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ABSTRACT

An experimental program based on a study by the Department of Housing and Urban Development was activated to deliver services to urban residents via automated communications technology. Designed to contribute to improvement in the quality of life, the program of a Community Information and Services Center (CISC) included: outreach programs, i.e., an active way of seeking out those who are in need of service, and providing information in whatever form and by whatever means required to satisfy user needs, e.g., public schedules of community events; educational, banking, and emergency services; legal, weather, and fare, ticket, and schedule information; expanded yellow page service; and access to government data. This paper describes basic CISC concepts, perceptions, and preliminary plans. Equipment needs, location, staffing, costs, enumeration of services, and computer automation are also described, and a detailed itemization of the kinds of information needed by urban residents, as indicated by current research, is provided. (Author/MBR)

OT REPORT 76—94

COMMUNITY INFORMATION AND SERVICES CENTERS: CONCEPTS FOR ACTIVATION

CLEVE HOPKINS

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July 1976

UNITED STATES DEPARTMENT OF COMMERCE
OFFICE OF TELECOMMUNICATIONS
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The mission of the Office of Telecommunications in the Department of Commerce is to assist the Department in fostering, serving, and promoting the nation's economic development and technological advancement by improving man's comprehension of telecommunication science and by assuring effective use and growth of the nation's telecommunication resources.

In carrying out this mission, the Office

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- Assists other government agencies in the use of telecommunications
- Conducts research, engineering, and analysis in the general field of telecommunication science to meet government needs
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- Performs analysis, engineering, and related administrative functions responsive to the needs of the Director of the Office of Telecommunications Policy, Executive Office of the President, in the performance of his responsibilities for the management of the radio spectrum
- Conducts research needed in the evaluation and development of telecommunication policy as required by the Office of Telecommunications Policy, pursuant to Executive Order 11556

EXECUTIVE SUMMARY

This report describes an experiment for the operation of a Community Information and Services Center (CISC), a place designed to contribute to improvements in the quality of life of urban residents. It is based on a 1971 recommendation from the National Academy of Engineering for an experiment to test the use of telecommunications to manage information needed by urban residents in the conduct of their daily lives and relations with their municipal governments.

Service delivery is inherently a labor intensive activity, and the use of modern telecommunications should enable information transfer between citizens and their governments to occur much more efficiently. A minicomputer with supporting peripheral equipment is cited to enable on-line operation with a single telephone number for citizen use in communicating with the municipal government. Each complaint or request for services can then be assigned a computer-generated serial number, date-time group, and identity of the responsible city operating department: when combined with the caller's identity and location, this information can be transmitted to the operating department for action and inserted into a summarizing record. This process is carried out while the caller is on the phone with the information practitioner and the operating department, creating a condition of responsiveness on the part of the municipal government. Feedback to the caller is provided when action generated by the complaint is completed. The summary records provide a basis for accountability by top city management on departmental activities.

Problems of response and autonomy in collocating a CISC with an Emergency Operating Center are discussed as it has been found by New York City that about one-half of the 911 calls are of a nonemergency nature.

A body of data is presented to enable construction of an information data base. Guidelines for computer applications transfer are presented. Attention is also invited to payoff from a relatively new position in this field, that of Data Base Manager.

Two other papers by the same author are Location Criteria for Community Information and Service Centers (CISC's) and Program Impact Estimation for Community Information and Service Centers (CISC's). This present paper on concepts for CISC activation brings to a close the work by the Office of Telecommunications in this field.

PREFACE

This paper is the first in a series on the concept and activation of one or more Community Information and Services Centers (CISC's) in a live context. The CISC idea grew out of a study, released in 1971 by the National Academy of Engineering, and the 1972 paper by Siegel and Hiibner, then at the U.S. Department of Housing and Urban Development, suggesting that an experimental program be activated to deliver services to citizens via modern automated communications technology.

The subject of this paper is basic CISC concepts, perceptions, and preliminary plans, hopefully promoting CISC prototype activation in a number of cities and towns across the nation. The CISC concept is based on two premises:

(1) That information useful to the citizen can be rapidly identified, moved, processed, and delivered;

(2) That municipalities are in the business of delivering services to their citizens.

Other papers in this series, deal with the measurement of the impact of a CISC on a local community, and location criteria for CISC's.

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ACKNOWLEDGMENTS

Attention is particularly invited to the pioneering work of Mr. Robert C. Powell in formulating the management structure and program documents for this project in conjunction with the U.S. Department of Housing and Urban Development. His point of departure was the report on Communications Technology for Urban Improvement issued by the National Academy of Engineering in June, 1971.

This paper was substantially improved by the contributions and perceptive insight of Dr. Robert S. Powers, who is now--July, 1976--concerned with cable television matters at the Federal Communications Commission. Dr. Powers collected a wealth of ideas and had begun to hammer out the general shape of this report in his capacity as leader of the project to activate, test, and evaluate a prototype Community Information and Services Center. Some specific contributions are indicated by citing Ref. 16.

