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Data Processing Analysis and Recommendations for the City of Gordon

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**DATA PROCESSING ANALYSIS AND RECOMMENDATIONS
FOR THE CITY OF GORDON, NEBRASKA**



**Center for Applied Urban Research
University of Nebraska at Omaha**



June, 1983

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TABLE OF CONTENTS

	<u>Page</u>
ACKNOWLEDGEMENTS	i
I. SCOPE AND PURPOSE	1
II. MICROCOMPUTER TECHNOLOGY	2
III. ACQUIRING THE TECHNOLOGY	3
IV. CURRENT DATA PROCESSING IN THE CITY OF GORDON	7
A. Administrative Offices	7
B. Chief of Police	9
V. BASIC APPLICATIONS TO CONSIDER FOR COMPUTERIZATION	10
A. Introduction	10
B. Applications	11
VI. EQUIPMENT CONFIGURATION AND ESTIMATED COST-- MICROCOMPUTER ALTERNATIVES	12
A. Immediate	12
B. Future	12
VII. ALTERNATIVE METHODS OF ACQUIRING COMPUTER TECHNOLOGY	13
A. Alternatives	13
B. Evaluation of Alternatives	14
C. Recommendation	16
VIII. CONCLUSION	16

I. Scope and Purpose

This report presents an analysis with recommendations regarding the data processing needs of the city of Gordon, Nebraska. The analysis was undertaken pursuant to a letter of March 14, 1983 from the Center for Applied Urban Research of the University of Nebraska at Omaha to the Gordon city manager.

This analysis has been undertaken within the context of a broader effort to assist small and rural local governments to acquire and use microcomputer technology more effectively. This effort is supported by a grant from the W. K. Kellogg Foundation. In addition to Gordon, Butler County, Nebraska and the Ashland-Greenwood Public Schools, Ashland, Nebraska are demonstration sites for this project.

This report will provide Gordon officials with information on the current status of data processing in their city government and the city's information management data processing needs. The report will also discuss the applicability of microcomputer or other computer technology, the probable configuration and cost of a computer system to meet their needs, and recommendations concerning future action by the city in the area of data processing.

II. Microcomputer Technology

Recent advances in technology have brought computers within the reach of many local governments in America.

These advances have substantially reduced the cost of computer systems and have also made possible effective computer use by local government personnel who are not data processing experts.

The first advance has been a tremendous reduction in the physical size and cost of computers coupled with dramatic increases in their functional capability. Second, the current generation of application programming, or software, available to local governments is characterized by flexibility and "user-friendliness." That is, the programming is designed for interactive use on video terminals by personnel who have little or no knowledge of computer technology or programming. One result of these changes is that local governments today can acquire and use computer systems to aid in performing everyday activities and can do so with a high degree of confidence and at relatively low cost.

The third major advance has been the introduction of the microcomputer. These small, inexpensive, yet relatively powerful machines, when coupled with appropriate software, can become significant tools in the performance of local government functions.

Microcomputers can be used as "personal" computers. That is, they can be single user, single function machines--somewhat analogous to the telephone or adding machine, or they can be used by several persons to perform

a variety of activities. Certain microcomputers can also be linked together to form local distributed processing networks of small machines.

III. Acquiring the Technology

Regardless of the type of hardware, a computer system should be viewed as a tool to be used like any other piece of office equipment. It is an integral part of the work routine, just like the typewriter, the telephone, the adding machine, or the filing cabinet.

Computer usage is technically feasible in almost all organizations. Technical feasibility, however, is often less important to local governments than several other factors, including:

* Cost. Cost is perhaps the best understood and most definitive means of determining the feasibility of any new system. Is the new system more or less expensive than current methods? Although cost may be the best understood criterion for determining feasibility, accurate cost estimates are often difficult to obtain, especially in cities with limited current data processing capabilities.

A word of caution is in order here. Few local governments that implement computer technology can expect to reduce overall costs. Thus, a strict cost justification for an electronic data processing system may be impossible. At best, a local government can anticipate cost displacement (e.g., the moving of costs from one place in the

budget to another) or cost avoidance (e.g., the use of more efficient technology to prevent, avoid, or move into the future costs that would otherwise occur).

* Ease of Operation. Some computer systems can be operated only by technically trained personnel. A factor in favor of the current technology, especially the present generation of mini- and microcomputers, is that in many cases local government personnel who are not trained in the technology can easily operate these systems, and a technical staff of programmers is not required.

