophotos” which have been rectified and fit the City’s base layer data.

City departments create and maintain GIS “themes” (topics or data layers) as needed for specific purposes with over one hundred themes at this time. The City owns and maintains fifteen ArcView licenses for department-specific GIS layer creation, maintenance, and use. At present, the GIS system is used primarily by the Public Works, Community Development, Police and Fire departments. The GIS data includes such items as sewer and storm drain information, crime locations for the Police Department, land use planning information such as zoning, streets and trail locations in parks. Other information is also included and used by City departments, depending on need. The system can be used for a large number of tasks, however data acquisition, input and maintenance can be very time consuming and costly.

Files used for GIS systems are generally very large and use a large amount of storage space. In 2004 a network server was purchased for GIS files and a second one is in the process of being acquired. The storage and consolidation of files is necessary to eliminate duplicates, conserve server space, and create logical drive mappings for the Public Works Department. The City recently created two positions specifically for GIS services. These positions are assigned to the Planning and Public Works Departments.

Five departments use GIS data (Public Works, Parks, Community Development, Police and Fire) primarily as follows:

- The Engineering Division currently has sewer and storm drain information in the GIS. The sewer data is complete; the storm drain data is in progress.
- Engineering uses this information (and planning layers) for calculating sewer and storm drain fees, future design work, assessment of impact to maintenance areas, reimbursement areas and previous assessment districts.
- Capital design engineers use GIS map products and aerial photos to design new projects.
- Displays for Council and committees often call for data from zoning and land use layers.
- Traffic personnel use GIS map products for displays. The Division hopes to incorporate right-of-way, street lights, signs and traffic signals.
- Construction inspectors use GIS information to locate existing facilities in the field.
- Engineering is currently designing mobile mapping units (based on Compaq IPAQ devices) using ArcPad software. These units will be used to track work orders for maintenance crews working in the Operations and Maintenance division.
- The Operations and Maintenance Division uses GIS for leaf collection maps.
- The Park Department has created databases that have been used for informational maps, trail designations in Upper Bidwell Park, delineating grazing locations for the annual goat grazing, plotting *Arundo Donax* locations, tracking trail maintenance projects by Department staff and volunteers and a host of other activities. All the recent environmental and planning documents for the Annie Bidwell Trail, Disc Golf, and trail signage have been included in the GIS system. It is expected that the cost to update the Bidwell Park Master Plan will be significantly more efficient and effective with the information available in the GIS.
- The Community Development Department creates a wide range of thematic maps showing utility data, floodplains, census data and traffic information for use in both short and long-term planning and decision making. GIS assists developers in identifying growth patterns and trends. It has also improved property owner notifications, land use analysis and annexation studies.
- The Housing Division uses a combination of the City’s GIS data and low-accuracy U.S. Census Topographically Integrated Geographic Encoding and Referencing (TIGER) vector data, representing census tracts, block groups, City boundaries, street center lines, enterprise zones and redevelopment areas for the City of Chico.
- The Chico Police Department has one ArcView license and uses GIS data to map basic crime statistics (e.g., type of incident, location, date). Police Staff maintains a map book of crime-

related incidents and locations and correlates the map data with the department's state UCR reporting. The main database is in the H.T.E. system on the I SERIES .

- The Chico Fire Department currently uses one ArcView license for basic GIS applications. The Fire department also tracks hydrant information and uses GIS in planning responses by area.

Integrated Financial Administration Services (IFAS)

SunGard Bi-Tech's IFAS software is used for the City accounting and financial system operating on a Hewlett Packard 9000 Unix system that was leased in 2002. This is a legacy system that is a critical part of the City Finance Department and all other City departments as budget preparation and information, payroll, and all accounting information reside on this system. It is anticipated that this system will continue to evolve to meet customer demands and it may necessitate added expenditures for software and/or hardware.

IFAS has been used as the City's financial management system since 1992. While the system has continued to be upgraded as enhancements to the software become available, the City has fallen behind on moving to the current architecture of the software. SunGard Bi-Tech now offers the IFAS software in a web-based environment, which is more user-friendly. By moving to this web-based architecture, the City would also be able to utilize the new product offerings designed by SunGard Bi-Tech to increase operational efficiencies and better integrate the myriad of financial-based functions performed citywide.

Upgrading this system requires installing new equipment and moving to a Windows server platform. Currently, the City uses Novell Netware not Windows as the operating system for servers. This would require an entirely new platform and expertise currently not available in the Information Systems Department.

At this time, one Senior Information Systems Analyst is dedicated to programming, report writing, updating, and maintaining this system.

H.T.E. Public Safety System

SunGard HTE software provides the Police Department and Fire Department with Computer Aided Dispatch (CAD), and CRIMES Records Management System (RMS). The data reporting requirements imposed by State and Federal agencies are significant and these systems are used to generate various required reports. The two IBM AS400's provide the platform required to run the SunGard HTE software. An analysis of this system by Matson and Isom Technology Consulting was completed during 2003 to evaluate the H.T.E. system and compare it with other packages available. During this evaluation, it was generally agreed that there are other software packages that work better, but it would be impossible to change due to the cost that was estimated in the hundreds of thousands of dollars. Therefore, recommendations were made how Police Department staff could improve their process and/or better utilize the H.T.E. software. At this time, one Senior Information Systems Analyst is dedicated to programming, report writing, updating and maintaining both I SERIES systems.

Website

Working with Matson and Isom Technology Consulting, the City of Chico has an award winning web site that provides information to City staff and the public. This website <http://www.ci.chico.ca.us> allows individual City departments to publish and maintain their individual department web pages, City Council, Boards and Commissions meeting agendas and minutes, and other special notices. This service has become increasingly important as members of the public have come to rely on this service. The software, "Manager Console", for updating and adding information is proprietary to Matson and Isom Technology Consulting. An Information Systems Technician is assigned the responsibility of conducting user group meetings to train City staff in the use of the Manager Console software, and assist in resolving problems critical for public information and notices.

Efforts are underway to provide on-line forms for various purposes with the crime report and Personnel Employment Application currently available. Information Systems staff are pursuing development of additional forms for other departments however software limitations need to be addressed.

Accela PERMITS

The PERMITS system is primarily used by the City Building Division to issue various types of building related permits and maintain information related to the building and development industry. Due to the time sensitive nature of this process and public demand, this system must be available virtually all the time. It currently operates on a dedicated server with user access controlled by the Building Official. Updates to this software and the data base are done by the Senior Information Systems Analyst Network Administrator.

The data base for this system contains assessor's parcel information as well as items input from the Building Department. At present, some of the assessor's data in this system is outdated. The Information Systems Department and Building Department have retained outside services to automate the updating of this data base. Accessing and/or integrating data from this system is also desired by other departments to eliminate redundant data entry into other systems, particularly GIS. The PERMITS system also has modules that are not currently used but available for the Planning Department land development process.

Novell Netware Network Operating System

Novell Netware 6.5 is the network operating system for the 17 servers comprising the City Wide Area Network. Servers are located at all City buildings and provide a variety of services and data storage. Netware is primarily a printing, data storage and file-sharing type system and at present no server-based applications are installed. The "Zen Works" and "Console One" software allows central management of servers and workstations. Novell is continually evolving this operating system to allow easier integration with other software and management of workstations. All workstations connected to the network have the Novell client software to provide this service. The network system of software also includes anti-virus and anti-spam protection to servers and workstations. Keeping these two software packages up to date and dealing with spam e-mails requires significant time and resources.

Border Manager

Border Manager is a "firewall" security system that works with Novell Netware to control access to the City Wide Area Network from other systems on the Internet. This is particularly important as almost all City systems can connect to the Internet with very few restrictions. If you can see the Internet, the Internet can see you and may present potential threats. This is the front line system that protects the City network from unauthorized access and/or malicious outside persons.

GroupWise 6.5

GroupWise is the City's e-mail software that is used by all City personnel for both internal and external e-mail. The City's Administrative Policies and Procedures prohibits the use of other e-mail systems and instant messaging programs. GroupWise provides a wide variety of features for e-mails, calendars, task managers, and spam control.

Table 3
City of Chico Software Inventory, 2004

Abacus PM - Construction Management	FleetMax	Petra Traffic Software
Accident Reconstruction Calculator (ARC)	FOOT 2000	Photo Shop
ACRT Tree Manager 5.0, 5.2	FRAME	Primavera Expedition 5.1
Adobe Acrobat (several versions)	HDL Property Tax, City and County	Quark XPress
Adobe Pagemaker 6.52	TEAM Software	RCA Real Estate Expert
Adobe Photoshop 6.0	Time Card	Speed Analysis & Speed Survey 2
Arc View	Intellisync (IPAQ's)	Windows XP
ASTD Training Management Software	Title 24	Sprint Link
ASUS Intel Chipset Support	TJ Beam	State Controllers Office Reporting for Finance
AutoDesk and AutoCad software	HDL Sales Tax, City and County	STRUCALC 5.0

AutoIssue 32	HTE Qrep (Cognos)	TDS Survey Works
BC Calc 99a	HP Switch and Printer Software	Traffic Ware 5.0
Border Manager	Lap Link	Page Builder web site software
C STARS	Lotus 123	TMW
Calendar Creator	IMC Counter Software	Tree Manager
Camedia Master 4.0	Kodak Digital Camera	Trane Tracer Summit
CARS	MS Office 97	UPS WorldShip
Cartegraph Software Suite (PaveView,	MS Office 97 Professional	Visio 2000 & Professional
CATS Schedule	MS Office 2000	Webmaster Suite
CD and DVD Creator	Nero CD software	Console One for Netware
CD Burning software, CD Creator and Roxio	Internet Explorer	Netscape
City Code Demo	MS Publisher 2000	WinCounts
City Serve Demo	MS Publisher 97	Westmate/Westlaw
Code Express	National Fire Code Update	Windows NT 4.0
Cogo	National Transit Database	Word Perfect
Commence 4.1	NTFS Dos	Zip Drive Software
Community 2000	Olympus Digital Camera	SignView, SignalView, SewerView)
Concrete Masonry Design	Omnipage Software	Canon digital camera
CopWare	Law Desk	TModel
Data Stream	Park Watch Database	Word Perfect 9
Epson Printer	Pathfinder Office	Quattro Pro
Flash Path	Pay Breeze	Presentations
Group Wise	GroupWise Anti-Virus software	Ghost
GWAVA anti-spam program	Informix	Reflections
MS Access	Back-up Exec	IFAS
Norton, Guinevere Antivirus	MS Front Page	Permits
Open Link	Arc Explorer	Dreamweaver
Permits	Novell Netware	Compaq IPAQ's
Power Point	Click, Drag, and Drill	MS 2000 server
Windows 2000	Windows XP	Apache web server
Zen Works	Canon digital camera	Parking Meters/Palm Pilot

Existing Telephone System

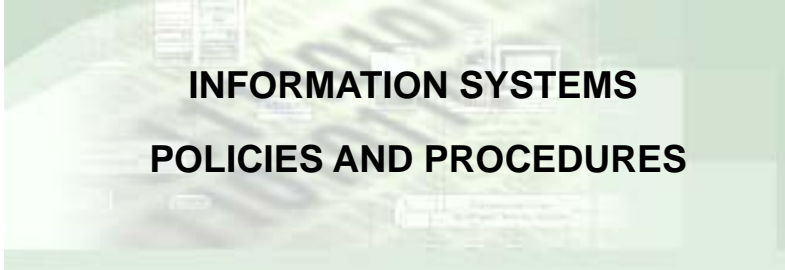
The City currently utilizes a Pac Bell Centrex phone system with a combination of ISDN and analog phones. ISDN services are only in the main municipal building but are only used for standard telephone use, not data transmission. The City is currently in the process of installing a new Mitel phone system that will provide additional features and functionality to all City departments. This includes voice mail and auto attendant features commonly available but not with the current Centrex System. A City owned phone system will centralize control and monitoring at the City Municipal Center so that changes and troubleshooting to the system can be conducted from one location. This system should recover the capital cost and eventually realize a significant cost savings.

Wireless Connection Services

The City Police Department currently deploys laptop computers in most patrol vehicles. These systems use a wireless modem connection to obtain information from the Police Department dispatch center and the IBM I SERIES H.T.E. system. The wireless service is provided by A.T.&T. (commonly referred to as CDPD) however the technology is being phased out. This will result in all agencies in California that currently use this technology being forced into changing services. As a result, the City recently converted wireless services in patrol cars to a new A.T.&T. system.

The City does not have any other significant wireless services, however the Municipal Services Center uses a small, short-range wireless network for two computers in the garage. It is anticipated that these services will expand in the near future.

The City currently has almost two hundred A.T.&T., Nextel, Globalstar Satellite, and Sprint cell phones; and almost one hundred Verison and Access pagers. All these systems are wireless services. Cell phones and pagers are supported by the Information Systems Department and paid for by individual City departments.



INFORMATION SYSTEMS POLICIES AND PROCEDURES

The Information Systems Department created and the City subsequently adopted a set of administrative policies and procedures (AP&P's) in 2001 that defines how City systems may be used. These policies have been distributed to all City employees and are given to new staff when they are hired. These policies are comprehensive and include the use of City computers and network systems, e-mail, Internet access, cell phone use, and other related policies. The currently adopted AP&P is attached as Appendix "A". As software and technology continue to evolve, these AP&P's should be evaluated and updated if necessary.

The City also has a unique and very popular loan program for City employees to purchase computers and related technology items for personal use. Up to \$2,500 may be borrowed to purchase systems. This program is administered by the Information Systems Department Administrative Secretary and to date, approximately fifty loans have been processed.

Information Systems Department Internal Policies

The Information Systems Department uses the GroupWise e-mail system for City staff to request service. "Tech-Help" e-mails are sent to request assistance. The department's internal policy is for all staff to continually check e-mails to "Tech-Help" throughout the day and respond to requests within an hour.

Actual resolution of the problem depends on the individual request. Requests for service are coordinated among the Information Systems Department staff and assigned to the appropriate person. These service requests are archived and available for analysis to determine response times and repeat requests. Information Systems Department staff carry Nextel cell phones with the "push-to-talk" feature to facilitate quick and easy communications. The cell phone numbers are available to all City staff as well as standard desk phones for emergency calls. This makes staff very accessible, however, it also tends to pre-empt the Tech-Help system and prioritizing tasks. In addition, phone conversations or hallway requests are in jeopardy of being forgotten during busy times if follow-up Tech Help e-mails are not done. This system works simply and efficiently, but as the department and the City grow, it may be necessary to implement a system specifically for help desk type application to track resolutions and develop a knowledge base for Information Systems staff to use.

The Information Systems Department has adopted internal policies including a "triage" system to prioritize requests for services summarized below.

Information Systems Department Service Triage Priorities

1. Major network or communications systems failure will be resolved immediately as this affects all City users or entire departments. (Example: Loss of network server).
 - a. Noticeable performance degradation in the network, particularly the e-mail system will be resolved as quickly as possible.
2. Failure of the I SERIES primary system and/or connections with the Fire Stations.

3. Failure of the HP 9000 system, payroll or time card software, or other time critical reports for Finance.
4. Service requests received from the City Manager, Department Heads or City Council.
5. Service requests in "Tech Help" are evaluated at 7:00 a.m. each workday morning and prioritized with most critical addressed first as follows:
 - a. Computer systems that are not useable and an employee that cannot work will be replaced with a loaner unit (if available) with necessary software installed and checked to assure correct function. E-mail or phone response time goal is 1 hour or less. Repair or replacement time goal is 4 hours (depending on location of system). Note: high end systems with specialized software (Auto Cad or Arc View) or uses may require added time if a comparable system is not available as a temporary unit.
 - b. Telephones that are not working will be replaced with new or temporary units. Response time goal for individual systems (no programming required, no voice mail service changes) is 1 hour or less (depending on location of system), for console phone that require programming of multiple features the goal is 4 hours.
 - c. Moving of equipment and/or phones as requested by departments done in consultation with employee to cause minimal work loss. Major moves and re-locations that require installation of cables and/or phone lines may take up to 4 weeks as outside contract or phone services may be required.
 - d. Software that is not working correctly or not operating, including Windows NT, 2000, the Novell client and GroupWise will be evaluated and/or repairs affected based on the usability of the workstation.
 - e. Requests for new or updated software installation will be done in consultation with department(s) or user and time established. Note: new software that is to be used by several people must be evaluated by IS staff to assure no conflicts or unexpected changes occur. If special configurations are required for network installation, or problems arise, delays will occur.
 - f. New or updated hardware installed within 30 days of delivery to City. Note: hardware requiring installation of phone lines, cables, etc. may be dependant on contractor schedules.
 - g. Amenities and items not critical for work such as sound cards, Internet connections, games, etc. done as time is available. Any software or hardware added to City systems must also conform to the adopted Administrative Policy and Procedures.
6. Printer or FAX repair requests are referred to local businesses specializing in this service.
7. Training in using various software packages is currently in each Department budget but coordinated by the Information Systems Department. Questions are answered as much as possible, however no specific staff person is assigned for this purpose.

Information Systems Department Response and Repair Goals

Severity	Impact	E-mail or Phone Response	Resolution or Repair
Non Critical	Routine requested Work	1 hour	As agreed to by requesting department
Important	Individual Impacted, workstation not useable	1 hour	4 hours
Urgent	Department Impacted	1/2 hour	4 hours
Critical	Entire City Impacted	5 minutes	4 hours

Definitions

Non-Critical – Scheduled work. This consists of equipment installations, upgrades, re-arrangements, and expansions that can be planned ahead of time.

Important – Individual impacted. This severity level consists of personal computer hardware failures, personal printer and other peripheral equipment failures, software crashes, operational support, and security changes.

Urgent – Department impacted. This severity level consists of problems that effect an entire department or location, such as remote network communications failures or departmental shared printer failures.

Critical – Entire City impacted. This severity level consists of problems that effect the entire City's operation, such as host or network computer failures, network infrastructure failures, and mission-critical software failures.

Repair and Service Goals

Information Systems strives to provide 100% "uptime" during the hours of 7:00 AM to 5:00 PM – Monday through Friday, excluding holidays, for all non-public safety information systems. Uptime means access to information technology resources free from unscheduled downtime. Individually, the Information Systems Department goal is that no City of Chico employee shall be without a workstation for more than four hours.

The Information Systems Department supports the City's Public Safety agencies 7 days per week / 24 hours per day. Scheduled downtime may occur at any time as agreed to by the parties.

Installations and upgrades: ZERO defects, 95% completed on time.
 Technical Support: 90% compliance for "urgent" and "important" service.
 95% compliance for "critical" and "non-critical" service.

Quality Assurance Policies

The Information Systems Department uses the Tech Help e-mails to track service and assess quality of service. The objectives of this program are:

- Track service requests to ensure that the Information Systems Departments efforts meet City staff needs.
- Work closely with Departments Heads to establish appropriate service levels.
- Provide timely, high quality products and services.
- Establish, measure, analyze, and use performance criteria and data to maximize up-time.
- Conduct customer satisfaction surveys and report findings.

- Evaluate performance for City systems compared to City staff requirements, other organizations, and industry benchmarks.
- Adjust procedures and practices when necessary to maintain high levels of service and response to customer requests.

The Information Systems Department recently conducted a survey of City staff and the results are tabulated in Table 5, City of Chico, Information Systems Department Survey Results. In general, comments from other departments regarding Information Systems Department staff are favorable.

Hardware And Software Standards

Hardware and software standards are updated annually in order to maximize the use of funds and obtain the most cost effective information technology equipment and services. Annual updates to hardware specifications reduce the administrative purchasing overhead, provides uniform equipment and minimizes the number of different types of workstations requiring support. Software is updated and revised as required, however in cases where additional software license fees are required, departments must budget funds for the upgrades.

Hardware and software standards simplify support and maintenance thus reducing support costs, however obtaining a consensus and subsequently issuing an edict regarding what software and/or hardware will be used would not be well received by City staff. However, with fewer software packages on systems and the hardware standardized, the required support services can be significantly less as systems are more reliable.