In preparing this paper, the author found two books and one document of particular relevance. One is entitled Information Needs of Urban Residents, published in December, 1973 by Edward S. Warner, of the Baltimore Regional Planning Council, with Ann Murray, and Vernon E. Palmour of Westat, Inc., under an HEW Office of Education contract--the citation is Ref. 5. This trailblazing book contains the results of an intensive and in-depth investigation into information needs of 1,945 citizens in Baltimore, Maryland. The other book is a 1972 volume entitled Planning Community Information Utilities. The content is a collection of papers written for a conference on that topic and convened by the American Federation of Information Processing Societies (AFIPS). The contributed papers were grouped "... into three areas corresponding to principal components of a prototype plan":

1. Information services
2. System design
3. Management

Although the CISC discussed in this present paper is not a utility in the sense of the AFIPS papers, many of the ideas and concepts are applicable and useful for the CISC, since it may well be a prototype or proving ground for public information utilities of the near future. Ref. 1 cites this book and a number of quotations are taken from it.

The document mentioned above is entitled Performance Guidelines for Planning Community Resource Centers (CRC's); see Ref. 14. Although the point of departure is for the expansion of services provided by libraries, much of the material presented is of very considerable use in planning for a CISC as described here. Quoting from the Introduction, "although organizational, managerial, and financial considerations are reviewed, the focus of this guide is on developing planning criteria for spaces required to house the activities." These criteria are presented in the form of a series of illustrations that trace the various categories of users as they occupy a Center. Some examples of such Centers in America and other countries are provided. It is the author's opinion that some of these places could be regarded as luxuries, but it is well known that the luxuries of one generation are the commonplace of the next. On page ix, the "... progression of activities...may be used by those who wish to assemble all informational, educational, and cultural resources of a community into a single center or a network of centers". The appropriate use of technology--communications and other--will probably make this idea practicable in more situations than are now dreamed of. Appendix A lists at least 14 categories of users' needs in columnar form, identifying the users, their problems, needs, services, facilities, and prototype programs. As evidence of the new thinking in this document, attention is directed to the lower box in the middle column on page 76 where such refreshing new signs as the following are found:

"'check-out desk' instead of circulation desk

'magazines' instead of periodicals

'government magazines' for documents

'information services' to replace reference books signs

'book index file' to indicate location of the card catalog"

Appendix D contains a list of additional information sources, including locations of training programs. The annotated bibliography has 98 citations. If the information handling portions of the CRC described in Ref. 14 is combined with the telecommunications technology described in this report, a really efficient delivery operation can occur. See Section VII.D for further abstracts from Ref. 14.

Much of the material in this paper comes from a June, 1975 unpublished report to the U.S. Department of Housing and Urban Development from the Telecommunications Analysis Division of the Office of Telecommunications, U.S. Department of Commerce. Contributors were Robert C. Powell, Robert Gary, Robert S. Powers, Theodore Zois, Cleve Hopkins and Charles E. Lathey (deceased).

The author is most certainly indebted to the reviewers for their individual and collective insight into the basic ideas and details set forth in this paper. If they should read it again, they will readily see the extent of their personal contributions and the resulting improvements. Thanks are therefore extended to Dr. Robert S. Powers, Federal Communications Commission, Washington, D.C.; Sally Vorheis, Human Resources Information Systems Manager, Lane County, Eugene, Oregon; Jim Powell, Senior Management Analyst, Department of Finance, City of Baltimore, Maryland; Joel Freiser, Director, Municipal Operations Program, Hoboken, New Jersey; Marie Pugh, Information Manager, Government Information Center, San Diego, California; Joseph Bewick, Office of Telecommunications, Department of Commerce, Washington, D.C.; and Dr. Marvin Rimerman, Director, Mayor's Office of Telecommunications, Baltimore, Maryland.

Meticulous preparation of the text and figures, with skill and diligence, was done by Glynetta Perrymore using the computer-based text editing system of the Department of Commerce; her penetrating, consistent, and continuing effort is acknowledged with sincere appreciation; it is an inspiration to work with such able support. Use of the text editing system has given the author the luxury of thinking about the subject matter of this paper without endless manuscript retyping for changes and corrections.

A special note of thanks is extended to the many authors and publishers whose works have been used in this report; the citations are inadequate in recognizing this source of ideas and materials.

The author apologizes to any contributors that may not have been cited, and assumes responsibility for the hopefully few errors that may be found.

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COMMUNITY INFORMATION AND SERVICES CENTERS (CISC'S): CONCEPTS FOR ACTIVATION

Cleve Hopkins*

ABSTRACT

This paper sets forth the basic concepts, ideas, perceptions, and preliminary plans for promoting CISC prototype activation in a number of cities and towns across the nation.