* Available Programming. The availability of proven, easy-to-use software or programming to make a computer system do what a local government wants, when it wants, and how it wants is crucial to system feasibility. Without adequate software, a computer is only an expensive box that fulfills no useful purpose. Software is available in most functional areas of local government from a variety of sources and needs to be considered prior to hardware considerations.

* Growth. An important factor in the feasibility of an electronic data processing system is the extent to which it can grow to meet future government requirements. Not only should the system be capable of accepting more sophisticated uses and equipment (hardware) but also of accommodating normal growth in the volume of city activities.

* Staff Considerations. The degree of acceptance of computer technology within a local government is a significant consideration in system feasibility. Similarly, the degree of staff ability to perform specific local government functions (e.g., payroll, utility billing, etc.) and staff aptitude and enthusiasm for the use of computers can be constraints on system effectiveness. To put it more plainly, staff support for computerization, competence in positions that will rely on computer technology, aptitude for using automated equipment, and interest or enthusiasm for automation are most important to the effective implementation of a computer system in local government.

* Political Feasibility. Finally, political feasibility may well be the single most critical element in the success of computerization in a local government and the most difficult factor to deal with. Political feasibility means the extent to which local elected officials and administrators understand and support the need for an electronic data processing system. In the absence of such support, a local government would be well advised not to proceed with system procurement. On the other hand, the support of these persons can help immeasurably to ensure the smooth acquisition, installation, and operation of a system.

Once a local government has reviewed these factors and determined both the need for and feasibility of acquiring new or enhancing existing automated technology, a step-by-step procurement plan should be adopted. This study of Gordon's current data processing requirements is the first step in such a plan. It will, in turn, lead to the following activities, in order of occurrence.

- * A decision by city officials whether to acquire a computer system based on the recommendation contained in this report. This decision should follow shortly after review of this report by city officials.
- * In the event the city decides affirmatively, CAUR will assist the city in development and submittal to data processing vendors of a Request for Proposal (RFP) for a system to meet the requirements identified in this study.
- * Proposals received by the city will be evaluated, and two or three finalists will be selected from among all of the proposals for additional consideration.
- * City officials will be asked to approve the selection of finalists and to authorize further evaluation of these proposals, including visits to local governments having systems installed by the finalists.

- * CAUR will conduct a detailed evaluation of the remaining proposals and will recommend a system vendor for consideration by the city.
- * Negotiation of a contract with the selected vendor will follow.
- * Finally, system installation, testing, and acceptance will complete the procurement plan.

This step-by-step plan outline here is recommended for use by the city of Gordon as a method proven effective for computer system acquisition in numerous local governments throughout the country.

IV. Current Data Processing in the City of Gordon

The current level of data processing in an organization, whether manual or automated, is an indicator of the organization's need for improved technology. It also provides insight into potential problems that may arise with implementation of newer technology. A review of an organization's data processing operation also allows the development of a cost analysis that can be used, in part, to suggest whether new or enhanced data processing capabilities are justifiable.

The following is a brief discussion of the data processing activities in the city of Gordon. Data for this section of the report were provided by Gordon's city manager, city clerk, public works staff, and the chief of police.

A. Administrative Offices

The clerk's office in Gordon owns a Burroughs L-8000 bookkeeping machine, purchased from a private owner in Scottsbluff, Nebraska in 1980 for \$2,000.00. Current maintenance costs for the system are \$2,250.00 per year, with a one- to two-week turnaround time for necessary repairs. Backup data processing is by hand.

The Burroughs L-8000 is an outdated machine. It uses programming on cassette tapes and can perform only one function at a time. Maintenance for the system can be expected to become increasingly costly and difficult to obtain, and it lacks expandability to accommodate additional functions. Its salvage value is minimal. Finally, due to its age and functional limitations, enhancement of present operations on this equipment (e.g., a more up-to-date utility billing system) would not be advisable.

The clerk's office has only two functions currently automated on the L-8000. These are:

- city payroll--20 biweekly payroll checks (plus approximately a dozen summer employees)
- utility accounts and billing--1000 customers for sewer and water and 1250 for garbage services, billed quarterly.

In addition, a service bureau, Applied Electronics Corporation of Chadron, handles the city's accounting functions. The service bureau uses a CPM operating system and software modified from the original programmer, Midwest Software. The city pays the service bureau \$180 per month or \$2,160 annually for its services.