Workstation Hardware Standard

The City should annually standardize on hardware components for workstations, CAD/GIS workstations, servers, notebooks, PDA's, and peripherals. As new hardware is purchased, specifications must be updated to address new technology needs, however it is beneficial in terms of support to have as many as possible with identical configurations. Standardization will ensure both budget and time-savings. The current configuration for workstations is shown previously in Table 1. These specifications are in keeping with the recommended policy to keep up with current technology, but not pay premium prices for cutting edge systems.

Network Servers and Communications Equipment Standard

Network servers are a mission critical part of City business. These systems must be reliable as possible and provide fast, convenient access with reliable back-ups in the event of data loss. As such, network servers must be high quality, heavy duty systems designed for such purposes. With Novell Netware it is possible to run services on small workstation systems, however this practice is generally not recommended and such systems should be budgeted and replaced as soon as possible. The City is moving toward installing "rack mounted" servers that conserve space and allow all equipment to be placed in a common cabinet. As with the workstations, specifications should be updated prior to each purchase and cost effective systems procured based on the service required.

All network servers should will provide the potential for increased capacity and data transmission (also called bandwidth) as improved technology becomes available. File transfers and storage will become larger and speed will become a limitation for some applications such as GIS and Auto Cad. Servers should be capable of providing gigabit speed connectivity in the near future with either fiber-optic or copper wire connections.

The City should continue to use industry standard standardizes on managed hubs, or switches and routers, which can be upgraded to higher speeds as needed and managed remotely. The City currently uses Hewlett Packard switches and managed hubs, and CISCO routers for wide area network connectivity. These devices are connected via T-1 communications lines provided by SBC. A graphic representation of the wide area network is shown in Exhibit "A".

The TCP/IP protocol, an industry standard, is required on all network and computer equipment. Network cabling currently terminates on an Ethernet network interface card (NIC) at each personal computer or printer. Standard data jacks are installed and maintained in most City offices. Most data jacks conform to the RJ-45 industry standard and provide connectivity over category five twisted-pair copper wire, known as 10-or 100-Base-T, capable of 100 megabits per second. All City facilities currently will use a standard patch panel design. This approach calls for connecting wire between source (servers, other centralized resources) and destination (desktop computers and printers) through a patch panel.

Legacy Systems

Software used for large City services such as the Financial, Public Safety and Building Permits systems will continue to drive the hardware requirements in the future. Each of these systems is proprietary and not easily replaced or revised to accommodate added functionality or data exchange. It is anticipated that these systems will continue to be used with potentially significant additions and/or changes requiring added Information Systems staff time and funds.

- Hewlett Packard 9000 Financial System
- IBM I SERIES's Public Safety Systems
- PERMITS Building Department System
- Geographic Information System

Existing Software Standards

The City of Chico has adopted several software packages as standard on workstations. Previously, several discussions were held to determine what standard word processing package should be used and Corel Word Perfect was chosen over Microsoft Word. The City has converted all major documents such as the City Municipal Code to Word Perfect, and all official correspondence, reports, minutes, agendas, etc. are in this format. The Information Systems Department currently installs the following standard applications for desktop use:

- Corel Office Suite version 10 including WordPerfect for word processing, Quattro Pro for spreadsheets, Presentations for the development of public display presentations.
- Novell Netware Client
- Microsoft NT, 2000, or XP desktop operating system depending on application requirements.
- Novell's GroupWise version 6.5 provides e-mail, calendaring, task management and Internet accessible e-mail for City employees
- Internet Explorer version 6 browser
- Adobe Acrobat Reader
- Norton Anti-Virus

Additional applications are also installed depending on individual department needs and are shown previously in Table 2. New, updated, upgraded or specialized software is evaluated and (if possible) installed by Information Systems Department staff. At present, some applications are problematic as they are designed exclusively for Microsoft environments will not run on a Novell Netware network. Some applications will also not operate on the Windows NT workstation operating system.

In addition to the software on workstations, the City has specialized software on larger systems including the SunGuard Bi-Tech IFAS governmental accounting software, the SunGuard H.T.E. public safety Computer Aided Dispatch and Records Management System, and the Accela Corp. PERMITS system that provides information and permitting services for the Building Division. These are legacy systems that are highly specialized and custom programmed requiring significant annual maintenance and support. Changing to different software for any of these systems is very costly and labor intensive thus requiring an ongoing relationship with the vendor for services and support.

Network and Server Operating Systems

The City's Wide Area Network operates on a Novell NetWare 6.55.1 system with seventeen servers providing general file and print sharing, security services, Internet connection and e-mail. The Novell

system includes several different programs such as Group Wise and Border Manager that control the servers and allow the Wide Area Network to function. Most workstations are connected to the City network. A single, stand alone, Microsoft Windows NT 4.0 Server is used exclusively for the Motorola Premier MDC message switch for Police patrol vehicle access to dispatch and CLETS connection. This server configuration was required by the vendor as they would not install the product on a Novell server.

The City's financial system is a legacy system operating on a Hewlett Packard 9000 in a UNIX environment. This operating system is required for the Informix based IFAS software used by the City Finance Department. The vendor, Sunguard Bi-Tech, has informed the City that this system has been "upgraded" to use a new environment that allows the Windows type screens to access IFAS information. Changing the City system will require installing Microsoft servers and cost approximately \$100,000. In addition, the Information Systems staff do not have the required expertise with Microsoft servers and outsourcing the maintenance and upgrades of this system will have to be outsourced until staff can be trained or hired.

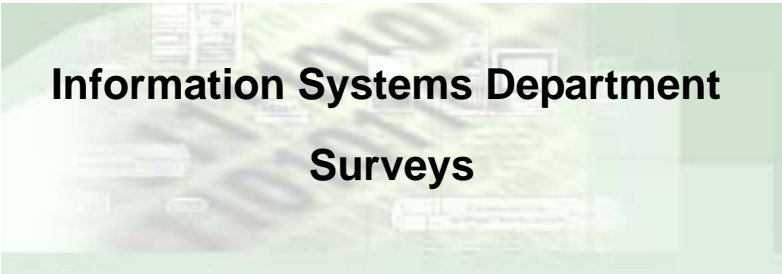
The Public Safety H.T.E. system running on the IBM I SERIES's operate on IBM's OS 400 operating system. These systems are capable of running different operating systems, such as Linux, but it is unlikely that H.T.E. will be modifying their software to accommodate different platforms in the near future.

Equipment Replacement Policy and Funding

The City currently has an equipment replacement fund for all equipment including computers and related equipment. This does not cover the leased systems for Finance (HP 9000), the Police or Fire Departments (IBM I SERIES's). The amount of funds required is based approximately on an inventory of equipment, the original cost, and the expected life span. In general, replacement of workstations and servers is based on the technology needed, not just age. For example, higher end workstations for CAD or GIS purposes are re-assigned within departments to clerical people using older, slower systems.

This policy assumes that the cost of replacing equipment is equal to or less than what will be required in the future. In the event outdated equipment must be replaced with more expensive units, the incremental cost is not covered in this program and must be included in annual budgets.

The Information Systems Department annually purchases computers and related equipment that needs to be replaced from this fund. The new equipment is also installed by Information Systems Department staff.

The title slide features a light green background with a faint, abstract pattern of overlapping shapes and lines, suggesting a network or data flow. The text is centered and uses a bold, black, sans-serif font.

Information Systems Department Surveys

Intro text?

Survey of City Departments

New section?

A survey was conducted by the Information System Department in 2003 to obtain comments and feed back from other City departments regarding current and future needs and services. This survey was not repeated for 2004 however is planned for the 2005-06 fiscal year. The survey included questions related to priorities, needs and the Information Systems Department performance and services. Detailed results of the survey are shown in Table 5.

The following observations have been made based on the information submitted by City employees:

- Virtually everyone uses the Internet and relies on their computers to accomplish work tasks.
- There is some redundancy in data entry and technology “bottle necks”.
- The City’s web site could be used for additional services and some departments could benefit from on-line transactions.
- Employees would like an Intra-net for various resources and ready access to information.
- The City computer systems are adequate for the job.
- Funds for technology need to be balanced with other needs, but there were a significant number of diametrically opposed comments with some prioritizing cutting edge technology, some wanting to improve existing systems and some not wanting spend too much.

Services provided by the Information Systems Department were rated by City staff on a scale of 1 to 6 for importance and effectiveness. In general, services were very important and staff effective in providing the service; however, there are some items of note:

- Communicating scheduled down time was very important to City staff and the survey indicated that staff were very effective in informing departments when interruptions would occur.
- “Tech-Help” e-mail service requests were important but there could be some improvement in effectiveness. On the other hand, E-mail responses to requests within two hours were generally important and staff was generally effective in responding within the time frame. Solving problems with unusable workstations was very important and staff generally effective in resolving the problems.
- Emergency phone help is very important and staff very effective, as is the ability to solve problems.
- Telecommunications services are important; however, the effectiveness scores indicate a need in this area. This is also true with application support services, however this is not surprising as there is no data base administrator or resident software experts in the Information Systems Department. (With the exception of the highly specialized analysts dealing with the IFAS and H.T.E. systems.)
- Training in basic PC use and software was desired and not surprisingly, the Information Systems staff is not really effective in this area as there is no position assigned this task. In the 2004-05 budget year, there will be short training sessions conducted by Information Systems staff for Presentations, and other commonly used software packages. These training sessions will be scheduled as time allows and topics based on demand. Currently, the City departments are responsible for this and it would appear there is a need for ongoing training programs.

- The level of support from the Information Systems Department is very important to most people and the overall effectiveness appears quite good. The effectiveness rating would likely improve with the addition of staff with expertise in data bases, training, and specialized software.
- In an attempt to determine if it was possible to standardize on a single word processor and spreadsheet, City staff were asked to comment on the Corel vs. Microsoft Office suites. While most staff would prefer to use the Microsoft product, there were a number that preferred Corel. In addition, the use of Microsoft Word and Excel is required to exchange files with most state and federal agencies. At present, if departments have a need for Microsoft software, they are responsible for budgeting funds and providing training.

Survey of Six Northern California Cities Information Systems Departments

In order to compare Chico to cities of similar size and requirements, Matson & Isom Technology Consulting (MITC) conducted a survey of six Northern California cities in April-May, 2003. It should be noted that budgeting of operating and capital costs vary widely among cities and in some cases, people performing information systems tasks are assigned to other departments such as Finance or Police. These dedicated support staff that were NOT assigned to an Information Systems Department are not included in the Employees column. It is difficult to obtain information allowing exact comparison and the nature of technology services varies widely among organizations. MITC surveyed Information Technology managers from the following cities listed in Table 4 below:

Table 4
Six City Comparison Survey

City	Population 2003	City Employees	IT Employees	City Employees per IT Employee	Budget (M/Yr) ^{3*}	Number of PC's	Budget per PC	PC's per IT Employee
Redding	84,600	1,000	22.0	45	\$1.8	600	\$3,000	27
Chico	68,589	406	7.5	62	\$1.068	350	\$3,051	53
Walnut Creek	64,296	370	6.0	61	\$1.2	275	\$4,363	45
Roseville	92,000	995	20.0	50	\$4.3	1,015	\$4,236	50
Santa Rosa	142,000	1,260	19.0	66	\$3.8	1,060	\$3,584	56
Visalia ^{*4}	92,473	560	4.2	133	\$1.1	470	\$2,340	111

Comparisons with the Chico Information Systems Department

- Chico has a low to average number of information technology staff for the number of end-users and computers supported.
- The budget per PC amount is in the low range at approximately \$3,000 per year. An analysis done by the Gartner Group of a typical enterprise with 2,000 PC's showed an average of \$19M per annum in direct and hidden costs for computing - \$9,500 per PC. This number includes the cost of staffing of IS departments required to administer a large number of workstations. Smaller firms may have an on-site technician or administrator full-time, or may have part-time or service company techs available. Firms of less than 50 users without wide area networks spend approximately \$2,500 per year per PC.
- The number of staff is in the low range for the size of the City. Two technicians and one analyst are primarily responsible for PC services with assistance from Senior Analysts if necessary effectively making 116 PC's per employee.

⁴ The City of Visalia has staff performing information technology services in other departments that are not included in the total IT Employee number.

Table 5
City of Chico
Information Systems Department
Survey Results
July 6, 2003

The Information Systems Department (IS) circulated a survey to all City employees to obtain feedback on how to improve and prioritize support services to City departments. The responses are tabulated below.

Current and Future Needs

1. How would you describe the role of computers as it relates to the ability for you and your staff to accomplish daily work tasks?

a. Central focus – can't work without them	46
b. Important	15
c. Necessary	1
d. Useful - but could live without	0
e. Useless	0

2. Is there redundancy in your department day to day tasks where you have to take the same piece of data/information, and enter it into multiple systems and or applications? (Listing them at the end of the survey would help.)

a. Never	1
b. Once in a great while	14
c. Sometimes	29
d. Often	14
e. With every piece of paper I get	0

3. Do have technological "bottle-necks" within your department that you are aware of where better or new technology would improve efficiency and/or workflow. (It would help if you could specify)

a. Nope	15
b. yes, a couple	33
c. if there's technology involved, there's a bottleneck	4

4. When it comes to the knowledge of the software used to complete job tasks, changes, and updates, it is....

a. The employees responsibility to keep skills current	14
b. The City's responsibility to provide initial and on-going training for various software packages	41
c. Each department's responsibility to provide needed training classes and include it in operating budgets	27

5. How important/relevant is the GIS system to your department and any job related tasks?

a. Central focus	6
b. Important	14
c. Necessary	10
d. What on earth is a GIS system?	29

6. Could your department use the Internet and the City web site to provide more useful services to the public?

a. There are many possibilities (Could you provide examples)	28
b. I have an idea of a service we could provide	11
c. I don't think this would be relevant for me/my department	7

7. Would your department benefit from the City being able to take credit cards for payment and transactions on-line?

- a. When can we start 14
- b. It would help some but my department doesn't do many forms 12
- c. Not applicable 26

8. Is there frequently requested information that your staff retrieves for the public that you would like made available on the City's Web Site? If so, please list at the end or E-mail info.

- a. About a million of them 5
- b. I have a couple repeaters that would be nice to have on the web 27
- c. I don't think this would be relevant for my department 15

9. Would it be useful if the IS Department created an Intra-net for City only employees that had various resource documents, web-based training, news letters and other easily accessible information for City staff?

- a. Yes 35
- b. Depends on what is there 17
- c. I don't think this would be relevant for my department 5
- d. What's an Intra-net 3

10. Does your department need access to the Internet in order to complete job-related tasks?

- a. It is used constantly to complete tasks/do research. 32
- b. Use it once in a while to complete tasks 30
- c. It's a time wasting nuisance and should be taken off City computers 1

11. Would you give budget priority to developing new technology services such as wireless connections, PDA's and laptops?

- a. Yes, we should obtain new cutting edge technology and make it a priority 12
- b. Technology "toys" and services have to be balanced with the need for staff, etc. 27
- c. Focus on improving existing systems that will get the job done for the most part and not cost too much. 19

12. Are the City's current computer systems and software adequate for your employee's needs to do their jobs?

- Yes 36
- No 7
- Kind of 5

Please rate the following categories according to two scales: **Importance** and **Effectiveness**. The scales are rated from 1-6, ranging from 1 "least" to 6 "most", circle 0 if the service does not apply to you.

Importance - Level of importance for the specific service.

Effectiveness - Effectiveness in addressing the specific service (*skill, knowledge & ability to resolve your computing need/problem*).

Service	NA	Importance						Effectiveness					
		1	2	3	4	5	6	1	2	3	4	5	6
1. "TechHelp" service requests via E-mail		2	0	5	8	17	27	2	1	7	10	19	19
2. Help via phone for emergencies	1	0	1	3	6	11	36	0	2	3	8	17	27

Service	NA	Importance						Effectiveness					
		1	2	3	4	5	6	1	2	3	4	5	6
3. After-hours support (emergency calls, IS Management staff only)	30	3	2	0	2	7	12	2	2	2	4	4	7
4. Solve computer problems in person, via phone or E-mail	1	1	0	3	8	12	31	2	2	2	5	15	30
5. Telecommunication services (phones, cell phones, pagers, voice mail, etc.)	3	0	1	2	12	15	21	0	2	4	13	19	11
6. Application support by phone or E-mail (e.g., Corel Suite, Micro Soft, IFAS, etc)	2	1	1	6	14	13	17	2	4	11	16	9	9
7. IS assistance in setting up technology in conference rooms for presentations by staff, consultants, etc.	19	1	1	5	11	9	11	0	0	4	13	12	6
8. E-mail reply to Tech-Help requests within a two-hour response time		1	1	3	10	20	19	3	2	2	12	18	18
9. Solve technical problems with unusable workstations within a four-hour response time.	4	0	1	2	1	14	27	2	2	5	11	11	14
10. Conduct follow-up to Tech-Help requests		2	1	7	16	11	18	3	1	9	15	11	15
11. Communicating to appropriate departments when there is scheduled down time (servers scheduled for maintenance, E-mail or Internet service not available, etc.)	1	0	0	3	6	12	33	0	3	3	4	15	29
12. Training in basic PC use and software	2	2	2	1	13	18	18	2	4	12	18	9	5
13. Opportunity for on-line training, accessible from your desktop, through the Internet	3	2	3	10	13	12	11	4	8	13	5	5	7
14. During the last year, how would you rate the level of IS Support Service		0	1	1	6	15	24	0	1	2	12	23	13
15. Internet connection	2	0	0	4	9	19	19	0	1	7	11	20	11
16. Web Site	5	0	2	4	13	16	13	0	2	7	15	13	11

17. The word-processing and spreadsheets I use (WordPerfect/Word, Quattro/Excel)

- | | |
|---|----|
| a. Use WP/Quattro, love them, can't stand Word and Excel. | 5 |
| b. Use WP/Quattro, they are so-so. | 14 |
| c. Use WP/Quattro, hate them, but I don't have Word and Excel | 2 |
| d. Use Word and Excel, can't stand WordPerfect/Quattro Pro | 8 |
| e. Use Word and Excel, they are so-so | 4 |
| f. Use Word and Excel, basically just because I get documents from other agencies that do | 16 |
| g. I don't care, but I wish we could decide on using one and only one | 10 |
| h. I don't care.... Period... | 5 |

Intro text?



Future Needs

Current development and improvements in technology are driving demands for more technology oriented services from City staff and the general public. The City has a responsibility to identify and fund cost effective services that provide better customer service, reduce operating costs and improve public services. It will be imperative for City departments and the City Council to give high priority to new or improved services and include funding in annual budgets. Upgrading, or implementing new IT information technology services must be on a continual basis if such services are to continue. This process must include not only the initial hardware and software costs, but annual maintenance, future replacements, and added staff costs. IT

With the current volatile budget climate projected to remain for the near future, City departments will have to prioritize their need for technology with other needs including staff or capital projects. Significant funds will be required for upgrades and/or enhancements to existing systems such as the IFAS Financial system, or major service additions such as wireless services to laptops in police patrol vehicles or fire vehicles. If a funding mechanism is not implemented, the City is at risk of significantly falling behind. Particularly with the legacy systems, new features and productivity enhancements, while expensive to purchase, may ultimately save staff time and/or provide better, faster service to the public.

Information Systems Department Staff Resources

The City's information technology environment has increased exponentially in the size, number and complexity of systems and applications since the Information Systems Department's inception in 1994. The same type of experience is occurring all over California. IT City departments have become increasingly dependent on information technology services in order to provide the level of services demanded by the public, respond to state and federal reporting and accounting requirements, and attempt to reduce costs. It is a given that the City will need to keep pace with the technology revolution as this will be far less costly than dealing with the ramifications of falling behind.

Each new employee, intern, hourly, or other City affiliated person has at a minimum, a computer, phone, network connection and software that require support and service from the Information Systems Department. In order to keep all systems operating correctly and services at an acceptable level, these impacts on staffing must be considered when adding individuals to the City network.

The Information Systems Department currently provides service to over 400 employees with approximately 350 workstations. Since most service requests come from employees with problems on workstations, this represents the largest demand for staff time, however significant time to accommodate programming and reporting requests for IFAS and H.T.E. is also required. The City Wide Area Network connects all departments and computers and requires extensive knowledge of network servers and communications equipment such as routers, switches, telephone systems, etc. Constant updates and patches to network operating systems and associated programs such as virus checkers are required to keep such systems operating. Network services are continually evolving to respond to user demands for more features and easier access. This also increases the complexity of the system requiring additional expertise and staff to support user demands. For example, the City decided to acquire several Compaq IPAQ personal digital assistants (PDA'S) for staff use. These "miniature" computers imposed a new level of services required of the Information Systems Department as they connect to City workstations and require special software that results in added support requirements.