A Community Information and Services Center is a place where residents of a local community can receive answers to questions that arise from their relations with the local government. Other activities of the staff in a CISC are to render some services and to collect information on citizen attitudes toward local government and its programs. The basic long-range objective of CISC activation is to enable a much more rapid and satisfying exchange of information between residents and local government using modern automated telecommunications technology. This project stems from a 1971 National Academy of Engineering study that showed, from a poll of over 300 cities, that the CISC is of the highest priority to aid in service decentralization in cities.

The equipment needed by an experimental CISC is described. Included also are discussions on location, staffing, costs, a preliminary operational plan, enumeration of possible services, integration of emergency services, computer programming, and a detailed itemization of the kinds of information that current research indicates is needed by urban residents.

*The work presented in this paper was done by the author just prior to his retirement from the Telecommunications Analysis Division, Office of Telecommunications, U.S. Department of Commerce, Washington, D.C. 20230. His current address is 23005 Timber Creek Lane, Clarksburg, Maryland 20734.

SECTION I

INTRODUCTION

The purpose of this paper is to invite attention to automation of the delivery of information and some services to residents of municipalities and to describe an experimental project for this purpose.

> "Municipalities in the United States provide a large proportion of the services provided by all governmental units. Usually delivered directly to people, in homes, businesses, and schools and on the streets, municipal services significantly shape perceived quality of life. Moreover, municipal services are big business; the more than 20,000 local governmental units in the United States collectively spend over one hundred billion dollars per year.
>
> "No less than other levels of government, municipalities require, generate, and process large volumes of information. Much of this information is ideally suited for computer processing. Yet municipal computer use has barely begun. In municipal services, therefore, the computer information utility could come to play quite important roles. But major economic and social pressures indicate that it will do so only if it is carefully conceived and designed, not to supply glamorous technology but to satisfy municipalities' needs" Ref. 1, p. 45.

Increasing social pressures will no doubt influence the shape of municipal service delivery, as those who are now and have recently been in schools and colleges across the nation are confronted with contemporary living. Ref. 2.

> "Political battle cries now emerging...call for more responsive government and more local control, for better and equitable services, and for lower and less onerous taxes. Most of these are historic demands, some dating back to the origins of the Republic. What is new and needs to be taken seriously is the wide support many of them now claim from all parts of the political spectrum. Furthermore, courts and legislatures throughout the country are steadily translating these principles into action, further strengthening this wide base. All this suggests an important shift in governmental values and in

the premises shaping municipal services and their supporting technologies" Ref. 1, p. 47.

In 1961, Lewis Mumford wrote as follows--Ref. 3:

"Municipal government is mainly involved in the delivery of basic services to its citizens. However, there are surprisingly few effective channels of communication between the local officials and the community at large. Readily obtainable citizen reaction to city government is an important requirement for quality service and yet opinion surveys are usually difficult and costly, if not totally impossible. The one-way characteristic of the newspaper and broadcast media allow only for minimal citizen participation in decision making. (See Ref. 4 for an example of an opinion survey.)

"From the citizen's point of view, channels for any communication with city government often involve barriers of frustration. For service requests, information, or emergency aid the citizen is ofted faced with delayed and/or inadequate response, or, too often with what he considers no response at all.

"There is great need for techniques of closing the gap between the local government and the community for the purposes of stimulating citizen participation and effectively bringing municipal services to the public."

"The strongest 'impression' that emerges from the available literature is that the average U.S. urban resident is suffering from a large and ever growing information crisis. The primary evidence for this contention comes from studies showing that citizens are frustrated in their attempts or are unable to get information for everyday problem solving:" Ref. 5, pp. 18-19. "The list of unanswered questions is almost overwhelming" Ref. 5, p. 41.

From the report of the Federal Council for Science and Technology Committee on Automation, Opportunities in the Service Areas--Ref. 6, p. 57--the statement is found that

"...completely new developments are appropriate to our service economy. National computer networks could bring vast productivity gains at low costs in services where information exchange is basic. Examples include checkless-cashless transactions, instant filing of tax returns and receipt of tax refunds, and vast expansions of our ability to exchange and analyze statistical data."

Again from Ref. 6 on p. 68:

> "Computer networks as a manifestation of automation, appear to make possible productivity gains in service areas where information exchange is basic. However, in all cases where new technology is introduced, hard decisions have to be made as to whether resultant productivity gains are consistent with the changing goals of society; further, new motivations may have to be offered to employees as monetary compensation becomes less attractive as an inducement to enhancing productivity."