At the end of each month, the city sends the service bureau a list of checks paid and revenues received. The service enters data from these documents onto its computer system and prepares monthly reports for the city, including balance sheet, income and expenditures journal, and consolidated funds comparison for each department by monthly and yearly totals. A time lag of two to three weeks occurs between the time the city submits its information to the bureau and the receipt of bureau reports. In addition, the data are maintained by the service bureau to facilitate year-end auditing.

The city clerk also operates a Xerox 620 memory typewriter. All correspondence, reports, ordinances (ca 25/yr), resolutions (ca 25/yr) and city council agendas (1/month) and minutes are produced on this machine.

A number of additional functions are performed manually. These include accounts receivable, accounts payable, and personnel records.

In addition the city manager is currently experimenting with in-house automated data processing on an Osborne 1 portable computer system with an Epson MX100 80 cps dot matrix printer, leased for \$200 per month. The manager has used the Osborne 1 budgeting, forecasting, grants, bookkeeping, and some word processing.

B. Chief of Police

At present, the chief of police makes no use of electronic data processing. His principal need is for a computer terminal and printer for data base management. His six-man force processes approximately 400 arrests per year. The desired system would assist with report filing and records searches. These functions would involve the automated accessing of complaint, warrant and criminal history records, drivers' licenses, and motor vehicle registrations.

V. Basic Applications to Consider for Computerization

A. Introduction

The use of automated data processing in the city of Gordon is relatively limited. This is understandable if for no other reason than the size of the city and its operational requirements. In addition, the Burroughs L-8000 currently being used is essentially old technology with considerable limitations as to expansion or enhancement. This equipment also represents a generation of technology that does not permit integration of the city's major administrative functions, e.g., accounting, budgeting, and payroll.

The current generation of data processing technology permits and encourages both functional and data base integration. In fact, the type of system that should be

considered by Gordon should have the following characteristics.

Transaction oriented--When a transaction such as updating the accounts receivable file is made, the system accepts the transaction and automatically updates all affected ledgers and funds. This would, for example, permit automatic distribution of the entry throughout the system and would also provide for an audit trail of the transactions.

On-line--Computer terminals and printers in one or more physical locations in city hall would be connected to the computer central processing unit.

Real-time--Processing on the system occurs at the time a user begins to work at a terminal, and no need exists to create punch cards, ledger cards, computer coding forms or other input type documents to run through the system at a later time. The system should also have the capability of allowing users to undertake unique inquiries and generate unique reports using English-like commands.

B. Applications

With these system requirements in mind, the following functional areas should be considered by Gordon for automation on a microcomputer.

- Integrated financial management system, including the following elements:
 - general ledger accounting
 - budgetary accounting
 - vendor accounting
 - accounts payable
 - accounts receivable
- Payroll/personnel system
- Utility accounting and billing.

VI. Equipment Configuration and Estimated Cost--
Microcomputer Alternatives

A. Immediate

A single microcomputer, with 64k of processing memory and 5 MB of hard disc storage, could fulfill the city of Gordon's basic data processing needs. The single system would have one work station located in the city clerk's office with a printer. The programming would include an integrated financial management package, payroll package, and utility billing package.

The costs would range between the two amounts shown in Figure 1.

FIGURE 1

Hardware (CPU, video display hard disc drive, and 120 cps printer)	\$ 6,000	to	\$ 7,500
Software (as discussed above)	<u>\$ 4,500</u>	to	<u>8,000</u>
Total	\$10,500	to	15,500

Maintenance for a system of this configuration would cost an estimated \$1,200 to \$2,000 per year, if deemed necessary. However, except for the disk drive unit, a maintenance policy is not recommended. This is due to the reliability of microcomputer systems in general and the fact that replacement costs for most system elements are relatively low.

B. Future

Future functions that might also be automated on a second microcomputer include:

- a data management system for the chief of police including a criminal history file, complaint cards, and warrant file
- vehicle and equipment scheduling and maintenance for the public works operation.

Automation for the chief of police would require the acquisition of a second microcomputer system with hard disc drive at a comparable hardware cost of \$6,000 to \$7,500 plus software.

Automation for the public works functions would require an additional microcomputer with floppy disc at a \$3,000 to \$4,500 cost plus software.