The Information Systems staff, while determined to continually maintain a high level of service to City departments, is experiencing increasing workloads that is easily documented by the increased number of staff, workstations and software packages. The current information technology environment is also

constantly changing. Organizations must keep up with demand, and a significant increase in the number and complexity of applications, programming languages, formats, platforms, etc. will occur. The demand from City departments for new and improved technology services will continue as well as software evolving to provide additional functionality that in turn requires new hardware in a continuing cycle. This continually escalating process throughout the City will require comparable growth in Information Systems staff as well as increased technical training of the existing staff. The current and near-future high priority information technology projects requested in annual budgets (see next section, Current and Future IT Implementation Projects) must also address the impact on Information Systems Department staffing. The GIS project, for instance, involves which requires integrating City data and making it available to the public via the Internet, possibly installing servers using a new platform, and will require more expertise than what currently exists on the Information Systems staff. As the planning and implementation proceeds, the City may begin with outsourcing portions of the work, but internal resources must be made available for ongoing management and growth of the system.

Additional staffing for the Information Systems Department will be directly dependant on the technology services demanded by the various departments, and the number of City staff, including hourly and interns in the City. At present, the Information Systems staff has to defer non-critical items at times to accommodate emergency requests, new services or upgrades. Several major projects are currently being contemplated that will require additional staff to provide the continual updating and maintenance services required such as:

- Document imaging, management, storage and retrieval for City offices that will require additional hardware and software.
- Geographic Information System (GIS) additions and enhancements that will require significant additions to hardware, purchase of software and staff dedicated to updating and maintaining this system.
- E-government services on the City web site including accepting forms and payments over the Internet, updating and adding information to the site.
- Laptops and/or PDA's in public safety vehicles or assigned to City staff that are connected through wireless networks.
- New phone and voice mail system for the City offices.
- Data base maintenance, program enhancements and updates, staff training in the use of various software packages, etc.
- Possible major changes to the City network and workstation operating systems in order to reduce software and annual support costs.
- The continual addition of various types of shared data bases that require updating and maintenance including storage and retrieval of video files of City meetings, connections to other agencies using wired or wireless technology to obtain information such as the Cal Gang program.
- IFAS financial system upgrade to version 7i requiring additional hardware, software and staff expertise.
- Data base integration between the City PERMITS, H.T.E., GIS, and IFAS systems.
- E-government services (also requiring data base integration).

Staff needed in the near future will include persons with data base expertise including programming of interfaces between legacy systems, technicians for added workstations and software, network servers and related equipment, communications systems and phones, website and e-government services, added software specialists to assist with both workstation and legacy system software, and training services for City staff. The installation of thirty to forty replacement computers each year is time consuming and generally faces delays due to higher priority requests. An interim solution to assure that equipment is put out as quickly as possible for 2004-05 is to hire paid interns and/or hourly staff for this specific task.

Outsourcing Professional Information Technology Services

In an effort to augment existing staff and obtain expertise in specific areas, an alternative means is to obtain professional consulting services. This can be very cost effective for specific special projects the

Information Systems Department cannot do with existing staff. As projects are identified, retaining outside consultants with accreditation and experience in the specific area should be considered for design and project implementation.

In future budgets, funds should be included for professional services to assist in implementing phases for large projects including the GIS system, initial installation and annual maintenance of the IFAS 7i major upgrade, the document management system, newer communications systems such as fibre optic lines, and possibly a wireless network. Professional services should also be budgeted to obtain specialized expertise to integrate data bases such as PERMITS and HDL as these services are time consuming and require highly specialized programming expertise.

Wide Area Network

The equipment used to provide network connectivity must be considered "mission critical". The Information Systems Department consistently monitors and supports all connectivity equipment (routers, switches, managed hubs), network servers and software to assure the system is meeting security and reliability requirements. The existing network topology is meeting City needs, however it is foreseeable in the near future that the T-1 communications lines will not be able to meet the demand for data transfer between City offices. This will be particularly evident as files such as those generated by the GIS system are transferred between City buildings. Additional capacity will be required in the near future. Several alternatives exist including adding T-1 or larger communication lines, fiber optic lines, or wireless connections. To accommodate added communications services, equipment for the Wide Area Network (WAN) will have to be replaced or upgraded in the near future.

City sites connected to the WAN must use either secure third-party data circuits or wireless methods that meet security and reliability requirements. All equipment must meet minimum present and future scalability requirements, allowing upgrades as new technology becomes available.

It is unlikely that the level of "hacking", virus and/or worm proliferation, or other related nefarious activities will reduce in the future. Therefore, aggressively protecting the City network from intruders can potentially save significant time and effort in the event of a successful attack that renders systems unusable. The Information Systems Department will continue to maintain firewalls at the Municipal Building and Police Department to monitor inbound and outbound traffic, protecting the City's private network resources and traffic. Any installation of Microsoft servers must include aggressive intrusion protection and staffing to assure all security issues are addresses immediately.

Critical Systems

The Information Systems Staff should work with the departments using the systems listed below to facilitate planning and implementation of new or revised software. These systems will likely evolve over the five year period and require significant resources. These systems should be incorporated into the City's disaster recovery and contingency planning, ensuring maximum availability of these vital systems.

HP 9000 Financial System (IFAS)
IBM I SERIES's Public Safety System (H.T.E.)
E-mail
PERMITS
Wide Area Network

Information Technology Security Assessment and Policies

The Information Systems department controls all network security, protecting the sensitivity of all data transmitted on the City's network. Security is currently enforced at all entry points into the City network, including firewalls at servers, and at the file and folder levels. In order to assure the security of the City systems an assessment should be conducted prior to implementing e-government services using credit cards. At a minimum this should include:

- Network Security System Design and Planning

- Document an analysis of security objectives, design of security architecture, placement of security products, analysis of data flow and monitoring planning.
- Network Security Policy Review
- Develop guidelines and procedures for securing network resources and critical data
- Network Security Testing
 - Test security products, such as firewalls, Virtual Private Networks (VPN's), intrusion detection and monitoring controls, encryption systems, anti-virus protection, content filtering controls for e-mail and web, access controls (authentication and authorization), network security controls (adaptive scanning), audit controls, data backup and replication systems and authentication systems
- Risk Assessment
- Penetration Testing

Document Imaging and Records Management

The City of Chico previously contracted with e-Visory Consulting to provide an overview of the potential use of document management systems among City departments. A copy of this report "Improving Records and Document Management, Report to the City of Chico, California" is attached as Appendix "D". The study suggested that document imaging and technology designed to enhance workflow can be used on limited basis. E-Visory also concluded that imaging technology could substantially improve the storage and retrieval of documents and improve overall departmental efficiency.

The City handles quite a large amount of paper in the form of applications, reports, hand-written material and the like. Currently, over 30 separate collections exist within the various City offices (not including those in personal files). Many of these documents are filed manually in cabinets, on shelves, in Building 400, or on microfiche for long term storage.

The following text is excerpted from the e-Visory final report to the City of Chico.

Benefits of a Document Management System

An Integrated Document Management (IDM) system would provide the following benefits:

- *Gain back space currently occupied by paper storage*
- *Reduce effort expended in locating documents*
- *Reduce liability exposure*
- *Congruence with e-government initiatives*

Planning Recommendations

The initial set of recommendations represent tasks which we believe the City of Chico should undertake before implementing any new records systems. They are characterized by providing rapid and low cost improvements to the City's operations, as well as preparing the City for the successful introduction of an electronic system to manage its records.

Records Retention

Update Record Retention Policy

While the current City policy is consistent with the state public records act, it does not help the City staff in determining how to deal with specific documents. The City needs to revise its' record retention policy to add specific details. The City currently has a records retention policy and procedure, but lacks a retention schedule. As a result, there is uncertainty as to the legal regulations that apply to a particular form or document type.

Perform City-Wide Record Cleanup

City staff is fully occupied by their daily responsibilities, which has resulted in non-urgent tasks, such as records review, being deferred. A City-wide effort to remove documents that no longer need to be retained has to be implemented: The City needs to catch up on deferred file cleanup, and it is foolish to

spend money storing or imaging documents that are about to be destroyed. The City Manager and City Clerk need to decide on the appropriate way to accomplish this task.

Some options are:

Existing staff, one day a month (probably different days for each department).

One shelf a week for each administrative assistant.

Overtime staffing.

Use of outside resources, such as interns or temporary labor.

Infrastructure Changes

Information Systems Support for Applications

We evaluated the City's ability to support the introduction of new technology such as imaging and workflow, and have come to the following conclusions:

Staffing

However, to add new City-wide infrastructure such as document management, the City will almost certainly need to add an additional full-time employee and possibly train that individual, or contract with some supplier to provide system support. In some organizations we would suggest that systems be out-sourced, but the security requirements of departments like Police are likely to make this impractical.

Consider Implementation and Maintenance Costs in Technology Purchases

Require all budget expenditures for technology include the expense of either:

- A vendor, a reseller, or a consultant implementing the product.
- Freeing a City employee to do the implementation.
- Add information technology project management staff to the I. T. department.
- Add or move staff to I.T. to support software applications.

Simplify Existing Processes

We see certain processes and procedures that should be changed, in part to simplify document processing, and also to free resources for the addition of new record and document management responsibilities.

Consolidate Collection of Cash

We observed cash collection at five different points within the Municipal Building. The related record keeping adds significant work for the City staff.

Keys to Implementing a City-wide Document Management System

We believe that the City will gain by recapturing space, reducing the effort expended in locating documents, reducing liability exposure, and preparing for future electronic government initiatives by implementing an electronic document and image management system that supports simple workflow.

The addition of electronic document management should eliminate a large percentage of the paper that is generated internally solely to communicate with other departments. Simple workflow will speed routing of documents between departments for review, improve tracking of projects, and will also make departments comfortable with the use of a single electronic copy, versus personal paper copies. The type of system we are describing is often described in the industry as an Integrated Document System.

The Tangible Return on Investment of implementing a solution is not sufficient to justify the purchase, in part because of the perceived need to hire additional staff. However, the additional gains in reduced liability we believe make the decision more convincing.

Implement Three Libraries

We recommend that the City look to implement three electronic libraries, all employing the same vendor's technology, so as to lessen the support demands on the Information Systems Department:

The first library ("Public Safety") will serve the needs of Police and Fire, and be isolated from access by other departments. This permits them to conform to legal requirements for isolation.

The second library ("Secure") will hold personnel, legal, and payroll information, and will be secured from electronic and physical access by most City employees.

The third library ("Public") contains documents which do not need to be secured and are public records. View access to this system will be provided at City public access desks, and, possibly, over the Internet. This system can probably share hardware components with the Secure library.

Required Product Functionality

The City requires an EDMS that provides group and individual document access control. It must be possible to restrict access to documents to only those authorized to see them. An audit trail of who has accessed or revised a document must be maintained for accountability. As a result, every user of the system must have a unique system identity, and access to a particular library be approved, managed, and recorded.

The system should provide integration with the supported office automation packages, such as word processing and spreadsheets, and provide for the storage of electronic mail messages on request. The system should permit integration with existing and expected internal systems such as:

- *ArcView GIS*
- *The Finance computer system*
- *Future Internet permitting*
- *Internet-based public information access*

Although integration with internal systems is not a pressing requirement at this time, it would be imprudent not to make sure that it can be addressed in the future.

Infrastructure Impact

We do not see any immediate changes to the City's technology infrastructure to support a document management system. However, network impact from increased file transfers should be a factor in evaluating any document system.

In reviewing the e-Visory report, the impact on the City network, staff and equipment cost estimates appear to be understated at this time and should be re-evaluated prior to developing budgets.

Web site and E-Government

The City of Chico is committed to using the Internet and web-based technologies to expand and improve services. As a result, businesses, private citizens and City employees will be able to access a wide range of information and services using readily available technologies. Customer service will be improved by providing quicker, more convenient public access to City services through the use of technology. E-government implementation requires vision, planning, long-term funding and changes in process for both employees and citizens.

The City will establish the ability to accept credit card payment for a variety of services both online and on location for those departments and services requiring high transactional activity. At this time, there are problems associated with the payment of fees for this service, however, it is expected to be resolved in the near future by the City Finance Department.

Continual assessment of requests for e-services from the public must be addressed. What is known today will drive the current planning effort, but flexibility and listening continually to the public must be incorporated to adjust what the City offers tomorrow.

Some currently requested items are:

- An easier way to navigate the Web site with easy-to-find information using search capabilities and/or a site map. A recent update of the network operating system includes a search engine that can be used on the web site and all other City files on network servers.
- A central community events calendar depicting events across the City including free or low-cost events for children and seniors
- The opportunity to fill out and process any necessary City forms online
- Online registration for City-sponsored events

- Live web cameras to view City areas or events
- Online business license renewal
- Online job applications have been completed but not implemented by Personnel as of this time.
- The opportunity to view Council meetings online
- A variety of maps and diagrams of the City
- Referrals to government and visitor information from the City web site
- On-line lookup of information, agendas, minutes, etc.
- Citizens and developers want building permit status information online, permit applications, and the ability to make payments online
- On-line service requests for City staff use to report safety or maintenance issues for City department action
- Wireless web connections for field staff
- Internet videoconferencing and/or streaming video
- Web conferencing
- Fire Department online education materials and fire prevention permits, and the ability to register for programs provided by the fire department
- On-line parking ticket fine payment
- On-line submittal of building department permits

Geographic Information System

The GIS system is potentially a very powerful tool for City departments with several specific needs. Current use of this system is somewhat limited as fully implementing a GIS system using the ESRI Arc View, Arc Info, etc. products is cost prohibitive at this time. Expansion of this service will require significant additional funding for hardware, software and staffing to support the large amount of data associated with this type of system. As specific needs are identified, funds to support the programming, data collection, purchase of hardware and software must be budgeted.

This system is only as good as the data base and it will be critical that resources be dedicated to assure information is accurate, organized, maintained, and updated. This will require significant added staff and possible re-structuring to create a GIS division.

Listed below are some specific items identified for future GIS projects:

- **Department of Public Works Engineering Division:**
 - Identify attribute data needed by other City departments
 - Methods of sharing GIS data with other City departments
 - Pedestrian access data layer(s) to include locations of sidewalks and pedestrian crosswalks
 - Impervious surface data layer(s) for storm water runoff analyses
 - Utilize GIS sewer line inventories for hydraulic modeling
 - Utilize GIS sewer inventory to make decisions regarding capital improvement projects
- **Department of Public Works Operations and Maintenance**
 - Street sweeper routing
 - Sewer and storm water network management
 - Creation of a rehabilitation strategy for non-critical sewers
 - Creation of a prioritization strategy in the event of sewer system failure
 - Develop a work order and routine maintenance data layer for City facilities
 - Develop a street improvement data layer
 - Traffic sign inventory
- **Parks Department**
 - Maps showing park locations, amenities, and other details made available to the public

- Coordinate park map data with Chico Area Recreation Department (CARD) use and events
 - Develop a data layer showing which parks get the most use and public request for use
 - Utilize GIS for Park Master Plan updates, including data regarding census, facilities locations, greenways, historical sites, land use, park locations, private recreation sites, recreation programs, school locations, topography and floodplains, transportation and water and sewer inventories
- **Community Development Department**
 - The Building, Planning, and Housing Divisions would benefit greatly from integrating GIS with the PERMITS system. This could reduce time in the field and lower associated costs by giving staff direct access to view geographic representations of all land-use and zoning information associated with a parcel, permit, inspection or plan
 - Reduce staff time by automating manual processes and allowing staff to check immediately to see if the subject of a complaint has a permit or license for a particular activity
 - Notify neighboring residents of zoning changes through radius analysis and mailing list generation
 - Analyze citizen complaints and resulting violations in proximity to defined areas and more
 - Reduce the time spent waiting to process a permit application; allows for quick decisions to be made on all permit or license applications
 - Speed the review process by graphically representing a broad range of complex geographic information specific to the active case
 - Improve decision-making by presenting maps that provide review personnel with current information
 - Provide excellent and clear means to communicate with staff, council and constituents by providing maps and other enterprise data
 - Develop a Web-based GIS to highlight the historic districts of the City and allow browsing of National Register and local historic district structure data
 - Promote economic development via web-based GIS data
- **Police Department**
 - Present map-based crime statistics and Megan's Law information on the City web site
 - Refine the current "Map Book" of UCR (Uniform Crime Report) statistics and associated maps of crime locations
 - Correct all erroneous/incomplete address information in the City's GIS database
 - Correct all address information in the HTE database (currently, GIS-based crime reports originate from HTE data exports via Cognos Impromptu)
 - Provide GIS map, crime data to officers on the street via Mobile Data Terminals
 - Use GIS map data in Dispatch for quicker routing information
 - Use GIS-based aerial photography for SAFE (Strategic Action For Emergencies) team needs
 - Create a crime/event map wall in the briefing area for officer visualization, collaboration
 - Collaborate with Butte County for Police and Fire Department-oriented data
- **Fire Department**
 - GIS information should be available on laptops in Fire vehicles
 - Street maps of the call location on laptop screens at time of dispatch along with detailed incident information entered by dispatch personnel. Maps to include hydrant locations, street addresses, access points, bridge weight capacities, etc.
 - Field personnel to have more complete incident information available on their laptop computer screen than is currently available from a radio dispatch. Note: City of Chico Fire Department personnel are required to maintain radio contact with their own dispatch personnel, as well as personnel from other departments and agencies, when responding in an automatic aid or mutual aid situation. Receiving dispatch information in the field via wireless communications (as is currently being done by City of Chico Police Department

units) will improve inter-departmental communications during an incident, and will free up the radio for inter-agency communications and for more urgent and time-critical departmental communications

- Front line apparatus able to access computer created pre-plans, Knox box locations, on site hazards, sprinkler system connections, floor plans and route-in information while en route to or at the scene of an incident
 - Command Post information with up to date field data and printing capabilities
 - Transfer information or documents between dispatch, fire stations, vehicles and apparatus about almost any location to the incident scene or Command Post. This would include hazardous material plans for businesses including the railroad and the Kinder Morgan "tank farm" fuel facility. Currently, transferring this information in the field would mean sending field personnel back to the fire station, or to multiple stations, and waiting for them to return to the field
 - Ruggedized notebook computers with wireless connections installed in fire vehicles to provide information between City of Chico and Butte County Fire Departments, the City of Chico Police units and the public safety dispatch center
 - GIS data in the vehicles for Fire personnel to find information associated with particular locations (i.e. owner, address, size, etc.) utilizing known addresses or assessors parcel numbers
 - The GIS data to find a variety of visual information about property in the Chico area, including maps showing City streets, parcel boundaries, General Plan land use designations, zoning, earthquake fault zones, flood plains, high fire zones, environmentally sensitive areas, the location of parks, schools and public facilities
 - GIS data for infrastructure facilities of particular concern to the fire department due to their underground locations and lack of visibility, and/or potential for hazardous situations. This includes information about the public water system, sanitary sewers, storm drains, gas pipeline systems, railroads, alarm systems and known hazardous materials. Fire personnel can be alerted to surrounding properties that should be evacuated during an emergency involving hazardous material
 - GIS data for fire personnel to identify properties within a specified radius of a designated area for permit notification and inspection purposes
 - GIS with accurate inventory of fire hydrants and hydrant flow data
 - Statistical reporting and presentation with historical incident response maps to show call volume by location, providing data necessary to locate new fire stations
 - The GIS maps and data used to locate noncompliant vacant properties for the City weed abatement program and other fire prevention needs
 - A basic assumption is that the more information fire personnel have prior to, and en route to an emergency, the more prepared they will be from receipt of alarm to successful conclusion of the incident thereby reducing the loss of both life and property
- **Public (Internet) Use**
 - Data for economic and community development
 - Police and Fire statistics
 - Planning data
 - Public Works projects
 - Community Development projects
 - **Private (Intranet) Use**
 - Police crime analysis details
 - Fire preplan and other maps
 - Public Works engineering
 - Traffic
 - Airport Details

Required GIS Software and Hardware

GIS workstations are the most advanced and powerful systems available due to the extensive data handling, video display, and processor demands made by the software. In addition, network servers and

data transmission lines must also be capable of high speed data transmission usually in the gigabit range, storage and back-ups of very large files. Current ESRI GIS software will not operate in a Novell Netware environment therefore fifteen workstations have a copy of the required software components and function as stand alone units. Future expansion of the GIS system will require significant added hardware and software to accommodate added functionality and large data files. In addition, these systems tend to become obsolete quicker than standard workstations and will require updates and/or replacements more frequently.