In June 1971, the Committee on Telecommunications of the National Academy of Engineering (NAE) submitted a report to the U.S. Department of Housing and Urban Development on Communications Technology for Urban Improvement, providing substantive detail on a number of possible projects designed to "...improve city living." Included as Appendix C to the NAE report is an analysis of responses by U.S. cities to a questionnaire concerning "...potential usefulness of the projects to cities." The one project deemed of highest priority by the cities was the Community Information Center (CIC). This response indicated that many of the cities are trying to decentralize their responsibility for the delivery of services in order to dealienate their constituents and to provide a beginning atmosphere for social changes leading to a better life for city residents. The 1972 paper by Siegel and Hiibner, both then in the Office of the Assistant Secretary for Research and Technology, U.S. Department of Housing and Urban Development, suggested that the use of two-way cable communications between residents and their local governments "...presents new opportunities for delivering social services in a cost effective manner," and that this mode may be superior to the present system of service delivery. Although unanswered questions are at hand--as is true of almost every new application of technology--Siegel and Hiibner suggested an experimental demonstration in a live context to "...remove the uncertainty..." in a system based on the premise that economic viability requires that many users who want a wide variety of services will each have to pay appropriate fees to support the system.

In applying telecommunications technology, it is essential to separate basic concept from equipment. In a rapidly developing field such as telecommunications, the embodiments of a concept can change rapidly in form, cost, function, and efficiency. Further, the rapidity of this change can inhibit application. Will equipment be obsolete before it is installed? Will a system cost less and do more if we allow five more years to pass before buying the needed equipment?

Such questions are a heavy burden on the public official who must decide when and how to spend public funds. Such rapid change may be a sign of vigor and a promise of significant gains in efficiency and flexibility to come; but it can also inhibit application because of the fear that commitment will foreclose opportunities to utilize future improvements. Equipment leasing is a way to circumvent this situation. Ref. 7.

* * * * * *

Those who advocate a CISC must answer this basic question: Why should a city have a CISC? Any such activity must compete with others for very scarce public funds--for streets, education, housing, water, sanitation, and health are among others--as well as with other users of computers such as policy and research staffs and the wide range of batch and time-shared computer services that are now increasingly available. The CISC should help to

(1) Improve the quality and effectiveness of important current services;
(2) Provide kinds or qualities of service not now available;
(3) Achieve highly valued principles--for example, by improving equity in the distribution of service costs and benefits, or by making municipal government more adaptive and responsive to changing citizen needs and desires;
(4) Reduce service costs;
(5) Increase revenues. Ref. 1, p. 48.

Baltimore was selected as a location for the proposed CISC experiment because (1) it was one of the original Urban Observatory sites, (2) it is close to the Office of Telecommunications in Washington, D.C., (3) Mayor William Donald Schaefer has an interest in technology--evidenced by his own Office of Telecommunications, (4) it is more representative of American cities than Washington, D.C., and (5) it has a wide range of social and economic problems.

In his 1971 paper, Ref. 8, Stevens asked if new systems of citizen feedback using new technology could be used to help redress the imbalance in political communication. (The Establishment can use mass communications to reach the people, but the people have limited ways to talk back to the Establishment.) He suggested that if this can be done, the Communications Revolution could be as significant as the Industrial Revolution. He drew the analogy of the Industrial Revolution diminishing the power of the economic elite

compared to the Communications Revolution diminishing the power of the "knowledge elite"--the Political Establishment.

In Ref. 9 the following statements are found: "As we are winding up the first half of the 70's, the emphasis of data processing has turned to the optimization of resources and techniques, as opposed to early attempts merely to extend the use of computers to a variety of functions. The issue is no longer a question of saving money by using computers; now there is the distinct possibility of being unable to maintain a viable business without the computer." "Most leading-edge companies have recognized that data and not hardware or software is the 'real wealth' and thus must be more carefully managed than in the past".

If a CISC is activated, overall firm management control must be exercised by top municipal officials to actually bring about more efficient delivery of those services the city now tries to deliver. Responsibility must be assigned for seeing to it that public services are really delivered when and where they are needed and that reasonable questions from citizens are answered. The use of technology is not a magic wand whose waving will remove all city service delivery problems. Technology can assist substantially in this process if for no other reason than to ease the daily task of dealing with massive volumes of requests for various kinds of services and information. Technology does not provide a melodramatic plan for removing all citizen complaints, but it can provide the path for prompt channeling of requests for these services to those who do deliver them. Service delivery must then take place as it is now done; streets cleaned and holes paved, sidewalk breaks repaired, tree limbs removed, water mains fixed, welfare referrals properly made and followed, parks kept in repair, and trash collected, to name a few! Technology can assist in making the tracking of complaints more positive, and in maintaining accountability records for top city management action.

This project for the enhancement of urban information and service delivery, whatever its size and scope, should be attached to the Mayor's office so that it will receive staff and public visibility. Technology can be readily transferred if it is coupled to the political process.