VII. Alternative Methods of Acquiring Computer Technology

A. Alternatives

The city of Gordon can acquire the required computer technology by three basic alternative methods. This is so

whether the city chooses a single microcomputer or multiple microcomputer system. These alternatives are:

1. Rely on outside service bureaus for data processing. These agencies can be used to provide either "batch" or "on-line" data processing services.
2. Acquire in-house computer hardware and also develop application software (programming) for the system.
3. Acquire a fully programmed and supported system, including both in-house computer hardware and packaged application software. Such a system would be operated by existing city personnel.

B. Evaluation of Alternatives

1. Service bureaus

a. Advantages

- Software and hardware are maintained by the service bureau.
- A highly qualified staff is available in certain functional areas.
- The transition to automation from current operations would be relatively easy.

b. Disadvantages

- Limits are imposed by cost and expertise available at service bureaus regarding initiation of more sophisticated data processing capabilities.
- Communication breakdowns and attendant costs can occur.

- Communication costs can be high, especially if an on-line service bureau is used.
- Scheduling and turnaround time difficulties may occur.
- In Nebraska, no service bureaus are known that offer county government data processing systems and support.
- Service bureau software may not provide much flexibility.
- The opportunity for expansion is limited and may involve high costs.
- The physical location of a service bureau may be a limitation.

2. In-house hardware/in-house software development

This alternative is not deemed acceptable for the following reasons:

- The length of time required to create the required software will be excessive.
- The personnel and cost requirements of in-house software development and support are excessive.
- The limited availability of qualified programmer/analysts with experience in municipal government would result in difficulty in hiring and retaining a qualified programmer(s).

This alternative would take too long, cost too much, and involve too much risk for a small local government to implement a data processing system.

3. Microcomputer and packaged software

a. Advantages

- The city would own and control its own system.
- The software is tested and reliable, and some packages can be modified by the vendor to meet the city's specific requirements.
- The system can be operated easily by existing personnel.
- The system provides a relatively easy transition and introduction to electronic data processing.
- A procurement contract may possibly be executed under which a vendor is fully responsible for system (hardware and software) performance according to the city's specifications.

b. Disadvantages

- Certain problems are associated with ownership and control of a computer system, including system depreciation and obsolescence, equipment failure, and use scheduling.
- Unanticipated vendor problems can occur.
- Personnel problems can arise involving both training of personnel and personnel fear of and/or opposition to a system.

C. Recommendation

This study recommends that a Request for Proposal (RFP) be developed to solicit proposals for microcomputer hardware and packaged software per the configuration recommended in Section VI of this report. The city should not consider in-house software development or use of service bureaus because the costs in both alternatives are thought to be excessive compared to the microcomputer alternative.

VIII. Conclusion

Three compelling reasons exist for the city of Gordon to proceed with this recommendation. First, the equipment that it currently operates for purposes of utility billing and accounting is antiquated, has essentially no expandability or enhancement potential, and maintenance on this equipment can be expected to become increasingly expensive. Second, the current generation of microcomputer technology is relatively inexpensive, highly reliable, and will provide the city with a considerably enhanced capability to perform needed data processing tasks.

Third, the city can proceed with the recommendation made to submit RFP's for a new system at virtually no risk. That is, no decision regarding acquisition of a replacement system will be made until bids have been received and evaluated and cost comparisons made. At that time, Gordon officials will have a much clearer idea of the costs and

benefits of a new microcomputer system versus continuing with present methods.

A new microcomputer system is estimated to cost from \$10,500 to \$15,500. It will provide computing capabilities in the areas of integrated financial management, payroll/personnel, and utility billing and accounting. If current maintenance and service bureau costs are subtracted from this estimate, the net result is an estimated \$6,090 to \$11,090. Amortizing these costs over three- and five-year periods reduces net system costs even further. See Figure 2. The cost of this equipment, moreover, can be financed over two or more years, thus reducing its impact on any single budget year.

FIGURE 2

One-year Difference

Estimated cost of micro-computer system	\$10,500 to \$15,500	
Current 1-year maintenance and service bureau cost	<u>4,410</u>	<u>4,410</u>
Difference	\$ 6,090 to \$11,090	

Three-year Difference

Estimated cost of micro-computer system	\$10,500 to \$15,500	
Current 3-year maintenance and service bureau cost	<u>13,230</u>	<u>13,230</u>
Difference	(\$ 2,730)	\$ 2,270

Five-year Difference

Estimated cost of micro-computer system	\$10,500 to \$15,500	
Current 5-year maintenance and service bureau cost	<u>22,050</u>	<u>22,050</u>
Difference	(\$11,550)	(\$ 6,550)