Relational Database Interconnectivity with GIS

Limited ability exists to import data from other sources at the City and it is highly desirable in the future to eliminate redundant data entry and expedite processes. Bi-Tech's IFAS database in the Finance Department tracks all City revenues and expenditures including licenses, permits, fees, transit tickets, and parking citations. Internally, IFAS tracks all accounts receivable, payable, payroll, and inventory. A connection to the GIS database would allow quicker and more efficient lookup and retrieval of any geographic oriented data (e.g., the GIS could report the number of businesses in a certain area that have failed to pay their yearly business license fees or update their permits). This would facilitate the notification process when mailing lists can be generated based on areas.

The current Police and Fire dispatch and records management system, HTE, contains much geographic based incident information, however, it is not able to graphically depict data. It is possible to extract data from the H.T.E. system into the GIS system, however the reverse is not true.

Accela's Permits Plus application is in use at various City departments for building permit tracking of other information, but is not integrated with the GIS system. Updating the data base for this system is problematic and has caused difficulties in obtaining correct addressing and other reports needed by the City Building Division.

Web-based GIS

The current GIS is a very powerful tool, but it is challenging to share data amongst all City employees, not to mention the public. The primary database layers reside on a server and are distributed by GIS Technicians in the Public Works Department. Fifteen City systems have the ability to manipulate the GIS data, and others must load the free ESRI ArcExplorer or ArcReader viewers and have access to the data created by the ArcView users. An alternative means of allowing others to access and use GIS data is through a Web-based solution that allows anyone to view and/or access data with an Internet browser. Several companies now specialize in providing such services that are targeted to specific markets, such as Police or redevelopment agencies. As demands increase, it may be possible to implement specific GIS services by purchasing such services from third party vendors. It must be noted that these services are standard packages and custom programming to add functionality or revise how the service works is costly and generally not recommended.

Existing Web-based GIS Service Companies

<http://www.GIS.Planning.Com>

Web based geographic information system (GIS) applications for government, business and community organizations that foster enhanced economic development, e-commerce and web services. GIS Planning combines state-of-the-art technical expertise with a background in economic planning practice to create user-friendly GIS programs on the world wide web. The company pioneered the field of Internet GIS for economic development from the creation of the world's very first web-based economic development GIS program to our latest suite of modern applications deployed throughout the United States.

GIS Planning, an ArcIMS and ESRI software developer based in Berkeley, has developed a niche in Web-based economic development-oriented GIS data. They provide software and data hosting services, as well as ArcIMS setup expertise. No internal hardware or software support is necessary, and no additional costs other than setup and hosting fees. The service is very limited in scope primarily economic development, with no flexibility to customize features without expensive custom programming.

The GIS data used is public data and does not include confidential information for private City use (e.g., Police and Fire). GIS data updates are generally done quarterly (with more cost to do them more frequently). This may not meet City staff demands as current data is being required. Web based data would not be resident on City servers and ultimately not in the City's control (accept as accomplished through GIS Planning). It must be noted that changes to the standard services offered require programming and additional funds.

<http://www.GeoSmart.Net>

In response to the need for publishing map services to a wider audience, MoosePoint Technology developed GeoSmart.net. Built as a companion product to ESRI's ArcIMS mapping software, using proven state-of-the-art components, GeoSmart.net is a robust solution for internet mapping needs. GeoSmart.net enhances the power and benefit of ArcIMS. GeoSmart.net was created to be flexible and easy to use that non-technical/non-programming staff can easily create, change, and maintain sophisticated web applications and extending the use of network-based map services within an organization (intranet), or to a larger community (internet). MoosePoint's GeoSmart technology provides a simple front end application which can be used to efficiently create and maintain ArcIMS web sites. GeoSmart services can place the setup and maintenance of the web-based GIS in the hands of City of Chico personnel and updates could be done whenever and wherever necessary. GeoSmart has built-in database connectors for integration with City databases (including IBM DB2, MS Access, MS SQL 7.0/2000, Oracle 8/9, Informix, MySQL, and generalized ODBC). There's no pre-designed limit to the number of users who could add or modify data (i.e., no per-seat licensing).

The Omega Group, a recognized expert in public safety-oriented GIS, has written it's *CrimeView®* and *FireView®* applications with GeoSmart technology; the Fire and Police Departments could employ these applications in the future to enhance their services.

This system would require the City to purchase ArcIMS software and server hardware capable of handling data use (which would require more internal support and on-going software maintenance costs). Departmental users would have to be trained to use GeoSmart.

Wireless Communications Services

Wireless technology is evolving rapidly with many new companies and services to choose from. These services are becoming more usable and cost effective; however, the costs of connection equipment and services offered changes frequently, making long-range planning difficult. Various wireless services should be continually evaluated to determine functionality and potential services that may fulfill City needs. One drawback to many wireless services is a clear "line of site" required at each remote point. The geographical layout of Chico may not be conducive to certain types of wireless services with the number of trees and buildings that interfere with transmissions. This results in lost connections and possible data loss similar to digital cell phones losing connections. Security concerns must also be addressed with any wireless service particularly when dealing with potentially sensitive information. The Department of Justice has specific requirements that must be addressed for any police department using wireless services.

The City of Chico Police Department currently uses the Cellular Digital Packet Data (CDPD) wireless network to connect laptops in patrol vehicles to the Police Department I SERIES system. This is a standard configuration used by most law enforcement agencies in California. The CDPD wireless network has become obsolete and the service will be eliminated in the near future by the parent company, A.T.&T. Due to the sensitive nature of this, A.T.&T. has offered an alternative solution that provides connectivity through a different system, GPRS. The Police Department has tested this solution and has agreed to convert to this system as no other service is feasible at this time.

A City owned wireless network may be desirable in the near future for City staff and possibly other users. This is predicated upon the installation of cost-effective equipment that requires a minimum of maintenance. The City owns several of the tallest buildings in the area that may present an opportunity to lease antennae space to other businesses or agencies that could reduce the cost of such services.

A detailed analysis and site survey will be required for the City of Chico to implement a City owned wireless infrastructure. Should funds be available, a professional services contract should be considered to evaluate alternatives and design a solution.

The Fire Department has also expressed a strong desire to have laptops or the equivalent in their apparatus with the ability to transfer information quickly and easily. At this time, funds are not available for this service, however in the event a City owned wireless system is installed, this would become much more feasible.

The City of Chico Police and Information Systems Departments are currently participating in a multi-agency effort to improve communications and data exchange between law enforcement agencies. Representatives from six northern counties and cities are attempting to acquire federal funds to install a regional wireless system for this purpose. This is in the initial stages and will require formalized agreements and funding commitments from participating agencies before implementation.

Common Wireless Protocols

There are many wireless network technologies available today each with some advantage over the others. The family of 802.11 IEEE standards includes several variations on high-speed wireless networking including 802.11a, 802.11b and the new 802.11g that are now commonly in use.

802.11b

The currently popular 802.11b is one of the wireless Ethernet standards in the 802.11 Series. Compared to alternatives like 802.11a and 802.11g, 802.11b network equipment costs significantly less. Its relatively low cost naturally resulted in many home and small business networks adopting 802.11b. 802.11b LANs support a maximum bandwidth of 11 Mbps. Although 802.11b performs much better than traditional dial-up networking, the performance of 802.11b is still significantly less than 802.11a and other, newer standards. This protocol is also known as: Wi-Fi and transmits in the 2.4 Ghz frequency range. This range is "unregulated," meaning that radio transmitters built into other products may use the same frequency and interfere with the 802.11b network. These products include some cordless telephones, microwave ovens, garage door openers, and baby monitors.

802.11b uses the same radio signaling frequency - 2.4 GHz - as the original 802.11 standard. Being an unregulated frequency, 802.11b gear can incur interference from microwave ovens, cordless phones, and other appliances using the same 2.4 GHz range. However, by installing 802.11b gear a reasonable distance from other appliances, interference can easily be avoided. Vendors often prefer using unregulated frequencies to lower their production costs.

- Pros of 802.11b - lowest cost; signal range is best and is not easily obstructed
- Cons of 802.11b - slowest maximum speed; supports fewer simultaneous users; appliances may interfere on the unregulated frequency band

802.11a

At the same time 802.11b was developed, IEEE created a second extension to the original 802.11 standard called 802.11a. Because 802.11b gained in popularity much faster than did 802.11a, some folks believe that 802.11a was created after 802.11b. In fact, 802.11a was created at the same time and intended mainly for the business market, whereas 802.11b better serves the home market.

802.11a supports bandwidth up to 54 Mbps and signals in a regulated 5 GHz range. Compared to 802.11b, this higher frequency limits the range of 802.11a. The higher frequency also means 802.11a signals have more difficulty penetrating walls and other obstructions. Because 802.11a and 802.11b utilize different frequencies, the two technologies are incompatible with each other. Some vendors offer hybrid 802.11a/b network gear, but these products simply implement the two standards side by side.

- Pros of 802.11a - fastest maximum speed; supports more simultaneous users; regulated frequencies prevent signal interference from other devices
- Cons of 802.11a - highest cost; shorter range signal that is more easily obstructed

802.11g

In 2002 and 2003, WLAN products supporting a new standard called 802.11g began to appear on the scene. 802.11g attempts to combine the best of both 802.11a and 802.11b. 802.11g supports bandwidth up to 54 Mbps, and it uses the 2.4 Ghz frequency for greater range. 802.11g is backwards compatible with 802.11b, meaning that 802.11g access points will work with 802.11b wireless network adapters and vice versa.

- Pros of 802.11g - fastest maximum speed; supports more simultaneous users; signal range is best and is not easily obstructed
- Cons of 802.11g - costs more than 802.11b; appliances may interfere on the unregulated signal frequency

Bluetooth

Bluetooth is an alternative wireless network technology that followed a different development path than the 802.11 family. Bluetooth supports a very short range (approximately 10 meters) and relatively low bandwidth (1 Mbps). In practice, Bluetooth networks PDA's or cell phones with PCs but does not offer much value for general-purpose WLAN networking. The very low manufacturing cost of Bluetooth appeals to vendors.

Wireless services are becoming more reliable and cheaper. As these systems evolve, they may become very cost effective to replace wired systems or to provide additional connectivity to field personnel or for other purposes.

Training Programs

Information technology training allows users and technical staff to get the most from the City's technology investment. Empowering City staff will reduce support time for Information Systems staff, as well as promote overall awareness of technology efficiencies. Training funds for staff is included in each department budget, but is generally a minimal amount. Training for Information Systems Department staff will become increasingly important as the technology systems become more complex and software is revised. Technology training is generally expensive, however, not providing training is sure to result in serious repercussions as the Information Systems Department staff will not be aware of new features or requirements, or able to keep up to date with the systems they manage.

As shown on the survey conducted by the Information Systems Department, training for specific software and general computer use was a needed item.

An effective information technology training program must include the following items:

- Financial support from departments for their staff training.
- Professional training programs for Information Systems Department staff in areas of their expertise and/or need.
- Development of effective mediums for sharing technical knowledge such as web services, CD training programs, on-line services, etc.
- Forums such as users groups that allow City staff to share experiences, developments, and take advantage of the technical staff's knowledge.

Data Exchange Between Systems and Departments

The City has implemented several legacy systems using proprietary software and specialized data base applications including the City Financial system, IFAS; the public safety system, H.T.E; and the PERMITS system for the Building Department. In addition, the GIS system is becoming an equivalent specialized system. Each of these systems uses a different data base program designed specifically to meet a unique need. As with other agencies and organizations, it has become evident that obtaining and/or sharing data between these systems and the GIS system is being requested more frequently.

Developing and maintaining custom program interfaces is expensive, however for some purposes this may be the only option. The City Time Card system is a Microsoft Access data base that has an interface to the IFAS system and has worked well. This system will require updating in the near future as the

version of Microsoft Access used for this purpose is now outdated. The future update to the IFAS 7i program may also preclude the use of "home grown" computer code and require the use of software included as part of the 7i system.

Additional identified data exchange and related projects include:

- Updating the PERMITS assessor's parcel information from the Butte County Assessor or the HDL data base.
- Importing or exporting data from PERMITS, IFAS, and H.T.E. to the GIS system.
- Providing the Time Card program to other departments with added features and information.
- Validating and correcting the data base in the H.T.E. system.
- Incorporating into the IFAS system the ability to pay on-line for various e-government purposes.
- Data base development for tracking and creating billings for various purposes that can also generate mailing lists.

Police Department

The public safety system operating on the I SERIES was evaluated by Matson and Isom Technology Consulting in 2003 in an attempt to resolve some issues with the H.T.E. software and data base. The Police Department and Information Systems Department are continuing to resolve issues with this system and will continue to do so in the future to provide more accurate data and reports. The following is a summary of policy items that are currently identified.

Incident Information Screen Issues:

- "Occur to" and "Occur from" issue: Need to define date value
 - Need to define which date will be used for incidents
 - HTE input: date should be date of incident, not date of reporting
- Address verification
 - Need to define which fields will receive CAD address copy over to HTE input: Should allow out-of-area addresses to bypass geofile

Case Management (Currently not used department-wide; only in dispatch) Issues/Policy needed:

- Must define when a case is locked (i.e., information cannot be changed unless authorized by a proper authority)
- HTE input: Usually the case is locked after the Records Supervisor approves the data

Screen change password entry Issues:

- Currently, user password must be reentered when switching screens
- Need each user setup with their own security measures; i.e., only Records staff can use Records terminals

Statute Lookup Issues:

- Currently difficult to perform lookups
- Need to standardize statute entries (CA penal codes change constantly, which requires manual update process)
- HTE input: If all fields are completed in statute information, lookup will be enhanced

Offence Information Issues:

- Need to standardize offenses (will assist officers in data entry)
- Can remove fields not currently used or underused i.e., "Weapon Type" field, may not need three fields (one will do?)
 - Burglaries Table 705 not currently completed
 - Need a list of "methods of entry" (currently this information only exists in the officer's narrative) and methods must be standardized
 - "MO" field: need to limit options

- Change needed: currently suspect, victim, and evidence not linked or related; need to create relationship by entry into Assault Information field
- Change needed: Business Name field -need to consolidate in order to avoid listing one business multiple times
- Suspect information; can remove Map Reference field, name can be copied over from previous incident entry
- Change needed: need to reduce suspect description fields prior to implementing Field Reporting module (limit number of options -too many currently)

Booking Process Issues:

- CSO's currently enter arrestee information into Arrest Information screen first because of need to access information immediately for friends, family
- HTE input: Alternatively, arrestee information can be obtained from CAD, alleviating CSO data input
- Change needed: Data should be input into Offence Information screen (Offence is a primary table; Arrest Info only used for UCR reports), then copied over to Arrest Information screen

Security Issues Issues/Policy needed:

- Timeout period needs to be established (if station left unattended for a certain period of time, station will lock)
- Password timeout currently set at 5 minutes
- Users' access to certain applications can be set (set by group or individual)
 - HTE input: setup groups first, then enroll users in groups as needed
 - Can copy user profiles to groups
- Authority: individual authority overrides group authority
 - Avoid assigning individuals authority; use group authorizations

Officer access to CRIMES Issues/Policy needed:

- Regarding MO inquiries (physical descriptions), these should be done at the supervisory level, not at MDT's

CAD Copy Overs Issues/Policy needed:

- Currently, copy over only used with Incident Information tables
- Quicklink can allow copy over to Accident and Offence modules
- Need to make a decision whether address verification should be turned on for intersections

Address Validation Issues/Policy needed:

- need to remove the use of "&" between addresses in intersections (won't validate against the geofile if verification is turned on)

Citation Data Issues/Policy needed:

- Currently receiving varying information from the field (sometimes receive no information on citations); only know about citations by manual forms turned in at Dispatch
- Need to notify Dispatch of citation issuance (MDT? Radio?)

Demands for technology services to both Police and Fire Departments will continue to increase as officers expect to have ready access to information and services in field offices and vehicles. Planning and design of such systems must be done carefully and by experts in the field to assure satisfactory performance and address security requirements. Providing wireless services to patrol vehicles is a very high priority project at this time and alternatives are being explored including implementing a City wireless system and/or Citrix type service.

As mentioned previously, the ability to exchange data between law enforcement agencies is becoming more critical as timely information can significantly affect an outcome. Presently, it is not possible to easily and quickly access information from other jurisdictions due to differences in computer systems, data bases, wireless systems, and other incompatibilities. This situation is not unique and public safety agencies are attempting to find solutions nation wide. The Chico Police Department has joined with several other north county law enforcement agencies to try solve this problem and also to obtain funds. This effort is just beginning but a Memorandum of Understanding has been executed by participating agencies authorizing the firm of Matson and Isom Technology Consulting to be the lead agency and coordinate efforts for this project.

Fire Department

The Fire Department participates in developing and maintaining the GIS system with themes related to fire services. Providing information such as quickest routes, building location and layout, and other critical items to fire fighters and apparatus in the field has been a high priority item for some time. Due to budgetary constraints and the cost of emerging wireless technology, these services have not been funded. As with police officers, the need for quick, easy access to information by field personnel is becoming more critical and also more cost effective. In addition, it is desired to have routine items such as training schedules, fire inspections and citations automated as much as possible and the current manual system eliminated.



Recommendations 2005 to 2010

Background

The Technology Master Plan is not meant to be a “shopping list” of hardware and software that is rapidly outdated. It is intended to provide guidelines and recommendations that will allow the City to logically plan and fund technology services needed by employees and people doing business with the City. The demand for information technology services is ever increasing and pressure for the City to respond to the demand for such services is also ever increasing. City Council and department support of this plan will be necessary during the budgetary process if a high quality level of service is to be provided to the City’s constituents and internal staff.

The Technology Master Plan has been designed as a roadmap for the City to manage its information technology environment by adopting a “middle of the road” philosophy. Cutting-edge technology is frequently expensive and fraught with problems requiring large amounts of staff time. The City should not engage in research and development type projects without very careful considerations for staff and budget impacts. Letting systems become obsolete and/or not maintaining software to current versions should also be avoided. Playing “catch up” is also generally very costly and limits the ability to interact with businesses and agencies using newer versions of software. Enhancements or additions to the City’s systems should focus on providing more value and functionality for the City (both internal and external users and managers), not just technology in search of a purpose.

The input and participation of all City departments during the budget process is crucial to achieving high quality technology services. Priority must be given to providing such services for City staff and the general public. Coordination of efforts will provide a unifying vision for the City’s information technology environment. Each department has specific needs that must be prioritized within the department as well as City-wide to provide a system where no “islands of technology,” inaccessible to others will exist and where no significant information technology needs are overlooked.

Information Systems Department Technical Support, Personnel and Services

The number of City staff and the associated demand for technology and related services is continually increasing. Each new employee has a direct impact on the Information Systems Department as they must be provided with E-mail, Internet access, various software packages, network access, computers, telephones, cell phones, pagers, PDA’s, etc. Software written by humans is not infallible and problems resulting from updates or installation of new software, or maintaining new data bases requires support staff and time. The City has added almost 300 people to the computer network system, including hourly’s and interns since December of 1999. Each of them requires technology services and support.

The Information Systems Department has been able to continue to provide high quality, cost effective service because of the continuing commitment to “work smarter” and use technology to assist in our efforts. These ever increasing demands will require additional Information Systems staff support for workstations, communications and the network in the near future and should be included in the annual budgets.

Additional staff positions recommended in the next five years.

Information Systems Analyst, Network Administrator
Information Systems Analyst, Data Base Administrator
Information Systems Technicians (two) assuming the number of computers, software applications and ancillary equipment continues to increase. One of these positions would be assigned to the new phone system and communications.

One-half of an Administrative Analyst (to make one full time position).