SECTION II

CISC OVERVIEW

A Community Information and Services Center (CISC) is a place where residents of a community can receive answers to questions that arise from their relations with the local government and their environmental situation. Other activities of the staff in a CISC are to render some services and to collect information on citizen attitudes toward local government and its programs. The basic long-range objective of CISC activation is to enable a much more rapid and satisfying exchange between residents and local government using modern automated telecommunications and information management technology. This project stems from a 1971 National Academy of Engineering (NAE) study that showed, from a poll of over 300 cities, that the CISC is of the highest priority to aid in service decentralization in cities; Ref. 10.

The specific purposes in activating a CISC include:

(1) Expeditious and responsible delivery of existing city services.

(2) Information and referral on services not offered by the city.

(3) Information on plans, proposals, and activities of the city government.

(4) Collection and processing of citizen attitudes and opinions about the city government for use by all concerned.

From a broader point of view, the CISC may be viewed as one answer by modern technology to some of the disturbing questions raised by the social upheaval of the 1960's. The CISC envisioned by the NAE included two activities:

(a) referral, intended to provide citizens with procedural information on where and how to obtain services; and

(b) the delivery of some services such as forms, brochures, or other specific information in an attempt to actually service the request; this could include

limited physical service or ombudsman assistance, Ref. 10.

It is currently planned that the experimental CISC being activated in Baltimore will operate initially at a centrally located downtown installation collocated with the city's new mobile radio and Civil Defense center. It is expected that this CISC will have an automated data base that could be used to support other CISC's located to serve local community areas of the city. Interconnection would be by dial up lines initially to as many as 24 multiservice community centers; Ref. 11. Local information or that in frequent demand can be in on-line storage, readily accessible by terminals.

One of the perceptions that has come out of the social disturbances of the 1960's is that citizens' problems are not as easily compartmentalized as a city management may think they are; Ref. 12. The citizen frequently has problems whose resolution may require information or services from a number of different agencies. Therefore "...a service delivery system which can solve client problems should be comprehensive, coordinated, and integrated" Ref. 13. The underscores are by the author, who also suggests that the citizen should be the final judge of what information he needs to solve his problems.

Inherent or perhaps implicit in the above remarks are two functions a CISC should perform, (a) the providing of information, and (b) participation in problem solving with the citizen who wants the assistance: see Ref. 14. The first function can be carried out by a centrally located CISC, readily accessible by a much publicized telephone number. If a CISC is located in a local community, this fact in itself implies that the staff is there to assist in problem solution, the second function. The basic CISC concept is that modern technology can be of assistance in the solution of problems that arise out of the questions that city residents ask of their city governments. These questions seem to relate to the city as a whole and to the local communities where the residents live. On this basis, a test of the problem-solving function should be included in the demonstration project in order to test the basic premise. Since the CISC is one of the few actual interfaces between the city government and its citizens, it must be staffed by well-trained persons who are committed to their tasks and supported by adequate technology and procedures. Otherwise, the CISC concept will not be adequately tested.

Some of the characteristics of an operating CISC in providing personal services and information are

(1) The needs and demands vary from day to day and minute to minute;

(2) Each transaction involves a personal or face-to-face interaction;

(3) There is a variation with time in the numbers of persons served and in the kinds of clients; and

(4) Response to clients is on a real-time basis. See Ref. 1, p. 56.

The long-term objectives of a CISC are likely to be threefold (Ref. 1, p. 59):

(1) To enhance citizen participation in the process of government;

(2) To enhance the interactive process with citizens; and

(3) Change the nature of nonproductive services.

The following three paragraphs briefly discuss these objectives.

By asking for citizen opinions and reactions to ongoing and proposed municipal programs, feedback can be obtained "...to bring out and ventilate otherwise explosive resentment against inequitable services--for example, biased police activities--and thus reduce potentially destructive tensions and point a way toward resolution of the underlying problems." The CISC could also aid in the formation of special interest citizen groups for social, political, or economic reasons, possibly alleviating some of the alienation in cities.

Service delivery is now a highly labor intensive activity, and it is reasonable to expect that the computer, used in conjunction with appropriate in-out terminals, will aid in making this interaction between the citizen and his local government more tractable and efficient. As more of these applications become operational, this use of computers will gradually become commonplace and readily accepted.

Nonproductive services such as fire fighting are those used to reduce the number of socially undesirable events as contrasted with education or transportation that contribute directly to social welfare. An eventual possible future use of a CISC could be as the center of a network for the transmission and identification for the early warning of fire. Such a system would require reliable sensing devices in each living

quarters. It would permit the occupants to flee before it was too late, and on the other hand would make it possible for the fire department to tailor its equipment and manpower for specific kinds of fires rather than having to be ready for massive operations. If the entire city were covered, a major impact on the cost of this class of public safety could be made. Ref. 1, pp. 60-62.

