6-1984

Data Processing Analysis and Recommendations for the City of Nebraska City, Nebraska

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June, 1984

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Acknowledgements

The authors wish to thank the elected officials and staff personnel of the city of Nebraska City for their cooperation and for providing us with the information about the city's current operations and future needs upon which this report is based.

We also want to thank the following CAUR staff for their assistance in preparing this report: Joyce Carson and Loni Saunders for word processing and Marian Meier for editing.

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I. Scope and Purpose

This report presents an analysis with recommendations regarding the data processing needs of the city of Nebraska City, Nebraska. The analysis was undertaken pursuant to an agreement between the Center for Applied Urban Research (CAUR) of the University of Nebraska at Omaha and the city of Nebraska City.

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

II. Contemporary Computer 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 efective 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 capabilities.

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.

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

* 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 local government personnel who are not trained in the technology can easily operate these systems in many cases, 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 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, accounting, 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 Nebraska City'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 by CAUR and two or three finalists will be recommended for additional consideration from among all of the proposals.
* City officials will be asked to approve the selection of finalists and to authorize further evaluation of these proposals, including visits to local governments or other organizations 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.
* The city will act on this recommendation.
* 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 outlined here is recommended for use by the city of Nebraska City as a method proven effective for computer system acquisition in numerous local governments throughout the country.

IV. Current Data Processing in the City of Nebraska City

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.

Nebraska City currently conducts all administrative and financial management data processing activities manually. This strongly suggests the applicability and feasibility of automated data processing technology in order to improve current methods of data processing and to provide city administrative personnel with additional information management capabilities.

V. Basic Applications to Consider for Computerization

A. Introduction

The use of automated data processing in Nebraska City is relatively limited primarily because of the city's size and its limited operational requirements. Among other things, the city's separate utility department handles utility billing, cash collection, and accounting on its own computer system, thus relieving the city of this responsibility.

However, most cities of the first class in Nebraska have automated most of their administrative activities, e.g., payroll, accounting, and financial reporting. Although Nebraska City is well behind these communities in its use of automation and computer technology, this provides Nebraska City with the opportun-

ity to acquire a highly reliable modern data processing system, including computer hardware and software to perform administrative functions, at a relatively low cost.

Such a data processing system for Nebraska City 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 also updates all affected ledgers and funds. This would, for example, permit automated rather than manual 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. This would enable more than one person at a time to have access to the city's computing power and to the information contained in its various files and records.

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.

Interactive--This means that users communicate directly and immediately with the computer through video display terminals.

User-friendly--Computer programming or software is written in such a way that the programming itself instructs users in its

operation. At the minimum, user-friendly software is "menu driven," meaning that hierarchical lists of choices of actions appear on the video monitors, and users instruct the system in the completion of required actions by selecting the correct choices.

Multi-programming--This means that the computer is capable of accommodating the performance of several functions by several users at the same time. For example, the payroll clerk could enter payroll data at one terminal, the accounting clerk could enter invoices at another terminal, the city clerk could inquire into the current budgetary status of a department, and the printer could print payroll checks all at the same time.

Capable of Unique Inquiry and Report Generation-- The system should include software that will enable users to make unique inquiries across all data bases, to create unique files, to combine data from various files, and to generate unique (not pre-programmed) reports, all using standard English language commands.

B. Applications

Interviews with the deputy city clerk-treasurer, police chief, and one city commissioner revealed the following areas in which automation should be given immediate consideration:

1. Administration

First priority would be to acquire a modern computer system to automate the administrative and financial management functions

currently performed manually. This would involve the following software elements:

- Integrated financial management systems, including:
  - general ledger accounting
  - budgetary accounting
  - vendor accounting
  - accounts payable
  - cash handling/accounts receivable
- Payroll/personnel system
- Word processing
- Data base management system.

2. Police Department

The police department has a large manual record system. The department would like to automate criminal history files, accident reports, incident reports, state reports, and master name index. This system would only be used during the office hours of 8:00 a.m. to 5:00 p.m. A separate system for the police department appears to warrant consideration.

3. Other

The cemetery, library, airport, and dock are all governed boards of the city. They should not be given separate consideration for automation nor should they have their own terminals on the city's computer system. However, the city clerk's office should continue to perform financial management and accounting functions for them (e.g., budgeting, monthly semi-annual and annual financial statements, and accounting).

VI. Cost Estimates

A. General Administration

A computer system to perform administrative functions for

Nebraska City is expected to cost from $47,000 to $90,000. For this price the city can expect to receive computer hardware, software, hardware maintenance, and software support over five years. The system will be composed of the following hardware and software elements:

Hardware

Computer CPU with approximately 512K of main memory

Disk storage system with approximately 40 to 60MB

System printer of approximately 150 to 200 lpm speed

Word processing printer of approximately 55 cps speed

Tape system for backup

Three CRT's (or work stations).

Software

Integrated financial management

Payroll/personnel

Word processing

Data base management

The four CRT's will be configured as follows:

one CRT - Financial management and word processing, located in city clerk's office

two CRT's - Data entry, financial management and word processing, located in main office area

B. Estimated Cost

The cost estimate is based on a three terminal configuration, either a multi-user microcomputer or a low-end minicomputer, and application programming as specified above, all for the city clerk's office. A separate cost estimate is provided on page 12 for the police department.

Hardware	Low	High
Purchase	$25,000	$40,000
Maintenance (5 years)	10,000	20,000
Total	$35,000	$60,000
Software		
Purchase	8,000	20,000
Support (5 years)	4,000	10,000
	$12,000	$30,000
System		
5-year total	$47,000	$90,000
Annual average	9,400	18,000

The range of first-year (or initial) costs for this system can be estimated as purchase cost plus 20 percent (one year) of maintenance and support costs. These figures are:

Initial Cost

Hardware	Low	High
Purchase	$25,000	$40,000
Maintenance	2,000	4,000
Software		
Purchase	8,000	20,000
Maintenance	800	2,000
Total	$35,800	$66,000

C. Police Department

Two options should be considered for this department. The first is to attach a terminal and small printer to the computer

recommended for administrative functions and to acquire a law enforcement software package to run on that computer. To do so would be technologically feasible, although this option would have the effect of increasing the memory and storage requirements and hence costs for that system. This additional cost increment can be expected to be approximately $15,000 to $20,000 for both hardware and software. The second alternative for the police department would be a stand-alone microcomputer system (one work station and printer) with packaged law enforcement software. The cost for this option is also expected to range from $15,000 to $20,000.

Since the police department's functions are considerably different from the administrative functions of the city clerk's office, a separate system for the police department is recommended. Such a system should be fully compatible with the system in the clerk's office in order to provide system backup in the event either system (or a major component thereof) were to fail.

VII. Alternative Methods of Acquiring Computer Technology

A. Alternatives

The city of Nebraska City can acquire the required computer technology by one of three alternative methods, including:

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 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 additional or more sophisticated data processing capabilities.
- Service bureau software may not provide much flexibility for the local user.
- Communication breakdowns and attendant costs can occur and communication costs can be high if an on-line connection to the service bureau is used.
- In Nebraska, no service bureaus are known to exist that offer a full range of local government data processing.

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. In-house computer and packaged software

a. Advantages

- The city would own and control its own system.
- The software is tested and reliable, and most 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 can 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 depre-

ciation 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 in-house computer hardware and packaged software per the configuration outlined in this report.

Three compelling reasons exist for the city of Nebraska City to proceed with this recommendation. First, the manual methods of data processing currently used by the city are out-of-date, cumbersome, and not as efficient as more contemporary methods using modern computer technology. Second, the current generation of computer 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.