City of Chico Information Systems Additional Required Staffing, 2005 to 2010

Staff Position	Estimated Year Needed	Function
Information Systems Analyst	2006	Network Administrator, Workstations, Communications, Windows 2000 server platform for IFAS. Assist Sr. Analyst with Wide Area Network and workstations
Information Systems Analyst	2005	Data Base Administrator, Web site, and GIS, training
Information Systems Technician	2005	Communications, Phone System, IFAS Windows Servers, and Workstations
Information Systems Technician	2008	Workstations, Web site assistance, software assistance
Administrative Secretary	2005	Full time position, currently half time.
Interim hourly Technician	2005	Interim technician services until full time position can be funded.

Network Topology, Infrastructure and Bandwidth

As the City grows and demands for service increase from both staff and the public, the need for higher capacity data transmission will occur. The existing Wide Area Network that is supported by "T-1" communication lines will not be able to accommodate the demand. This will certainly happen should the City implement any type of videoing for conferences or meetings, or GIS services.

It is recommended additional bandwidth be added when demand increases, however alternatives to provide such service should be evaluated, such as wireless, fiber-optic cable, as well as standard telephone line connections.

Wireless services are becoming increasingly available and more cost effective. These services should be considered as an option to a wired network for future services. However, there are still serious security implications with wireless services and careful assessment and protection from intrusion must be included when implementing any wireless project.

The demand for data storage and retrieval is expanding exponentially. Storage area networks and network attached storage devices can provide large amounts of space for data and will be needed in the near future, especially if the City proceeds to further implement a Geographic Information System. Hardware technology can provide the physical space for very large amounts of data, but as indicated in the E-Visory report for a document storage and retrieval system, file management is critical to keeping good records and a workable system. City staff must learn to clean up their garbage files.

It is recommended that the City incorporate a Network Attached Storage (NAS) system in future budgets to accommodate the ever increasing amounts of data, particularly from GIS and document imaging systems if implemented.

It is recommended that the distribution and location of files be evaluated periodically and server use optimized.

Website and E-Government Services

The City web site is currently utilized primarily to provide information to City staff and the public. At present, hosting of the web site is outsourced to Computer Associates _____ with Matson & Isom Technology Consulting providing a proprietary software package developed specifically for this purpose. This software allows City staff to update and add to the web site. As the site evolves and begins to

provide more interactive and/or on-line forms, this will likely need to be moved in-house as the current software is very limited and support services are minimal.

The City currently has a web site users group that meets with the Information Systems Department staff to review content and processes for the web site.

It is recommended that this continue and City department staff be responsible for posting information that is department specific with oversight and assistance from the Information Systems Department staff.

In the event staff are not added, it is recommended to outsource moving the web-site in house. This will allow the web-site to continually evolve and be in position to provide the future e-government services desired by the City.

The City currently does not accept credit cards for payment and that has precluded implementing any type of on-line transactions. Developing electronic forms, the required review and approval process, and payment will require participation from each department. The implementation of Verisign PayFlow Pro payment processing gateway or similar system, to allow funds to be delivered from the Web site to the merchant bank will be required.

It is recommended that this service be provided in the near future and the City Finance Department resolve issues with credit card payments.

As the City moves forward to allow citizens to pay for City services via the Internet, credit card acceptance will become of critical importance. Citizens will expect services from the City in the most convenient manner possible including on-line.

It is recommended that a standard for Citywide credit card acceptance be developed for all types of credit card transactions, not just the Internet. This meets the goal of presenting a single view to citizens when they pay for services whether they pay in person, via the phone or on the Internet.

Most City forms must be re-designed to be done electronically and will require significant staff time, however the resulting time savings and customer service should more than offset the cost. With assistance from the Information Systems Department staff, employees should begin to build and use a central forms repository to more efficiently process and route necessary internal forms. Being able to complete a form online and route it to the appropriate staff will increase productivity and reduce manual paper processing in the City

It is recommended that City departments with the Information Systems Department identify commonly used forms and design an electronic process that will save staff time and be more convenient.

The Internet is becoming an indispensable tool for communicating and sharing information with large groups of people in diverse environments. E-government allows the City to share information and communicate among employees as well as with the public, without the restrictions of office hours, travel, and parking. Tasks that once required face-to-face interaction now can be automated on the Web, saving the City and citizens' time and resources. Information can be distributed via the Internet instead of manual replication potentially saving time and money.

It is recommended such services and information be continually evaluated and identified by all City staff in order to more effectively use the City web site and provide better services.

Employees involved in the City Web Site Users Group supporting the City's Web site can currently use the *Manager Console* content management software from Matson & Isom Technology Consulting to

manage their department information. It will be necessary to provide training and possibly software to the users group when the web site is moved in house.

It is recommended that the Information Systems Department staff continue to coordinate the users group and provide technical assistance when necessary.

It is recommended the City web site be hosted on City equipment in the future to accommodate added demands and resolve software limitations with the custom Manager Console software.

Security issues must be addressed with on-line services and users want to know who is collecting their personal data, how it will be used and how its disclosure will be limited. Citizens want reasonable access to information collected about them and an effective means of recourse.

It is recommended that a privacy policy for the public addressing these issues and City policies and procedures that support the external privacy policy be developed in conjunction with the City Attorney's office to assure all legal requirements for confidentiality and security have been met.

Financial Management System

The City currently uses SunGard Bi-Tech's Integrated Financial and Administrative Solution (IFAS) software to manage the financial, personnel, payroll, asset management and budget information for the City. The system currently used is a generation behind SunGard's current version. As workload demands continue to rise, especially in a time of diminishing resources, the Finance Office must utilize every aspect of technology available in order to operate efficiently and effectively. In order to achieve maximum efficiency and take advantage of the new product offerings from SunGard, the City would need to migrate from the current version to IFAS version 7i, known as Netsight. This new version operates on a Windows 2000 server platform that would be another completely different network operating system for the Information System Department to support. It also requires the purchase of up to three network servers to fully implement the new version.

Netsight is a web-based version of the IFAS software currently used by the City. Netsight offers a more user-friendly interface, one that is customizable by the user. This ability to customize screens will greatly improve the cycle time necessary for inputting data into the IFAS system. Additionally, the casual users within other City departments would also benefit by using Netsight because of the user-friendliness of the system and its resemblance to other web-based software programs.

For this reason, the Finance Department recommends implementing the 7i software in a phased approach, beginning with the Budget Item Detail Module. This module is the most widely used, and from the demonstrations of the module by SunGard Bi-Tech, the Finance Department feels it would dramatically increase the efficiency of inputting the City's budget, in turn allowing for increased higher level analysis. Because this module would be used citywide, the City would achieve greater economies of scale from this initial investment. From Budget Item Detail, the Finance Department would implement new modules as deemed appropriate over the next five-year period, keeping the rate of return and realized efficiencies as the determining factor in choosing the order of the modules implemented.

It is recommended the Finance Department budget and implement the new IFAS 7i software in a phased manner. This project was begun in 2004-05 with the allocation of \$30,000 and will continue in the future until the project can be completed. The budget must include purchase, installation and complete support of the Windows 2000 server(s) until such time as an additional Information Systems Technician can be hired.

Additional modules available that improve productivity include the IFAS Imaging system allows for images (e.g., faxes, invoices, etc.) to be scanned and then attached to a wide range of elements in the IFAS database. For example, images attached to the Accounts Payable database can be recalled based on PO, Invoice Number or Vendor Number eliminating the need to file and retrieve paid invoices. Scanned

images can also be accessed in reports. The IFAS COLD (Computer Output to Laser Disc) Storage archives reports and allows for storage and retrieval of reports electronically. This application can save resources by accessing reports that are archived electronically on a hard disc or compact disc rather than stored on paper. This would be particularly applicable to Payroll, Accounts Payable and Accounts Receivable and possibly Budget.

It is recommended that these added modules be evaluated and budgeted in the future as funds allow.

Programs currently used to issue and track business licenses are very outdated and not supported as they were written by a third party. A new system from HdL has the potential to increase revenues through self-assessment of the business license tax. It will also provide improved reporting and integrate with the sales and property tax information currently received from HdL providing for more accurate information and efficient operation of the business license program.

In Fiscal Year 2004-05, the Finance Director purchased a new license and permit system to replace the current "in house" system developed several years ago. It is anticipated that this system will be installed and operational this year.

Geographic Information System

The Geographic Information System (GIS) currently used by the City is based on the industry standard ESRI Arc View software. Several departments currently use the GIS system for specific purposes, however the most visible use is for City Council maps and displays particularly for the Planning and Public Works Departments.

GIS systems are extremely powerful with the ability to track, display and organize data for virtually any City need. However, the data collection, input and updating of these systems can require significant staff time or outsourced services. Exporting and importing data from other systems such as the City's IFAS financial system or HTE public safety system is also problematic at this time. GIS systems also require the most advanced technology in terms of workstations and servers resulting in added costs. It is recommended that prior to expanding the existing GIS system or adding services or features, budget and staff impacts should be carefully evaluated.

The City currently has a GIS users group that includes representatives from City departments, California State University, Chico, Butte County, and the Butte County Association of Governments. Data collection and distribution among multiple agencies can conceivably save costs and provide more consistent data. Two GIS analyst positions were recently created and filled by existing staff with expertise in ESRI's Arc View program. These positions are assigned to the Planning and Public Works Departments, not the Information Systems Department as their specific job tasks are for those respective departments. In addition, staff from the Police and Fire Departments also are responsible for specific tasks requiring the use of the GIS system. Should the demand increase for information from the GIS system, additional staff, hardware and software will be required.

It is recommended that the GIS system and services be annually reviewed during the City budget process to determine if it is feasible to add resources to this system or retain outside consultants for specific tasks. Additional staff, services, hardware, and/or software should be included in future budgets as demand increases.

It is recommended that an analysis be done in consultation with the Community Development, Public Works, Police and Fire Departments to determine if a GIS division should be created.

Document Imaging and Records Management

The City previously retained the consulting firm of E-Visory Consulting to do an analysis of the City's document storage and retrieval system, and evaluate the possibility of implementing a document imaging,

storage and retrieval system. The resulting report is attached as Technical Appendix A. The report identified some options and costs, however a detailed implementation and funding plan is recommended prior to installing such a system. It also appears that the funding estimates and the impact on the City's existing network will require updating and possibly re-evaluating. A phased approach may be possible and should reduce the budget impact. As previously indicated, adding major services will have an impact on the City's WAN and Information Systems Department staff.

It is recommended that the plan prepared by e-Visory be re-evaluated during budget sessions to determine if a phased approach can be done, determine if costs are correct, and also evaluate impacts on the Information System Department staff and resources.

Document Imaging and Records Management

The City handles an enormous amount of paper in the form of applications, reports, hand-written material, et al. Many of these documents are filed manually in cabinets, on shelves, in Building 400, or on microfiche for long term storage. An Integrated Document Management (IDM) system would provide several benefits as shown in the consultant report from e-Visory attached in Technical Appendix A.

It is recommended the e-Visory study be updated during this five year period and a phased approach to electronic document storage and retrieval be planned and available for future budget consideration.

It is recommended that individual department requests for document imaging equipment such as scanners be evaluated to assure compatibility with other existing and future systems. In addition, scanning documents in any quantity will require significant additional storage space and must be included in any such capital request.

Information Systems Department Disaster Recovery Planning

The City of Chico has an Emergency Plan that is maintained by the Fire Chief. This plan provides information to various City departments on several types of emergencies.

It is recommended that the Information Systems Department formalize disaster recovery planning and incorporate appropriate provisions in the master Emergency Plan being updated by a consultant in 2004-05.

Security Assessment and Security Policy

Network systems today are under virtually continual attack by unwanted or undesirable elements including viruses, worms, spam, etc. that have the ability to cause serious disruption of services. The City currently uses several layers of protection against intrusion and e-mails transporting program code, however employees are currently not prevented from downloading program files from the Internet.

Although the practice of downloading software is prohibited in the City Administrative Policies and Procedures, it is recommended that the Information Systems Department implement measures to prohibit this practice.

Access to the City's network from outside systems should not be provided unless approved by the Information Systems Department and only with formal acceptance of the City of Chico Administrative Procedure and Policy Manual

Third party (non-City employee) access to the City's network-based data and resources will only be granted for the purpose of support and maintenance, and must be approved by the Information Systems Director.

Dial-up, as a method of accessing the City's network, should not be allowed. Whenever needed possible, access through the firewall must be approved by the Information Systems Director, and terminated immediately when no longer needed. It must be noted that this requires staff time from the Information Systems Department.

Information Systems staff keep software patched and up to date and have installed three systems to prevent spam, viruses, worms, etc. This effort will be more important as the City begins to use credit card transactions for e-government services over the Internet which will increase demands for high level security. The City IFAS financial system operating on an HP 9000 is not connected to the Internet or accessible by non-authorized persons. The same is true of the IBM I SERIES's used by public safety.

It is recommended that an outside security audit be included in a future budget to detect potential threats and provide a risk assessment.

Basic Hardware and Software Standards

Hardware

It is recommended the City continue to purchase a standard workstation designed to easily run the standard word processing, spreadsheet, and data base software used by the City, but not pay premium prices for cutting edge technology.

It is also recommended the City continue to purchase high-end workstations for staff assigned Computer Aided Drafting (CAD) and/or Geographic Information Systems (GIS) software.

Network servers should be designed and scaled for specific purposes to allow the most cost effective use of funds.

Data and services should be distributed on servers to provide optimum speed, reliability and accessibility.

As servers reach the limits of their capacity, an assessment should be made to either replace the server or re-assign systems to less demanding tasks. For example, the large network server located at the Municipal Center will eventually become obsolete as the primary server for the building, however it may be perfectly adequate to replace another system that is also older and more outdated but performing a lower level function. Additional technology services requiring additional servers, particularly those not operating in a Novell Netware environment must be carefully evaluated in terms of capital cost for hardware and software, and added staff resources required to maintain them.

The City's Wide Area Network (WAN) equipment is an integral and critical part of the hardware that supports all the technology services offered by the City. A diagram of the entire network is shown in Exhibit A. As service demands increase, this system of phone lines, routers, switches, and hubs will also require new equipment and additional capacity. Service demands should be monitored to determine when additional communications lines, fiber-optic lines, and/or wireless services are required. Since this part of the Information Systems Department is virtually transparent to users (unless it stops working), it is easily forgotten.

As demands increase, it is recommended that the cost of updating or replacing this equipment be included in any analysis of service increases.

Copy machines are currently under the purview of the Information Systems Department and consist of Canon IR 400 and 600's leased in 1998 for a five-year period.

Due to budget concerns for the next few years, low use machines have been retained and others replaced under the current lease agreement. This agreement expires in June 2006. It is recommended that a new lease be executed for copy machines during the 2006-06 budget year.

Telephone System, Cell Phones, Pagers, PDA's

The City has purchased a phone system to replace the SBC Centrex system currently used by all City offices. This system will be installed in the 2004-05 fiscal year. This could potentially save significant amounts of money. While Information Systems Department staff must be familiar with this system, it will take time to become completely knowledgeable. Maintenance and support services will be provided by the vendor for approximately three years to accommodate the learning curve to maintain an update this system.

Cell phones and pagers have become indispensable tools and can save significant time by providing quick, convenient access to staff not at their desks. These services are provided by several vendors, and selection of a service is based on the coverage characteristics needed by the individual. At present, the Information Systems Department has an inventory of all cell phones and pagers, however it is very simple for departments to purchase units without the requisite approval.

It is recommended that an annual audit be done of all cell phones and related billings to assure correct accountability and control cost by obtaining the most cost effective plans.

Personal Digital Assistants (PDA's) are becoming common in the workplace along with demands to connect to workstations. The City has purchased several Compaq IPAQ's for various departments. Since these are actually small computers in their own right, it will be imperative that a single standard be maintained to reduce the support required for more programs and operating systems. PDA's and the new "tablet" computers allow City staff in the field to perform tasks without making trips into offices potentially saving significant staff time.

As this technology becomes more readily available and cheaper, it is recommended that an assessment be done particularly for field personnel to determine if this is a cost effective measure that improves productivity and customer service.

Several of the new phones, pagers, etc. have the ability to connect to the Internet though various wireless services. While this technology can be very valuable for specific purposes, at this time it can be quite costly and any Internet connection can be a security problem.

It is recommended that requests for this type service be evaluated carefully and security controls implemented by the Information Systems Department to prevent possible Internet intrusions.

Software

Software used by the City can be categorized into legacy systems and desktop applications. Legacy systems include the Bi-Tech IFAS accounting system used by the City Finance Department, the H.T.E. Public Safety System used by the Police and Fire Departments for dispatching and records, and the Accela Corporation PERMITS system used by the Building Division. While these systems all have limitations and are the most costly, removing them and installing new systems is very cost prohibitive.

For the five-year period in this document, it is not recommended to replace any of these systems, however data integration will continue to be a problem unless respective companies provide and support interfaces to other programs such as the GIS system. Some City departments use a time card program that is a custom application written for Microsoft Access 97. This package will require updating in the near future as the data base program is becoming seriously outdated.

It is recommended that funds to update the Time Card program be included in the 2005-06 budget if the new IFAS 7i software does not have a suitable time card program.

City desktop applications for workstations primarily use Microsoft Windows NT or 2000 for Workstations as the operating system with a Novell Netware client that provides connectivity to the network.

It is recommended the Information Systems Department continue migrating to Windows 2000 and all new systems purchased with the Windows operating system.

The City has currently adopted the use of the Corel Office Suite with Word Perfect, Quattro Pro, and Presentations as the official City standard. There is also a need for many people to have the Microsoft Office package consisting primarily of Word, Excel, and Power Point. Since there is a demonstrated need for both packages and passionate loyalty to certain software by employees, it is likely that a single standard will not be acceptable.

It is recommended the City continue to make Microsoft Office products available as much as possible in order to facilitate file exchanges with other agencies.

It is recommended Adobe Acrobat Portable Document Format (PDF) files be used as an alternative to file conversion between software packages and as a method of exchanging files.

The City standard Novell Netware network operating system is cost effective, functions reasonably well, and provides a significant level of protection from viruses, worms, etc. The use of "open systems" such as Linux and Open Office is rapidly evolving. These software packages are initially free of charge, however programming experts and support services must still be provided. In the future, these systems may be a potential cost savings, however the City must carefully consider the impact of converting the extensive collection of existing documents and operating systems to non-standard systems that may not be compatible with other agencies and businesses.

At this time, it is recommended Novell Netware continue to be the network operating system standard as it is not cost effective, and very disruptive to change a network operating system.

The GroupWise City standard e-mail system is a very powerful, functional and stable e-mail system that also provides calendaring, task management, junk mail handling, and other desirable features.

Since this system is compatible with all other major e-mail systems, its continued use is recommended. No other e-mail programs such as Microsoft Exchange should be installed to prevent potential conflicts and virus exploitation.

The City website is currently managed by City staff using the "Manager Console" software developed by Matson and Isom Technology Consulting. The website is also hosted by this firm.

As the web site evolves with more information and E-government services, this system should be brought in-house as the software is very limited and not able to accommodate future needs.

City departments use a large collection of software packages for specific purposes. This obviously leads to increased demand for support from Information Systems Staff. Software also evolves and adds features and functionality to respond to user requests, however that also generally leads to more complex installation and update requirements. Of particular note are software packages that require a Microsoft network server and operating system that is problematic for the Information Systems Department staff as the current network environment is Novell Netware.

It is recommended that budgetary and interoperability concerns be thoroughly evaluated prior to implementing any software packages or data base services requiring a Microsoft server.

Intra-Departmental Data Exchange

The City legacy systems, IFAS, H.T.E., PERMITS and the ESRI GIS system are all separate data bases that do not exchange information easily. This requires multiple and redundant data entry on the part of City staff. Custom interfaces, generally done by outside specialists, can be written to allow transporting data between applications, however care must be taken to clearly define what is needed and also how the programming will be maintained. Commitment to custom programming such as interfaces will require added staff with expertise in the specific area, or a long term commitment to maintenance services. Since software changes, any programming to accommodate data exchange must change also. In some cases, this can be very expensive and difficult to do.

As pressure increases to provide “end-to-end” tracking, data base management, financial services, and E-government services, it is recommended the City continue to explore methods to integrate the various data bases by retaining professional services, or purchasing added modules for existing software that can provide the needed interfaces.