The Research and Policy Committee of the Committee for Economic Development as cited in Ref. 15, recognized that "knowledge and information are major factors in the growth and productivity of the American economy and in the well being of the society ...." The Committee further recognized that "Advances in the technology can make information accessible more quickly and in larger quantities." The Committee then asked the question of whether the proliferation of electronic media will also assure greater selectivity and quality of information. The report states: "If the move from scarcity to abundance in communications does not guarantee better or more complete information, if it only guarantees more, then it may well serve no constructive purpose." Powers--Ref. 16--concludes that it "...is the purpose of the CISC to assure that the citizen not only has access to more information that he wants, but that the information is up-to-date and credible to the user."

This section is concluded with a quotation from Warner in connection with whom the CISC should serve:

> "In summary, it appears that, ironically, those subgroups of individuals who occupy the most disadvantaged positions in our society are the least likely to articulate information or resource needs, and report fewer problems/questions than other individuals. As mentioned earlier, however, it would be hasty to conclude that these disadvantaged individuals have fewer needs for information or services than the more advantaged segments of the population. A more logical explanation might be that individuals with multiple unmet needs of long duration become so accustomed to them, and to their inability to solve them, that they no longer consciously regard them as problems/questions, and report only problems that are new and/or urgent. In addition, many of these respondents may well be less articulate or less willing to articulate their needs than more advantaged respondents". Ref. 5, p. 83.

The CISC is thus challenged to work out ways and means for communicating with the disadvantaged as well as the more affluent members of the community.

SECTION III

CISC DESCRIPTION AND OUTPUT

This section contains information on how the CISC is expected to operate.

1. Communication between city residents and the CISC is expected to occur in three ways at first:
   (a) walk in, (b) by telephone, or (c) via one or more remote computer terminals. It may at a later date include one- and two-way cable television. Over-the-air television programs could also originate in the CISC as well as one- and two-way radio transmissions.

2. A single, widely publicized telephone number can be assigned to the CISC.

3. Proposed Information Content. Sufficient information to start a response on the questions of daily living should be on line. See Section IV for more on this topic.

4. Service Responsibility. Since the CISC represents the city government to its clients, it is essential that the response be such as to convince the caller that he or she has come to the right place for problem solution, that the city government can and will give the caller a reasonable response to the question. Under this mode of operation, and with an expected daily call load of perhaps 100/hour in Baltimore during usual business hours, it is imperative that adequate computerized information-handling facilities must be used by each responding information practitioner.

   Although the basic thrust of this plan and the supporting details in this paper are directed toward the activation of an experimental computerized CISC, it should be pointed out that automation is not absolutely necessary for successful operation. If the workload does not warrant automation, adequate response can be provided by a few really skilled information practitioners, each with a telephone and a carefully assembled and organized directory whose contents may be defined by a good knowledge of local conditions and the material in Section IV.F and Ref. 14. The directory must be well done, and those who use it must be well trained. One way to do this is to have the information practitioners themselves compile the directory prior to system activation. One

example of a manually operated information center is in San Diego, California, where Federal, state, county, and city government have pooled their resources in a joint location in the City Hall: the telephone number is 714 293-6030. See Ref. 17. Sufficient records on operation of the center must be maintained to permit viable decisions on expansion or automation.

5. Accountability. This topic refers to the fact that the principal objective for the existence of a city government is to provide a variety of services to its residents. In carrying out this function, the city government is accountable to the residents for services delivered. If services are not delivered, the citizens become increasingly dissatisfied. It is the author's opinion that much of the social unrest of the late 1960's was caused by deep citizen resentments of governments with their seeming imperviousness to complaints. In most cities, the Mayor is the most visible city official responsible for all activities of the city government, and is generally considered accountable in some way for its acts. Few, if any, cities or towns have a record keeping activity that can identify and assign responsibility for taking action on the huge volume of complaints and queries that flood the city's switchboards. However, modern telecommunications and information-handling technology can provide ways and means to carry out such a record keeping operation. For example, a caller wants a pothole in the street in front of his house filled or another caller has an animal rescue problem: the responding information practitioner is seated at a computer terminal, and using a conventional typewriter keyboard, enters the caller's name, address, and phone number, the complaint or problem, its computer-generated serial number, date-time group, and the city department that is responsible for the matter. While the caller waits, this information is transmitted at the push of a button to the Mayor's summary record, to the responsible department, and to the CISC storage file. The receiving department's immediate reply includes an acknowledgment of the transmission and an estimate of when the problem will be taken care of or the approximate date of inspection, which is given to the caller immediately in addition to the serial number and date-time group. As soon as the work is done or the complaint satisfied, the responsible department practitioner enters the proper date-time group in the computer record corresponding to the proper serial number, transmitting this to the Mayor's summary record as well as maintaining its own departmental record for supervisory purposes. Shortly thereafter, a phone call can be made or a postcard sent to the caller to

indicate some action on the complaint if not satisfaction. If the city is wired for cable a response can be made directly to the caller's terminal. In this way, the citizen should feel the city government is listening to him, the departmental supervisors and managers know their workload, and the Mayor has a means of holding his department heads responsible for their assignments.