Custom programming including data base interfaces should be done through professional services agreements with specialist in this area.

Information Systems Department Policies and Procedures

The current Administrative Procedures and Policies (AP&P's) were adopted in 2001. A copy is attached in Appendix A. The AP&P's provide City employees information regarding the use of City equipment, e-mail and Internet services. This information is distributed to all employees and is given to all new employees when they are hired. These policies clearly address the City expectations from employees using City technology services and equipment.

It is recommended that the AP&P's be reviewed periodically to assure they are up to date and any appropriate revisions incorporated.

At present, there is no “cyber-cop” enforcement to assure employees comply with the requirements and it should be noted that the ability for anyone to access the Internet and download programs can be problematic. The demand on technical support staff to repair systems that have been corrupted by downloaded software is increasing and is becoming a drain on the Information Systems Department staff.

It is recommended that the ability to download and run executable programs be blocked on workstations to enhance the reliability of the systems and reduce service calls.

Fees for service philosophies vary in government and with technology becoming increasingly expensive and required to conduct business, the City needs to determine if fees for services and the added technology cost for services provided electronically will be established.

It is recommended that an analysis be conducted by the Information Systems Department to determine which systems could be funded from existing fees, or by implementing new fees, and a report made to the City Manager.

Equipment Replacement Policy and Funding

The City currently has an equipment replacement fund for all equipment including computers and related equipment. This does not cover the leased systems for Finance (HP 9000), the Police or Fire Departments (IBM I SERIES's). The amount of funds required is based approximately on an inventory of equipment, the original cost, and the expected life span. In general, replacement of workstations and servers is based on the technology needed, not just age. For example, higher end workstations for CAD or GIS purposes are re-assigned within departments to clerical people using older, slower systems. These systems are subsequently surplus as they are no longer useable.

While this practice requires additional staff time from Information Systems, it has been cost effective and it is recommended to continue. Installing thirty to forty computers is

time consuming therefore it is recommended that additional staff on an hourly or part time basis be obtained to expedite the installations.

In order to continue to provide funds for technology services, hardware, software, etc., it is recommended the City investigate and if possible, implement a technology fee. If possible, fees should be structured to include capital and operating costs, including staff time.

Wireless Services

Wireless services are currently provided to the City Police Department patrol cars, however this service currently provided by AT&T will be discontinued in 2004. An alternative system is being proposed by AT&T, however, there are limitations and cost remains a question. The Information Systems Department is currently evaluating alternatives to provide this service.

It is recommended the Information Systems Department and Police Department investigate alternatives to the A.T.&T. system with costs and services identified prior to changing systems.

A city wide wireless network may be within the realm of possibility in the near future. This could provide services to City staff for various purposes, and potentially the general public. The Fire Department has requested wireless services be provided to field apparatus to provide quick, easy access to information vital to firefighters.

It is recommended the Information Systems Department investigate alternatives and costs to provide a City owned system.

It is recommended that alternatives to provide wireless services to Fire Department apparatus be evaluated and proposed for future budgets.

Information Technology Disaster Recovery Plan

It is recommended the City of Chico provide detailed and functional information specific to disaster recovery plan to the consultant that is currently preparing the City Emergency Plan.

Police Department Services

The Police Department is participating in a multi-agency collaborative project to provide the quick, easy exchange of data between law enforcement agencies. Participating agencies are attempting to secure grant funding from State and/or Federal agencies to provide these services. A memorandum of understanding has been executed by the participants authorizing Matson and Isom Technology Consulting to coordinate this effort and apply for funds.

It is recommended the City continue to participate in this effort and provide technical expertise where needed. In the event funds are made available for this project, design and installation details must be provided to the City Information Systems Department and a budget analysis done to determine ongoing costs. The system design should be able to accommodate additional public safety agencies including fire departments.

It is recommended that issues with the existing H.T.E. system previously evaluated by Matson & Isom Technology Consulting continue to be addressed and improved by the Police Department and Information Systems staff including standardization, validation and clean up of the existing data base to provide better, and more consistent reports. Police Department staff should receive added and continual training on the use of this system to maximize the use of this system.

It is recommended that technology to allow field reporting by police officers be continually evaluated and tested including the use of a CITRIX server type application. At such time as a viable solution is approved by the police officers, a project should be included in the City budget.



Cost estimates have been prepared as follows for certain projects identified in this report. As technology projects are considered, careful consideration must be given to assure that all items for capital and operating budgets are included.

E-Government Services

Business license form & payment	\$1-2k
Employment Application	Completed
Additional PDF-based forms	\$500/frm + \$500-\$800/pg, based on complexity
Online credit card payment	
Internet merchant account	
VeriSign PayFlow Pro license	\$250 setup; \$60/mo.
Creation of overall E-commerce logic for Web and database	\$12-15k
Payment of parking fines	\$2k, integrated with E-commerce logic above
Website improvements	
Service request form, routing & tracking	\$4-5k,
Web site content updates	10-15 hr/wk
Ongoing navigation updates;	
overall site organization 5 hr/mo.	\$600-\$700 if outsourced
Community Calendar:	\$0-10k, depending on desired features
	10hr/wk
Online community forums	\$4-8k, depending on desired features
Website hosting	\$1,720/yr outsourced
In-house Hosting:	\$10k one-time, increased bandwidth use
Consultant services to assist in	
Moving web-site in house.	\$10,000

Financial Management System

Bi-Tech IFAS version 7i including hardware and support services.	\$130,000 for first year capital and operating
Time Card update/re-write	\$45,000 to move to new data base program
Business License Program (HDL)	\$50,000

GIS Services

GIS Hardware

The City of Chico policy provides for the replacement of computers approximately every three years for GIS and CAD systems. These users have the most advanced and up to date systems in the City. The graphical and database-processing nature of GIS requires more than the average workstation used by clerical staff, thus the budget must provide for high-end systems as follows.

GIS Workstations	\$ 4,000 ea.
Network Server: 2.4GHz or better processor, RAID 5-configured	\$15,000 ea.
36.4GB drives for storage of filters, AIT2 or similar backup system	

Cat 5 network wiring, as needed	\$ 200 per drop
High-speed large format plotter	\$10,000 ea.

GIS Software

GIS software is currently loaded on workstations with the data base loaded on a network server. Larger GIS applications generally are server based and require additional server hardware and software. Should the City decide to expand GIS services, cost estimates will be required for these additions.

The City of Chico in general is using Environmental Systems Research Institute (ESRI) products for its geographic information systems software. ArcEditor and ArcView licenses are on a yearly maintenance contract. The City also uses the AutoDesk, Inc., family of products for its computer-aided drafting software. All AutoDesk products are on a yearly maintenance contract. All departments/divisions using geographic information systems or computer-aided drafting software are required to coordinate their purchases through the Information Systems Department.

The software used by the City for GIS is from Environmental Systems Research Institute (ESRI) and other third party providers. There are four levels of GIS users in the City:

- Professional -These users administer, create, maintain, and use complicated topological spatial data sets. These users create applications for ArcGIS (ArcEditor, ArcView) in Visual Basic for Applications (VBA) programming languages. These users can be found in Planning, Engineering, Police and Fire Departments.
- High Desktop - These users create, maintain, and use complicated topological spatial data sets. These users create applications for ArcGIS (ArcView) in Visual Basic for Applications (VBA) programming languages for their departments. At least one user in each department should be trained at this level.
- Intermediate Desktop - These users use ArcGIS (ArcView & future use of ArcIMS) to join spatial data sets to derive information. These users use ArcGIS to query and map attributes from the Bi-Tech IFAS, Accela Permits Plus, and other data sets. These users are found in all departments.
- Low Desktop - These users use ArcGIS (future use of ArcIMS via an intranet browser interface, ArcExplorer, or ArcView) to query and map attributes for information only in the GIS. These users are found in all departments.

Software and Associated Costs

(Prices listed are standard list prices with no discounts or special offers considered, as of January 1, 2003)

Software	Price (First License)	Maintenance Costs	Primary User
ArcGIS (ArcEditor)	\$ 7,000	\$1,500	Professional
ArcSDE (to be used with a RDBMS such as SQL Server, DB2, Oracle, Informix)	\$10,000		Professional
Spatial Analyst (formerly GRID)- works with all ArcGIS products	\$2,500	\$1,250	Professional
ArcGIS (ArcView 8.x) Single Use, Concurrent Use (ArcView 8.1 comes with 12 months of maintenance) ArcView 3.x (maintenance is additional)	\$600 ea/ x 15 licenses = \$9,000	\$400 (1 st license), \$200 (per each add'l) = \$3,200 (none at this time)	High - Low Desktop

Network Analyst (for ArcView 3.x & later 8.0)	\$1,500	\$ 500	High - Intermediate Desktop
ArcIMS	\$7,500	\$1,500	General Public/ City Staff
ArcExplorer	Free	Free	Low Desktop
ArcView	\$1,800	\$180	Professional

Web-based GIS Estimated Costs

GIS Planning

The following table of budget estimates from staff at GIS Planning shows the costs involved in contracting GIS Planning, Inc. to provide web-based economic development-oriented data for the City of Chico, general public, and other agencies:

Description	One-Time Costs	Yearly Costs
Initial setup cost	\$ 5,500	
Yearly maintenance costs		\$18,000
Contingency for additional features	\$15,000	
Communication lines		\$ 2,400
Totals	\$20,500	\$20,400

GeoSmart/MoosePoint

The MoosePoint software costs in the following table data were obtained from Bruce MacLaren. MoosePoint would require both a database server and a web server, both running GeoSmart editions and ArcIMS. The City will also need appropriate communication lines for intranet use of the GIS software.

Description	One time	Yearly Costs
Enterprise Edition (incl. implementation & Training)	\$21,000	\$4,200
Runtime Edition (for one additional (web) server)	\$7,500	\$1,500
ArcIMS license	\$7,500	\$1,500
Database server hardware, licensing	\$10,000	
Web server hardware, licensing	\$10,000	
Communication lines		\$2,400
Totals	\$56,000	\$9,600

Omega Group

The Omega Group has created Police- and Fire-specific applications using GeoSmart. The following costs are for in-house GIS use only. Separate budgets will need to be created to provide for wireless connectivity and servers/equipment for Police or Fire vehicles or PDA use of these applications.

Description	One-time Costs Includes Training & Implementation	Yearly Maintenance Fees
CrimeView, 1 seat	\$25,000	N/A
FireView, 1 seat	\$25,000	N/A
ArcIMS license	\$7,500	\$1500
Totals	\$57,500	N/A

Wireless Services

Wireless services are evolving rapidly and costs vary depending on the quality and reliability of the services. The estimates below are provided to allow comparison of costs between services and will require updating prior to actual purchase as they will likely change. A comprehensive report on wireless services is attached as Appendix E.

Costs for Wireless WAN, City-Wide Services

The costs below are for a full, 10-site implementation, linking all City facilities together and possibly replacing the current T-1 infrastructure. These costs assume site surveys have determined that each site can communicate with others without interference. Depending on the service chosen, additional ongoing costs will be incurred.

Description	Unit Cost/description	Costs
Cisco Aironet 1400	10 x \$5,995 per site	\$59,950
Cisco Secure Access Control Server Solution Engine 3.2		\$11,995
CiscoWorks Wireless LAN Solution Engine		\$2,995
Site surveys, Installation costs	10 x \$16,250 per site	\$162,500
Total Cost		\$237,440

Wireless Costs for LAN Use

Description	Unit Cost/description	Costs
Cisco Aironet 1200	\$1,295/unit	(Qty Unknown)
Cisco Secure Access Control Server Solution Engine 3.2		\$11,995
CiscoWorks Wireless LAN Solution Engine		\$2,995
Total one-time costs (for one unit)		\$14,990
Network configuration	180 hours @ \$125/hr.	\$22,500
Site Survey	10 hours @ \$125/hr.	\$1,250
Total Installation costs		\$23,750

Document Imaging – From the E-Visory Associates Report

The following summary shown in *italic* is from the E-Visory Associates consulting report done in 2002.

Tangible Gains from Implementing the IDM System

Caveats

In the numbers below, we have not factored in cost recapture, such as might be obtained by:

Selling used storage systems (file cabinets, movable shelves)

Cost savings in office supplies (staples, paper clips, manila files, storage boxes, new file cabinets, etc.) other than copying costs.

Eliminating other document related expenses, such as microfilming.

We have also not tried to estimate for inflation, but instead have used current pricing across the five year evaluation interval.

Tangible Gains

1) Increased Staff Efficiency

We see a reduction in staff time spent locating information (including locating files that are in use), copying documents for review, and filing duplicate copies. The time now spent filing paper would become the time spent adding a document into the library.

Average of 60 minutes per week for 100 employees, at a cost of \$12/hour per employee.

5 Year Savings: \$300,000

2) Reduced Copying Costs

The elimination of multiple copies of documents should reduce the City's reproduction costs. Approximately 150,000 (1/2 of 300,000) sheets per year at a cost of \$.05/sheet over 5 years
5 Year Savings: \$37,500

3) Reduced Storage Space

We estimated that City-wide almost 40,000 square feet are being used for storing paper. At a commercial space rate of \$1.25/square foot/month, this represents \$50,000 per month, \$600,000 per year, and \$3,000,000 over five years. Not all of this space can be quickly or economically be recovered, but as the City converts to electronic documents and begins to destroy out of date records, it should be able to convert some of its filing and storage space to other uses, rather than build or leasing additional space. We have estimated that, over five years, an average of approximately 1,500 square feet in the City Administration building, the Police Headquarters, and Fire Station One, can be freed, at a value of \$1.25/sq. foot/month * 60 months (\$75/sq foot space saved).

5 Year Savings: \$112,500

We estimated the floor space used for document storage in Building 400 at approximately 30,000 square feet. Over the five years, an average of 7,200 square feet of file storage in Building 400 should be freed as the rate of new storage drops below the disposal level, at a value of \$1.25/sq. foot/month * 60 months (\$75/sq foot space saved)

5 Year Savings: \$540,000

Estimate of Total Tangible Savings to be obtained by Implementing IDM over a five Year Period:
\$990,000

Intangible Gains from IDM

Not all the benefits from implementing this technology can be easily quantified. Many of them deal with potential liability or exposure. We have identified the following items:
While public inquiries have not, so far, become a significant factor, they have the potential to do so. Implementing an electronic system permits Chico to provide "self-service" inquiries from a public access station.

So far the City has not had to respond to a major request for records, nor had to certify that it has produced all relevant records to a court. Today, such a request would consume a significant amount of staff time across all departments. In addition, with the large number of paper copies being created and filed by departments, it would prove difficult for the City to prove that a document did not or no longer did exist.

The most critical records of the City are maintained only in the Municipal building. A fire in only a small area of the third floor would destroy the originals for all City legislation, all City contracts, and all current City litigation. In fact, any accident to the roof or the sprinkler system would result in wide-spread damage to essential records. The City does not currently have any secure storage area, but in our opinion, it could not afford to build a vault large enough to handle its essential records.

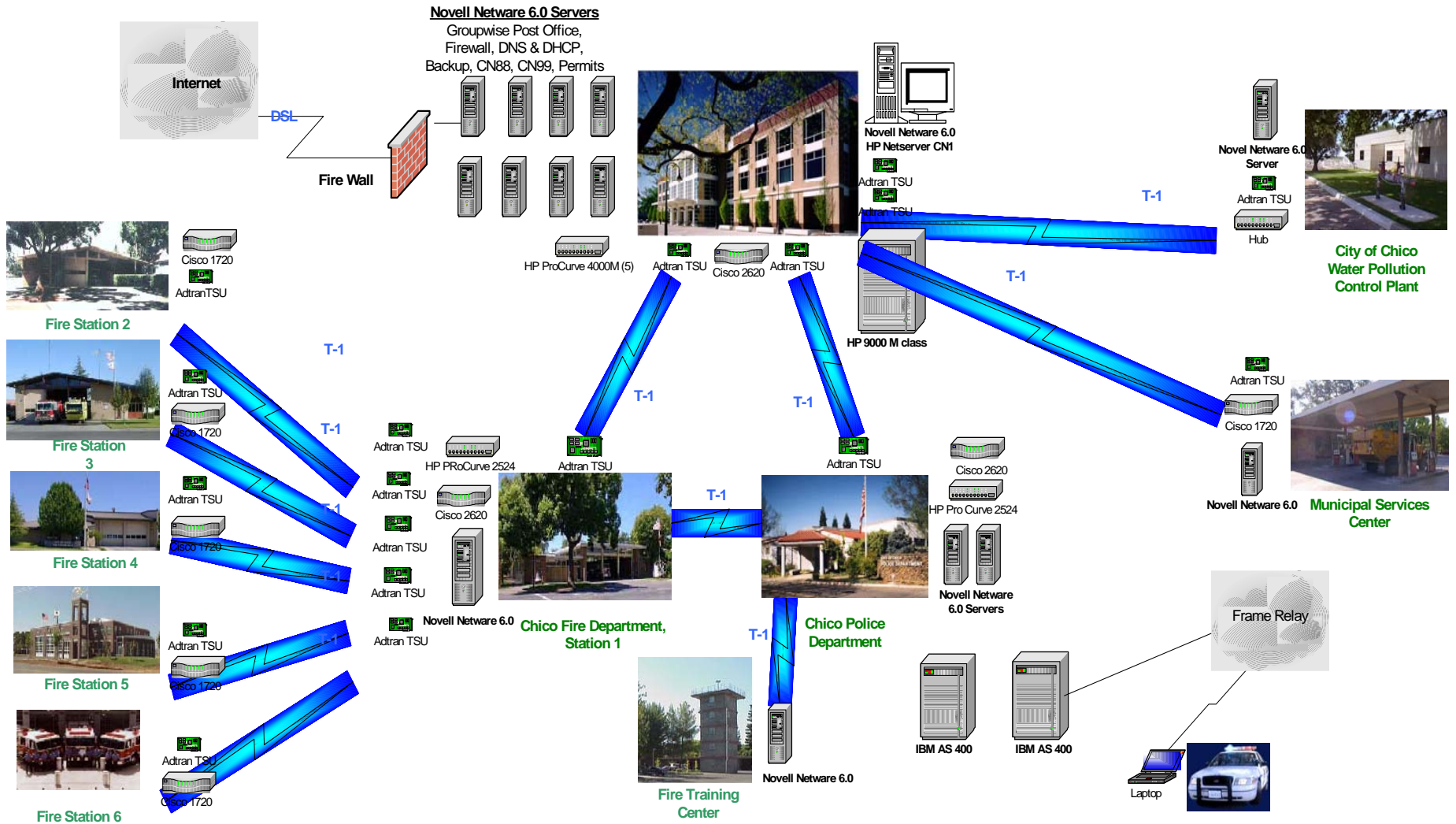
Estimate of costs to implement IDM System

We estimated the costs for the City to purchase and operate their own IDM systems. During the RFP, this option should be compared with proposals from service bureaus.

Purchase Costs

<i>Hardware</i>		
<i>PC Servers</i>	2 x \$5,000	\$10,000
<i>Production Scanners and Workstations</i>		
<i>High-end PC's with 21in monitors</i>	5 x \$2,000	\$10,000
<i>Medium volume scanners (22 ppm)</i>	3 x \$7,000	\$21,000
<i>Large format scanner</i>	1 x \$17,000	\$17,000
<i>Low volume scanner (15 ppm)</i>	1 x \$3,000	\$3,000
<i>Optional low-end scanners</i>	\$500 ea.	
<i>Optical Storage</i>		
<i>Public safety jukebox</i>		\$8,000
<i>Municipal jukebox</i>		\$30,000
<i>Software</i>		
<i>IDM software</i>	3 libraries	\$80,000
<i>COLD for Finance Dept.</i>		\$5,000
<i>Total Purchase Costs</i>		\$184,000
<i>Maintenance costs (18% of purchase price per year)</i>	5 years	\$165,600
<i>Operations Staffing</i>	5 years	\$200,000
<i>Training costs</i>		
<i>Administrator training</i>		\$10,000
<i>User training</i>		\$10,000
<i>Total estimated acquisition costs</i>		\$569,600
<i>Cost Savings</i>		
<i>Ratio of Savings (\$990,000) to Cost (\$569,600)</i>		1.7

City of Chico Information Systems Department Wide Area Network



Appendix C

As the City moves forward with the ability for citizens to pay for City services via the Internet, credit card acceptance becomes an issue. The City needs to develop policies and standards for two reasons: Citizens expect consistent services from the City regardless of whether we provide that service in person, over the phone or via the Internet;

Standards are needed to ensure the City is selecting technology that meets the business requirements. Standards for citywide credit card acceptance apply to all types of credit card transactions across the city – not just the Internet. This meets the goal of presenting a single view to our citizens when they pay for services whether they pay in person, via the phone or on the Internet.

Privacy Policy

Internet users want to know who is collecting their personal data, how it will be used,

and how its disclosure will be limited. Citizens want reasonable access to information collected about them and an effective means of recourse. Chico needs a published privacy policy for the public addressing these issues and City policies and procedures that support the external privacy policy.

Advertising/Branding

Advertising on the Web has introduced many new variables.

Municipalities vary in their approach and decision to use or not use advertising to obtain revenue or promote the community, as well as City services. The City will need to address, from a policy standpoint how or if advertising will play a role in our strategic Web direction.

Fees for Service

Fees for service philosophies vary in government and e-government is no different. The City needs to address whether we will charge different fees for services based upon how the service is delivered – in person, over the phone or through the Internet.

Assessment

Continual assessment of requests for e-services from the public and must be formally addressed. What is known today will drive the current planning effort, but flexibility and listening continually to the public must be incorporated to adjust what the City offers tomorrow. Today citizens are seeking:

An easier way to navigate the Web site with easy-to-find information

A web site organized by how the public views the world, not how the City views the information

A central community events calendar depicting events across the City including free or low-cost events for children and seniors

The opportunity to fill out and process any necessary City forms online

Online registration for City-sponsored events

Live web cameras to view City areas or events

The ability to pay online

Personalization or customization of the Web site to suit individual needs, and the ability to select the view or specific content they wish to see

Online license renewal

Online job applications

City News subscriptions

The opportunity to view Council meetings online

A variety of maps and diagrams of the City

Referrals to government and visitor information from our site – as they often do not know which sector (county, state, chamber of commerce, etc) provides a specific type of information or service.

In the next 12 months, the City will address more structured methods to obtain ongoing assessment information from the public and employees regarding electronic delivery of government information and services – and seek to adjust the plan accordingly. This assessment process will continually collect and monitor public and employee interest and desire for electronic delivery of government services.

Information Technology Project Implementation

The following best practices for Information Technology Project Management are included for reference and to assist City Departments to remain on track with technology projects from concept to completion. This implementation scheme can be used as general guidelines when developing and implementing projects.

Initiation

- Define a project charter that describes the following items:
 - Project description in 25 words or less (why is the project needed, why now, how it fits with the Information Technology Master Plan vision)
 - Defined project and business objectives (“SMART,” or specific, measurable, agreed upon, realistic, and time-bound)
 - Scope of the project (business and technical boundaries)
 - Organization (who’s on the team, what skills do they bring)
 - Constraints (limits: Finances, time, locations, technology, resources, standards)

- Assumptions (areas of uncertainty, risk areas)

Reporting (who reports to whom, when, what format, frequency)

Deliverables

- High level; must include a sign off process, where the Information Systems Director and/or City Manager approves the project deliverables
- On high level projects, and particularly on those which involve inexperience on the Information Systems staff's part, a risk assessment must be performed

Define business risks, such as service or business risks, interference with other projects, City image

Define project risks, such as the potential for the project to go over budget, be late, or never be fully implemented

Define system risks, such as the potential for the system to miss essential functionality, contain unidentified errors, be rejected by users, uncertain performance in speed, support expense

Planning

- Define a clear work breakdown structure (project tasks, milestones in logical sequence, involve the entire team in brainstorming)
- Estimate time
- Provide a detailed schedule for the project
- Execution

Close out

Major Information Technology Projects

Project Description	Departments Affected	Implementation Costs	Timeline
GIS	All	\$200,000	3 years
E-Government	All	\$NA	Ongoing
Document Management	All	\$570,000	3 years
Wireless for Mobile Users	All	\$150,000	1 year
Phone system replacement	All	\$350,000	1 year
Outsourcing Technical Services	IS	\$?	Ongoing

APPENDIX D

Wireless Communications Services

Introduction

The City has a potential need to offer wireless services to mobile workers within City buildings and around Chico. This Technical Appendix gives an overview of available and future technologies and where they may fit into three categories; Public Safety, WAN, and LAN.

Due to constantly changing technologies, it is very difficult to predict wireless technology services available five years in advance. Options considered here are based mostly on technologies with associated standards, true scalability, and future plans to increase service with limited or no hardware implications.

Wireless technology is evolving rapidly with many new companies and services to choose from. The services are becoming more usable and cost effective to more people; however, the connection equipment and services offered change frequently, making long-range planning difficult. Various wireless services should be continually evaluated to determine functionality and potential services that may provide alternatives for City services. A detailed site survey will be required for the City of Chico to implement a City owned wireless infrastructure. Remote sites may only require a single access point, making the setup quicker and less expensive. For security reasons, it would be necessary to separate the wired LAN and wireless LAN into Virtual Local Area Networks (VLANs).

One major drawback to wireless use is a clear "line of site" required at each remote point that make up the backbone infrastructure. The geographical layout of Chico may not be conducive with the amount of trees and buildings that may interfere with transmissions. This results in dropped connections and possible data loss similar to digital cell phones losing connections.

Security concerns must also be addressed with any wireless service particularly when dealing with potentially sensitive information. The Department of Justice has specific requirements that must be addressed for the Police Department using wireless services.

The scope of this section moves beyond just law enforcement. When considering technologies, Chico Fire and Public Works was also considered. Possible usages for these departments are Building Maps for fire, and GIS for Public Works. The possibilities are many.

Vendors researched

Many vendors were explored for this project. Most of the vendors have technology that is cutting edge and not used in many other departments or cities. An overwhelming majority of the cities chose to stay with solid, standardized cellular technology. Most of the other wireless offerings are non-standardized, yet often times offer more bandwidth and speed. Many of these technologies will be discussed later in the future technologies section.

Specific network companies which were evaluated were Verizon, AT&T, and Sprint. These were chosen because they are industry standard, and proven.

Other options in this area would be to purchase a proprietary system and have a proprietary network without touching one of the major companies. These options will be discussed in future technology section later in this document.

Specific applications for encryption, security, and access which were evaluated were Padcom, Netmotion, and Infowave. During the research process these names were mentioned most as industry standard. Each offers it's own unique set of features, which will be discussed in the next section.

Server (Middleware) Applications

Infowave

Infowave offers a product called "Wireless Business Engine" (http://www.infowave.com/products/ent_symmetry-wbe.asp). All products reviewed have certain aspects in common, encryption (security), network optimization (compression), and communications reliability.

Infowave's architecture is connector based. This means that the server manages connections between backend applications (i.e. E-mail), and the mobile devices. The mobile device has an agent installed that handles the communication and compression.

Encryption is handled by a 163 bit Elliptical Curve Cryptography (ECC) algorithm. This encryption is end to end which means it is encoded at the device and decoded once securely on the host network.

The transferring of data is intelligently managed by the device and the server. This intelligent management of data allows for "dead spots" and network congestion.

Infowave architecture is known in the industry as extremely difficult and time-consuming to setup. The major drawbacks include lack of standardized authentication such as Kerberos or LDAP. Infowave is also not compliant with Federal Information Processing Standards (FIPS) 140-2 and Health Insurance Portability and Accountability Act (HIPAA).

Padcom

Padcom offers the Connectivity Suite (<http://www.padcomusa.com/connectsuite.html>) which consists of four separate applications. These applications include; TotalConnect, TotalRoam, TotalSecure, TotalControl.

TotalConnect is the foundation of the suite and manages all the wireless devices in the field. TotalConnect makes all devices look the same to the network whether they are using dynamic or static IP's, Packet-Switched or Circuit-Switched networks. The main function is to seamlessly integrate all roaming users.

TotalRoam manages devices as they move between one network to another. An 802.11a network may be located in the parking lot of the police station allowing fast transfer of data, as the police car drives out of the parking lot TotalRoam will seamlessly switch the network unbeknownst to the end user. Certain large data may be queued for delivery once a faster network is established. These parameters are administrator configurable.

TotalSecure is the encryption piece of the suite. The administrator has a choice of three encryption algorithms; ARC4 (128 to 2048bit), 3DES (192bit), AES (128, 192, or 256 bit), the latter being the new Department of Commerce standard. All of these algorithms are DOJ approved. Encryption occurs on the device and is decrypted once securely on the host network.

TotalControl is a firewalling feature offered by Padcom. It enables administrators to allow certain clients only access to certain ports, or applications. It also gives administrators the ability to manage which applications are available based on network bandwidth availability.

Padcom has the most robust system available for wireless data communications. Although it is the most complete, it is also the most expensive (Twice as much as the competitors). Other drawbacks include a difficult installation and configuration.

Netmotion

Netmotion offers authentication, encryption, seamless roaming and compression. Netmotion also offers the ability to roam between converged networks such as 802.11x networks and Circuit-Switched networks automatically locating hot spots.

Netmotion for use with the City of Chico will not require a major investment in server hardware. 100 – 250 users will easily install on a standard intel-based Windows Server or an existing Windows-based

server. Application integration is seamless as Netmotion optimizes network applications to run over a chosen wireless link.

Netmotion is comprised of client and server hardware. The client "agent" handles the encryption and compression and communicates with the server during network transitions.

Encryption standards are lower than that of Padcom but are still DOJ compliant. Supported algorithms include, AES, TwoFish, 3DES, or DES.

VPN support is very robust in that Netmotion offers support for many technologies. These include; PPTP, L2TP/IPSEC, IPSEC, Nortel and Cisco. Single sign-on capability is offered with the Cisco VPN product. Supported authentication includes Kerberos, LDAP, Radius, and PKI.

Netmotion offers full support for most wireless LAN and WAN technologies.

Pricing is based on a per user basis, as well as a flat fee per server. Currently AT&T is offering a free Netmotion Server and up to 100 clients with a signed 1 year contract on the AT&T GSM\GPRS wireless network.

Wireless Providers

Verizon

Verizon offers a service called Mobile Office http://www.verizonwireless.com/internet_data/mobile_office/index.html. Verizon is a little behind the times with its service and coverage is limited in Chico and surrounding areas.

Sprint

Sprint Vision is a valid contender in the Chico area. Coverage is excellent and the service rivals that of AT&T. More detailed coverage detail and technical analysis should be completed before a choice is made on a network provider. Sprint and AT&T are very close in offerings and price.

AT&T

If a recommendation needed to be given today, it would be AT&T. This choice would be based solely on pricing and rebates. Since the City of Chico is already using the AT&T network, they are entitled to cost savings and rebates to the effect of ~\$15,000. Also, AT&T offers a government program for additional savings which the City already participates in.

AT&T seemed to be more knowledgeable and have a better presence in the north state area. This may have been a perception based on the people who were interviewed.

Cities using wireless technology

Bellevue, WA

- Network Provider: AT&T
- Wireless Technology: GSM/GPRS
- Middleware Provider: Infowave
- Network Access Device: Sierra Wireless PC Cards for laptops and PDA's
- Comment: "Because of Rapid Changes in technology, don't make expensive long-term investments – spend in small chunks." - Toni Cramer – CIO, City of Bellevue

Sulphur Springs, TX

- Network Provider: Sprint
- Wireless Technology: Vision (Sprint's CDMA 3G)
- Middleware Provider: Sky Stream Technologies (Local carrier)
- Network Access Device: Novatel Wireless 3G Cards

- Comment: "We are having some success and some problems." –Robert Stidham – Asst. Chief of Police, Sulphur Springs, TX PD

Oakland, CA

- Network Provider: AT&T
- Wireless Technology: CDPD
- Middleware Provider: Padcom Connectivity Suite
- Network Access Device: Panasonic Toughbook CF34
- Comment: "We are having some success and some problems." –Robert Stidham – Asst. Chief of Police, Sulphur Springs, TX PD

Best Technology

A recommendation of a long-term provider would require more thorough investigation including coverage maps as well as physical coverage testing. AT&T would be favored due to the rebates involved, but other factors may be more conclusive.

ATT GSM/GPRS

Coverage area would be the only question. Physical testing would need to be performed to acquire more conclusive data.

Sprint Vision

The up front cost of Sprint may be a deciding factor. Since the City chose AT&T for CDPD, they are offering to waive fees and rebate old equipment based on time in field.

Security Implications

To meet DOJ standards, it is recommended to use a middleware provider which already meets DOJ minimum requirements. The client encryption mechanism recommended above, Netmotion, is fully DOJ compliant.

Recommendation for City of Chico Police Department

The recommendation today would be a combination AT&T GSM/GPRS and Netmotion Middleware. This recommendation is based on cost and needs. AT&T would be the least expensive due to the rebates and waived installation fees. Netmotion has the least difficult installation issues, and is also being offered free with the conversion to the AT&T network (This offer is for a limited time). As described above, more detailed review of coverage areas, and bandwidth would need to be completed before a final decision is made.

Future Technology

Chico has local companies providing emerging wireless technologies. Two of which investigated are Zephyr Communications and Digital Path.

Zephyr

Zephyr Communications (<http://www.zephyrcommunications.com>) is a wireless startup company in Chico. Zephyr will offer coverage throughout Chico from a single, centrally located tower.

The technology that Zephyr uses is called Licensed Wireless Broadband. This means the band is private and proprietary. This adds to security and increases bandwidth availability. This technology works in tandem with SOMA Networks technology which will be the hardware used for the tower equipment and end user equipment.

Currently Zephyr does not offer a reliable service for mobile users, but is expected to be available by Summer of 2004. This technology is one to watch as it will increase bandwidth drastically.

Digital Path

Digital path has been deploying broadband to residential users within Chico. It is currently not marketed for use with mobile technologies, but the ability to do this is expected soon.

The technology is available for mobile users, but there is not a big enough need at this time to deploy.

Digital Path uses 802.11x technology with a number of residential users acting as Wireless Access Points throughout the City. The signal is transmitted from these points to nearby users and to the next access point.

Both Digital Path and Zephyr are still in their infancy, but will be viable candidates for use in the City in the near future. The benefit of these companies is they are local and will be willing to work with the City to provide for the needs of the City users.

Seamless Roaming (Service Continuity)

Seamless Roaming or Service Continuity are concepts of hopping from one network to another or from one access point to another. This technology is emerging due to needs of the mobile user.

Padcom and Netmotion build in this ability in their software offerings, and Lucent has created hardware to allow this ability. Many other companies have offerings that would fall out of the scope of this project.

Lucent (Mobile IP)

Hardware to allow seamless Roaming, usually sold to ISP's and Large Network Providers.

Wireless Assessment –Wide Area Network

Wireless Technologies Assessment Introduction

Wireless WAN for the City of Chico could encompass all offices and remote sites within the City. Many proven technologies exist today and many new companies are entering the market at this time. Much of the new venture capital monies are targeted towards wireless WAN and LAN needs, which means the current environment will be constantly changing over the next few years.

The City of Chico has several distinct locations throughout the City currently connected to the wired network including the Municipal Center, six fire departments, the police department, airport, municipal services center, fire training center and water pollution control plant.

Implementing a wireless WAN could partly reduce costs of maintaining and paying for traditional phone lines such as T-1's. Many wireless technologies would also increase the available bandwidth which would be the main reason for installing such a system.

Available Technology

As mentioned earlier, there are many companies providing equipment today, and many companies entering the market everyday. The leader in networking technologies, Cisco Systems (<http://www.cisco.com>), is also taking a leading role in the wireless LAN and WAN technologies. Others include Alvarion (<http://www.alvarion-usa.com>), Buffalo Technologies (<http://www.buffalo-technology.com>), Radio Lan (<http://www.radiolan.com>), Western Multiplex (<http://www.westernmux.com>), and Lucent Technologies Wavelan Products (<http://www.wavelan.com>).

Many of the technologies available today use the 5.8ghz unlicensed band to transmit data based on the 802.11a standards. Many of these offerings have point to point (Increasing bandwidth and distance limitations) and point to multi-point offerings. All of them claim 50mbps throughput or greater at specified distances. Most of the packages include all mounting hardware and antennas necessary to do a complete installation.

The amount of companies entering this market would seem to imply that it will become a viable standard, hence allowing the technology to become a reliable long-term standard. Although it should be said, the industry is fast moving and standards and technologies are constantly changing which make it difficult to predict years in advance.

Other WAN usage (Businesses and Cities)

Many other cities have used this technology to connect municipal buildings and remote locations. Businesses inter-connect campuses and remote buildings using the same technology.

The benefits include no recurring fees, cheaper deployments, no reliance on telephone companies and no trenching or laying wiring infrastructure. The City of Chico currently has a good rate for T-1 lines, and the cost of Wireless may not immediately pay for itself. The most significant factor being bandwidth increase up to 30 times that of T-1.

The City of Chico would also see benefit in the ability to connect far stretching entities such as the airport. The distance of the 5.8ghz point to point technology is 7.5 miles at full bandwidth and up to 20 miles with bandwidth limitations.

One drawback to acquiring these distances is "line of site" would need to be achieved at each remote point. The geographical layout of Chico may not be conducive to this with the amount of trees and buildings that may interfere with transmissions.

Chico Current WAN Infrastructure

Chico currently has a wired infrastructure that would be potentially replaced by this technology at some time in the future. The benefits of the current infrastructure are that the lines are not affected by environmental factors such as weather or distance, and wiring is already installed in most buildings.

The drawbacks are the recurring costs incurred by the City through SBC for the line usage. The cost of the lines however are very reasonable with government pricing.

Currently the City maintains eleven T1 lines to the various City municipalities. The routers would still need to be maintained with the wireless WAN, only the recurring monthly fees would end.

The cost of the 11 T1 lines is \$180\each for a total of \$1,980 per month.

Another way to integrate this technology with the current infrastructure would be to pick out current sites that could use the additional bandwidth that wireless offers, and only upgrade those specific sites. The T1 could be downgraded to a backup system, or removed altogether.

The recommended vendor for use in a Wireless WAN would be Cisco. Cisco currently is not the best technology available, but with the current infrastructure within the City of Chico, it would be the most reasonable and cost effective to implement.

A high level plan would include a Cisco Aironet 1400 appliance at each remote location including Fire Departments, Police Department, Airport, and WCPC. These sites would be equipped with the point to point 1400.

The Municipal center would be equipped with the multi-point version to accept all the incoming connections from remote sites.

For additional security it would also be recommended to use Cisco Secure Access Control Server Solution Engine 3.2, which would increase the security of the access points and bring the administration to a single point.

CiscoWorks Wireless LAN Solution Engine (WLSE 2.0) is a new addition to the CiscoWorks package that allows monitoring of the access points. The addition of this package would allow monitoring of all wireless devices from a single administrative point or remote monitoring via web browsers.

Estimated Cost for Wireless WAN

The cost of the Cisco Aironet 1400 is \$5,995 (list) each. The hardware cost would be incurred at each location.

List price of the Cisco Secure Access Control Server Solution Engine 3.2	\$11,995
List price of the CiscoWorks Wireless LAN Solution Engine	\$2,995
The installation costs per site is estimated at	\$16,250
• Installation: 50 hours @ \$75.00/hr.	\$3,750
• Network configuration: 80 hours @ \$125/hr.	\$10,000
• Antennae Configuration\Site Survey: 20 hours @ \$125/hr.	\$2,500
10 sites	
• Municipal Center	
• Airport	
• WPCP	
• Police Department	
• Fire Department (x6)	
10 sites x \$5,995.00 (Hardware), \$16,250 (Installation) =	\$222,450
One time cost for server software:	
• CiscoWorks:	\$2,995
• Security Server:	\$11,995
• Total:	\$14,990
Estimated Cost Total	\$237,440

Wireless Assessment –LAN

Wireless Technologies Assessment Introduction

There are many possible solutions for the Wireless LAN solution for the City of Chico. Wireless Access Point vendors have been springing up almost monthly. This gives a good competitive market, while confusing some of the decisions that need to be made by IT decision makers.