After the above was written, it was found that a software design specification to accomplish much of the complaint tracking activity has been produced by the Urban Information Systems Inter-agency Committee (USAC) Project at the City of Charlotte, North Carolina. See. Ref. 18. It was prepared through a three man-year effort by the Charlotte Consortium consisting of the City of Charlotte, the University of North Carolina, and the System Development Corporation. This design specification could be reviewed for applicability and feasibility to any municipality by perhaps a 3 or 4 man-month effort, leading to possibly a 3 man-year effort to produce a program and code for the appropriate available computer. On page 1-3 of the Design Specification Overview, the claim is made that

> "The module, when implemented, will place video terminals in six departments including the Action Line location. These terminals will permit automated entry and retrieval of about 75% of the complaints, requests for services, and requests for information made daily to city departments. This process also provides periodic reports for follow-up special studies and routine reporting. Implementation of this module will benefit the municipal citizen by providing expeditious response to the complaint/requests for service or information queries concerning the services provided by these organizations. This process provides for the complainant to be notified when his request has been completed and a follow-up procedure to determine the level of satisfaction with the services performed. This follow-up promotes the public relations aspect of the municipal government/citizen relationship."

A point was brought out at the First National Health and Welfare Management Systems Conference in Chicago during April, 1974:

> A major theme in public assistance programs of all types, for the next few years at least, will be <u>accountability</u>. Assistance providers must learn to be accountable for their expenditures of money and other resources. Otherwise, in times of fiscal constraint, legislatures and

the Congress simply will not continue to provide the resources. Ref. 19.

The CISC will provide--as a minimum--the mechanism for better levels of accountability than are now reached in the operation of manual information and service delivery systems.

6. Output. CISC principal output is the actual phrasing and delivery of answers to questions from city residents to the city government as well as some face-to-face service delivery. Other outputs are the creation of computerized summary records that show as a minimum, the numbers of questions, their categories, sources, times to respond, and dispositions by department or other city agency. It will probably be CISC responsibility to prepare reports for the Mayor.

In listing the above items, the assumption is, of course, made that the department receiving a complaint will take immediate action to alleviate or remove the basis for the complaint or otherwise provide citizen satisfaction. If this is done successfully, citizen alienation should be reduced.

Another CISC output is the automated summaries of citizen responses to questions put to citizens about their attitudes toward various city programs and activities. In this way, top city management can obtain invaluable feedback on their proposed and ongoing programs.

Other activities that may or may not be enumerable could include:

Use of the CISC to build a positive image of the city in the minds of the residents;

Use of the CISC to issue notices of the occurrences of various city events;

Designating the CISC as the city's central source of publicity and promotion campaigns;

Working closely with many civic and community organizations in planning for the types of questions expected and in obtaining feedback.

SECTION IV

PROPOSED CISC INFORMATIONAL CONTENT

A. Introduction

There are a variety of ways in which available technology can be applied to provide community communications: Ref. 20. Considerable study has already been given to the concept of an information and services function. It is useful to summarize here for background purposes the operational elements of such a service as a functional part of a Community Information and Services Center, and to illustrate some of the services that this function could provide.

At this point the comment is made that the automation of the flow of information across the interface between citizens and their local government is likely to bring about an entirely new method of carrying out this activity. This consequence stems from the ability of the computer and its associated telecommunications to rapidly move large amounts of information in times measured in seconds. This characteristic of the technology when associated with high volume citizen demand is leading to new ways of doing business that are only remotely related to current methods.

Detailed information is also provided in Part F below to enable the construction of a data bank for either manual or automated operation for service delivery support. This report recommends in Section V a preferred route to apply technology for rapid and flexible response.

The concept of an information and services center does not require that such a center be operated by a governmental entity. It could be operated as a commercial venture with a full range of options with regard to how the services are paid for and how the operation could provide a profit incentive. These options are not analyzed here. Such analysis could be the subject of a separate study in itself.

By way of perspective, it has been assumed by those advocating the information and referral center concept that it is more efficient to concentrate the necessary equipment and service staff. Users must travel to this point of concentration or phone to make use of information services offered. The alternative, of course, is to make such equipment available in the home. To make this latter alternative economically

feasible, it is necessary to use whatever communication equipment is already available in the home, such as the TV set, the telephone, and whatever communication channels such as cable TV are already entering the home for other purposes.

The elements of an information and services activity described below provide two functions. These have been defined as follows:

1. Provide to citizens information about services available to them from government agencies, and

2. Facilitate contact between the citizen and the agency that can provide such services.

All centers would perform at least these two basic functions. Other services could be added, of course, especially those of a more commercial nature in perhaps a private enterprise version of a CISC. But the principal interest of this report is in what may be termed "human services"--services related to the more basic human and community needs, such as welfare, education, and health services, among others.