The considerations are standardization, bandwidth, security and range. The market standard by far is still based on 802.11 standards. Many vendors offer compatibility today with 802.11a and b with upgrades available for the pending g standard.

Uses researched for the City of Chico were use in the municipal center for roaming users, hot spots for mobile users and public use for airport visitors.

Most of the time and cost associated with configuring a wireless LAN is the upfront network configuration (VLAN configuration, cabling [power and network], site survey, etc.). The City of Chico would potentially have a large wireless network in the municipal center where a majority of the City employees reside.

Vendors researched

Cisco (<http://www.cisco.com>) once again was the main vendor researched due to the existing Cisco infrastructure at the City. Other vendors include Alvarion (<http://www.alvarion-usa.com>), Proxim (<http://www.proxim.com>), Entrasys (<http://www.entrasys.com>).

Wireless LAN in industry

The industry today is implementing wireless LANs en masse. Many companies use wireless LAN's to offer visitor's access to the internet, internal users access to network resources from conference rooms and other locations throughout the business campus.

Industrial companies use wireless access points to allow production floor users access to production applications, corporate network and internet access. Shipping and receiving applications can be accessed by truck drivers and fork-lift drivers.

Wireless networking is allowing companies to work smarter and more productively.

Security Implications

It is much easier to pick up a signal from a 802.11 access point than from a point to point wireless device. In general, 802.11 access points use broad spectrum technologies which send the signal in all directions. Potential hackers could pick up a signal from outside of a building and attempt to access private networks.

Many new security protocols and encryption technologies have become available. It is essential to make sure users authenticate and all security policies are enforced such as password length and routine change maintenance.

Authentication is typically handled by a RADIUS server or an authentication hardware device. Variations of the Extensible Authentication Protocol (EAP) work in tandem with many supported authentication types.

Encryption is variable by vendor. Most access points support the Wired Equivalent Privacy (WEP) standard. This encryption technology is known to be insecure at the 40 or 64 bit levels, and somewhat more secure at the 128 bit level.

More secure wireless access points support Wi-Fi Protected Access (WPA) protocol, which improves upon known flaws in the WEP standard.

For the City of Chico to implement a wireless infrastructure, there would first need to be a detailed site survey. Access point range varies depending on geographic factors.

The municipal center would be the biggest implementation as it encompasses greater area and multiple floors. Other factors include steel framed walls and concrete walls which can affect coverage.

The remote sites may be easier to implement as most would only require a single access point. For security reasons, it would be necessary to separate the wired LAN and wireless LAN with VLANs and most likely the infrastructure is not in place to do this at these remote sites.

Full wireless coverage at all remote sites is very difficult to plan within the scope of this paper.

The recommended vendor would again be Cisco for some of the reasons described above. The Cisco Aironet 1200a 802.11a and b compatible access point would be the recommended hardware to allow the wireless technology to scale as standards change. The Aironet 1200a is compatible with 802.11a technology and backward compatible for 802.11b. The g standard which is being standardized at the time of this writing, should be a firmware upgrade from Cisco.

Another benefit of standardizing on Cisco, is the CiscoWorks Wireless LAN Solution Engine will manage up to 2500 access points from a central location or via web access. Also, Cisco Secure Access Control Server Solution Engine adds security and is easily integrated into the existing City of Chico infrastructure.

Estimated Cost Wireless Local Area Network

The cost of the Cisco Aironet 1200 is \$1,295 (list) each. (The true hardware cost will not be known until a detailed site survey is conducted.)

10 sites (Municipal Center, Airport, WPCP, Police Department, Fire Department (x6))	
Municipal Center, 6 Access Points per floor	\$23,310
Airport	\$ 1,295
Fire Department (Six Stations)	\$ 7,770
WPCP	\$ 1,295
Police Department, 6 Access Points	\$7,770

Total Hardware Cost for all facilities **\$41,410**

List price of the Cisco Secure Access Control Server Solution Engine 3.2	\$11,995
List price of the CiscoWorks Wireless LAN Solution Engine	\$ 2,995
Network configuration: 180 hours @ \$125/hr.	\$22,500
Site Survey: 10 hours @ \$125/hr.	\$ 1,250

One time cost for server software:

- CiscoWorks: \$ 2,995
- Security Server: \$11,995
- Total: \$14,990

Grand Total - (Estimated Pending Site Survey) **\$80,150**

Wireless Services and Technologies

Currently IEEE 802.11x is the widely utilized standard, however with a City the size of Chico, IEEE 802.16 may be one technology to investigate. Also known as WiMax, the 802.16x technology is expected to be rolled out in early 2004 and provides ranges between 30 and 40 miles with access speeds of 70 Mbps. This is in large contrast to the 802.11x standard of only 300 feet and 54 Mbps.

SOMA Networks technology currently offers a base station product which boast a three to five mile radius within a metropolitan area and up to ten miles in rural areas all without line-of-site antenna requirements providing access speeds of 12 Mbps.

The two companies below are still in their infancy, but are examples of potential viable vendors for wireless services.

Zephyr

Zephyr Communications (<http://www.zephyrcommunications.com>) is a wireless startup company in Chico. Zephyr will offer coverage throughout Chico from a single, centrally located tower.

The technology that Zephyr uses is called Licensed Wireless Broadband. This means the band is private and proprietary. This adds to security and increases bandwidth availability. This technology works in tandem with SOMA Networks technology which will be the hardware used for the tower equipment and end user equipment.

Currently Zephyr does not offer a reliable service for mobile users, but is expected to be available by summer of 2004.

Digital Path

Digital path has been deploying broadband to residential users within Chico. It is currently not marketed for use with mobile technologies, but the ability to do this is expected soon. The technology is available for mobile users, but there is not enough need at this time to deploy.

Digital Path uses 802.11x technology with a number of residential users acting as Wireless Access Points throughout the City. The signal is transmitted from these points to nearby users and to the next access point.

Wireless Technology for City WAN Use

A wireless Wide Area Network (WAN) for the City of Chico could benefit all offices and remote sites by increasing data throughput and saving on recurring costs. The City of Chico has at least ten facilities located throughout the area which are currently part of a "wired" (T-1-based) wide area network. At some point in time, the wired network will not be able to provide the throughput needed between City offices and added bandwidth will be required. Implementing a wireless service should be considered as an alternative in the future.

Wireless Technology for Local Area Network Use

Wireless Local Area Networks (LAN) are intra-building "unwired" networks. In some instances, wireless LANs could replace or add to existing wired infrastructure. The Municipal Services Center has solved a problem with a wireless service to computers on the shop floor that allows these systems to be easily moved around to vehicles as they are not connected to network cables. A wireless LAN in certain facilities (e.g., the airport, or Municipal Center) could provide additional access for wireless notebooks or PDA users, enhancing the wired network or providing network access where it currently does not exist.

Future wireless systems must be carefully evaluated to assure reliable service as metal frame buildings such as the Municipal Center and the Police Department have been known to experience some problems. Converting to a wireless network in a building that already has a satisfactory wired infrastructure in place would not be cost-effective; however in buildings that have old or suspect cable, a wireless system may reduce cost by eliminating the need to replace old cables.

Security Implications

Many of the systems described above use the 802.1x security standards. Most of these offer common authentication security such as Radius, TACACS. Cisco offers a number of variations of the EAP protocol (rfc 2284) for hardware authentication and is compatible (A free IOS upgrade may be necessary) with most Cisco devices.

WEP keys are generally used for encryption, which would be managed by the devices.

Wireless Technology for Mobile Users

The current standard wireless technology, Cellular Digital Packet Data (CDPD), is being replaced by higher bandwidth and more usable technologies. Given the public safety dependency on this technology, the need to find a replacement is at the forefront of the wireless planning.

For mobile wireless services, we recommend that the City remain with AT&T. This choice would be based solely on pricing and rebates. Since the City of Chico is already using the AT&T network, they are entitled to cost savings and rebates to the effect of ~\$15,000. Also, AT&T offers a government program for additional savings in which the City already participates.

In addition to the mobile wireless service, mobile users, in particular the Police Department, require high levels of security. To accomplish Department of Justice standards, it is necessary to use a "middleware" application for encryption, security and access. We have evaluated three companies which supply this level of security: Padcom, Netmotion and Infowave. These are considered industry standard. Each application offers its own unique set of features, and all products reviewed have certain aspects in common: encryption, network optimization and communications reliability.

Netmotion Mobility is our recommendation for a middleware server solution. Offering authentication, encryption, seamless roaming and compression, Netmotion also offers the ability to roam between converged networks such as 802.11x networks and Circuit-Switched networks automatically locating hot spots. Netmotion offers full support for most wireless LAN and WAN technologies.

Netmotion for use with the City of Chico will not require a major investment in server hardware. 100 – 250 users will easily install on a standard Intel-based Windows server. Application integration is seamless as Netmotion optimizes network applications to run over a chosen wireless link. Comprised of

client and server hardware, the client "agent" handles the encryption and compression and communicates with the server during network transitions.

Encryption standards are lower than that of Padcom but are still Department Of Justice (DOJ) compliant. Supported algorithms include, AES, TwoFish, 3DES, and DES.

VPN support is very robust in that Netmotion offers support for many technologies. These include; PPTP, L2TP/IPSEC, IPSEC, Nortel and Cisco. Single sign-on capability is offered with the Cisco VPN product. Supported authentication includes Kerberos, LDAP, Radius, and PKI.

Pricing is based on a per user basis, as well as a flat fee per server. Currently AT&T is offering a free Netmotion Server and up to 100 clients with a signed 1 year contract on the AT&T GSM/GPRS wireless network.

Potential Revenue from City Owned Wireless Services

With an infrastructure already in place and realizing a need for high speed internet access, small Cities throughout North America have begun to operate as Wireless Internet Service Providers (WISP) of their own. Through the incorporation of existing City structures, Cities such as Buffalo, MN; Columbus, MD; Adel, GA have all successfully instituted wireless networks which are being offered through fee based service to residential and business clients.

There are two possible options being used at this time. Option 1 represents City owned structures (buildings, towers, light poles, utility poles, etc.) supporting a wireless network that is managed by the City with all equipment owned by the City. This model allows cities to generate revenue by providing fee based wireless services to outside sources. Option 2 represents City owned structures which are leased by wireless companies who own and maintain their own network. In model 2, the cities benefit by either receiving revenue from the leasing companies or by exchanging structure space for wireless services.

City Owned Wireless Services

With an infrastructure already in place and realizing a need for high-speed internet access, small Cities throughout North America have begun to operate as Wireless Internet Service Providers (WISP) of their own. Through the incorporation of existing City structures, Cities such as Buffalo, MN; Columbus, MD; Adel, GA have all successfully instituted wireless networks which are being offered through fee based service to residential and business clients.

There are two possible options at this time:

- Option 1 with City owned structures (buildings, towers, light poles, utility poles, etc.) supporting a wireless network that is managed by the City with all equipment owned by the City. This model allows cities to generate revenue by providing fee based wireless services to outside sources.
- Option 2 with City owned structures which may be leased by wireless companies who own and maintain their own network. The City could potentially benefit by either receiving revenue from the leasing companies or by exchanging structure space for wireless services.

Option 1: City Owned Wireless Structures and Equipment

As stated above, this option, by providing Internet Services to residential and business customers, allows the City to generate revenue while providing a WAN solution to all City locations. The City would utilize the locations currently being supplied by T-1 lines as wireless access points. Additional City structures, such as light poles, could also be used within the wireless infrastructure to provide 2.4 GHz line-of-site (NOS), 5.8 GHz (NOS) or 900 MHz non-line-of-site (NLOS) technologies to customers.

Rate structures for customers would then be set according to line performance with 5.8 GHz technologies providing the highest performance speeds and 900 MHz providing the lowest performance speeds. This would follow structures already implemented within other United State municipalities where monthly rates, up to 2.4 GHz fall between \$15.00 and \$150.00 depending on line speed. 5.8 GHz technology is typically reserved for infrastructure backbone.

City Owned Wireless Systems Potential Benefits

Benefits the City could see by implementing a City owned wireless system include:

- No recurring fees
- Bandwidth increase of up to 30 times that of a T-1
- Inexpensive deployments
- No reliance on telephone companies
- No trenching or laying of wiring infrastructure
- Return on investment estimated at 2-3 years (The cost of the 12 T1 lines is \$170/each for a total of \$2040/month. Cost estimates for the wireless WAN are provided in Table A2)
- Ability to connect far stretching entities such as the airport

City Owned Wireless Systems Potential Drawbacks

Drawbacks to implementing a City owned wireless system include the need for additional staffing as the network would need to be maintained, customer service and sales would have to be addressed and a help desk would need to be staffed to provide assistance to customers. Unfortunately, civil suits are already beginning to appear with the private industry fighting municipalities on non-compete suits.

Option 2: City Owned Wireless Structures, Wireless Internet Service Provider Owned Equipment

The option of the City leasing out structure sites to wireless providers offers revenue generating possibilities while also providing the City with a wireless WAN. In addition, structures could be leased to more than one wireless provider giving each City owned structure greater revenue generating possibilities. Large company tower vendors are currently charging between \$500 and \$2,000 monthly to wireless carriers. Costs are calculated on space required (footprint usage) and tower benefits such as condition of tower and security provisions. Network functionality and all equipment is assumed to be maintained by individual wireless providers saving the City from having to hire additional personnel.

City Owned Wireless Structures, Potential Benefits

- Reduced or no recurring fees (if structure space is traded for services)
- Bandwidth increase of up to 30 times that of a T-1
- Inexpensive deployments
- No trenching or laying of wiring infrastructure
- Revenue generating structures
- Ability to connect far stretching entities such as the airport

City Owned Wireless Structures, Potential Drawbacks

- Reliance on wireless company
- Wireless companies are still in their infancy with the potential for closures
- Recurring fees (unless a trade for structure space is made)

Wireless Recommendations

Wireless Technology for City Wide Area Network Use

We recommend the City perform a detailed wireless wide area network analysis for the possible implementation of a City owned wireless WAN. Due to the number of trees in Chico and loss of line-of-site antenna possibilities between City structures, a detailed study should be performed to determine the exact infrastructure and cost required. Once this has been done, the City would then be able to look at options such as providing wireless services to residential and business customers.

Wireless Technology for Local Area Network Use

It is not cost effective to completely convert a building that already has a satisfactory wired infrastructure. We recommend the City install local services when wired systems are at capacity and it is not feasible or

cost effective to add to existing networks. Computers that need network connectivity that are not in the proximity of cabling or need to be moved are candidates for wireless service.

Wireless Technology for Mobile Users

Costs for Wireless Wide Area Network (WAN)

The costs below are for a full, 10-site implementation, linking all City facilities together and replacing the current T-1 infrastructure using 802.11 x technologies. These costs assume the site surveys have determined that each site can, in fact, communicate with others without interference.

Table A2

Description	Unit Cost/description	Costs
Cisco Aironet 1400	10 x \$5,995 per site	\$59,950
Cisco Secure Access Control Server Solution Engine 3.2		\$11,995
CiscoWorks Wireless LAN Solution Engine		\$2,995
Site surveys, Installation costs	10 x \$16,250 per site	\$162,500
Total Cost		\$237,440

Wireless Costs for Local Area Network (LAN)

The hardware cost will not be known until a detailed site survey is conducted.

Table A3

Description	Unit Cost/description	Costs
Cisco Aironet 1200	\$1,295/unit	(Qty Unknown)
Cisco Secure Access Control Server Solution Engine 3.2		\$11,995
CiscoWorks Wireless LAN Solution Engine		\$2,995
Total one-time costs (for one unit)		\$14,990
Network configuration	180 hours @ \$125/hr.	\$22,500
Site Survey	10 hours @ \$125/hr.	\$1,250
Total Installation costs		\$23,750

References

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- Gaey Clesson – IT Contact – City of Bellevue, WA – gclesson@ci.bellevue.wa.us
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- Robert Stidham – Assistant Chief of Police – Sulphur Springs, TX – rstidham@1starnet.com – (903)885-6672
- Allan Lamb – Alameda County Sherriff - alamb@co.alameda.ca.us – (510) 667-4902
- Kristin Futran - Regional Sales Director – AT&T – Kristin.futran@attws.com
- Michael R. Conner – Major Accounts Manager – Sprint - mconner@ubiquitelpcs.com
- Erik Helms - Western Region Sales – Netmotion - (206) 691-5637
- Kathy Episcopo – Western Region Sales – Padcom - kepiscopo@padcomUSA.com
- Mark Smith – IT Staff – City of Martinez – (925) 372-3447

Websites:

- Sprint Vision Site- www.pcsvision.com
- ATT Wireless for Government – Law Enforcement - <http://www.attws.com/business/data/government/lawenforcement/>
- GSM World - <http://www.gsmworld.com>
- SOMA Networks - <http://www.somanetworks.com>
- Sierra Wireless - <http://www.sierrawireless.com>
- City of Sulphur Springs, TX - <http://www.sulphurspringstx.org>
- City of Bellevue, WA – <http://www.Cityofbellevue.org>
- Alvarion Technologies - <http://www.alvarion-usa.com>
- Enfora (IP Mobile Tracking devices)– <http://www.enfora.com>
- Proxim - <http://www.proxim.com>
- Buffalo Technologies - <http://www.buffalo-technology.com>
- Radio Lan - <http://www.radiolan.com>
- Zephyr Communications - <http://www.zephyrcommunications.com>
- Verizon – <http://www.verizonwireless.com>
- Entrasys - <http://www.entrasys.com>
- Western Multiplex - <http://www.westernmux.com>
- Lucent Technologies Wavelan Products - <http://www.wavelan.com>
- Digital Path - <http://www.digitalpath.net>
- 802.11 Reference Site - <http://www.80211-planet.com>

Publications:

State Tech Magazine by CDWG – <http://www.cdwg.com>

**City of Chico Information Systems Department
Technology Master Plan, 2005 to 2010
Acronyms and Definitions**

PDA	Personal Digital Assistant, such as the "Palm Pilot", and Compaq "Ipaq"
IPAQ	PDA's used by City staff
PERMITS	Software used by City Building Department to issue various permits
GIS	Geographic Information System
T-1	High capacity data transmission line provided by the phone company
IFAS	Integrated Fund Accounting System, used by the Finance Department for all City accounting, bookkeeping, payroll, etc. services.
H.T.E.	Software used for Police and Fire Department public safety reporting and dispatching.
WAN	Wide Area Network, connects all City buildings and computers together.
TCP/IP	Transmission Control Protocol/Internet Protocol, a long way of saying how the City workstation can communicate with each other that is similar to a unique phone number.
NIC	Network Interface Card, provides the connection for the network cable to connect to the City network.
ISDN	It Still Does Nothing, a type of phone line installed to most phones in the City Municipal Center that was intended for voice and data transmission but never used.
GPRS	General Packet Radio Service, wireless service proposed by AT&T for Police Department patrol vehicles.
IEEE	Institute of Electronic and Electrical Engineers, also sets standards for computers.
HP 9000	Hewlett Packard 9000 large computer used by the City Finance Department
IBM I SERIES	IBM large systems used by the Police and Fire Departments
CAD	Computer Aided Dispatching, or Computer Aided Drafting, depending on what department is being referred to.
AT&T	American Telephone and Telegraph, provides wireless services and cell phones primarily to the Police Department.
SBC	Formerly Pacific Bell, local telephone provider and system
VPN	Virtual Private Network, a method of providing a secure wireless connection used by the Police Department.
UNIX	Operating system for the HP 9000 that allows the software to run.
CDD	Community Development Department, or Click Drag and Drill a software package used to provide various reports and help develop the City budget.
HDL	Data base containing assessors information for City and County property used by Finance Department.
MHz	Mega Hertz
OS 400	Operating system for the IBM I SERIES's that allows the software to run.
CDPD	Cellular Digital Packet Data, a wireless service currently used by the Police Department
AP&P	Administrative Policy and Procedure
Bandwidth	Refers to the ability of a service to transmit data. High bandwidth indicates the ability to transfer a lot of data quickly such as a T-1, T-3 or fiber optic line.
SPAM	Unwanted junk E-mail generally sent by businesses or persons to thousands of people.

Appendix E

**Improving Records and Document Management
Report to the City of Chico, California
e-Visory Consulting**