B. Functional Elements of the Center

While the services provided by an information and services center may be grouped in various ways, such as nonemergency and emergency, or governmental and commercial, there are nine functional elements that characterize the operation of the Center regardless of the kind of services dealt with: from Ref. 7. These nine elements are outreach, receive and interpret inquiries, identify service resources, provide information, referral and resource contact, follow up and tracking, management information, evaluation of resource agency performance, and accountability. These elements are described in the paragraphs immediately below.

1. Outreach

As with any service, the public must be aware of the information and services center. The outreach function goes beyond publicity, however. It includes more active elements of searching out those who are most likely to be in need of the services--see Ref. 5, Chap. 5--and educating them as to the use and capabilities of the center. To some degree, publicity will occur spontaneously by word-of-mouth. Beyond this, the appropriate degree of aggressiveness of the outreach function will depend upon the capability of the center to

handle the inquiries, and the ability and willingness of the local service agencies to accept increased work loads.

2. Receive and Interpret Inquiries

Though the function of receiving inquiries may appear obvious on the surface, there are options as to how the function is carried out. The option chosen will determine the basic character of the center, its effectiveness, its flexibility, and its cost of operation. For example, will the user come to the center to receive over-the-counter service by a trained practitioner who has the necessary communication devices at hand? Or will the user communicate electronically with the center by phone or broadband--CATV--cable? Will the staff member at the center operate the necessary communications equipment personally? Or will the center function in a teaching mode, guiding the citizen in use of the equipment?

3. Identify Service Resources

In this function, the center identifies for the citizen the agency or agencies which may be able to provide the services needed by him. This identification is made after the caller's needs are identified and the center assesses the eligibility of the citizen for service from the various agencies. This function provides a prime opportunity to make use of modern information handling and communication technology. There are other opportunities as well. But the crux of the information and referral center operation is handling the information which is used to correctly identify and route citizen needs to service resources.

4. Provide Information

This is the function by which the efficacy of the center ultimately will be judged by the citizen. The citizen must receive information in whatever form and by whatever means are required to satisfy his or her needs. The option selected for a particular inquiry will depend upon the nature of the inquiry and the extent of the response necessary. For example, an inquiry requiring search and selection may make use of a readout on a cathode ray tube. An inquiry as to eligibility for welfare assistance may be handled on a communicating typewriter that can process the necessary questions to a time-shared computer. Note Ref. 21. For a list of job openings suitable to the citizen's experience and within a given radius of the citizen's home, the center may provide a hard copy printout. A copy of a certified birth certificate could be sent by a facsimile unit from a centrally located CISC to a local community center.

5. Referral and Resource Contact

In this function, the center does more than simply provide information. The function takes place after basic information is given to the client and after the client has made a decision to contact a suggested service resource. The center takes whatever action is needed to provide a specific time and place appointment for the client. The process is similar to the airline reservation clerk who uses a terminal to reserve space on a particular flight on a stated day.

6. Follow Up and Tracking

The center may wish to determine whether the client contacted the resource agency to which he was referred and whether the client received satisfactory service from that agency. "Follow-up" generally refers to a later contact with the client and/or the agency to which he or she was referred to determine whether the client actually met his or her appointment with the agency. "Tracking" refers to the process of complete monitoring of the progress of the client from the time of first contact with the center until the needed service is obtained and the individual leaves the human service delivery system. Follow-up would not generally be done where the citizen's inquiry is for information only.

Tracking will serve at least two purposes. It may help the client obtain the needed services, and it will help the governmental service agencies to evaluate their own performance.

7. Management Information

Data aggregation is the basis of a management information system. On the assumption that an efficient information and referral function will use computerized information handling, aggregated data can be readily obtained as a useful by-product of the center's operation. This aggregated data can be valuable to resource agency managers and to the center itself. By collecting and analyzing data from its own operations, the center can determine, for example, the number of clients served, the geographic and demographic distribution of clients served, the fraction of those contacted who actually obtained services, what the clients did with what was provided, and which agencies supplied the service, thus providing measures of need and effectiveness.

For management and evaluation purposes, the clients need not be individually identified. Only aggregated data are needed. Thus, the client's privacy is not threatened in this process. The center operation could be designed to automatically aggregate, analyze, and print management reports showing resource or agency performance at the neighborhood level from the data collected.

8. Evaluation of Resource Agency Performance

The management information derivable from the operation of the center is useful not only to resource agency managers for improving their own operations, but also to government officials who are responsible for allocating public funds. There are political sensitivities, of course, in such evaluations. In theory, at least, if judged by objective measures of performance, tax dollars could be budgeted more effectively.

9. Accountability

This refers to the fact that the municipal government is responsible to the residents for services rendered. See Section III.5 above for further comments.

C. Expanded Services

The concept of an information and services center has been described as being primarily concerned with governmentally supplied services. There is no reason why such an information center must be limited to this type of service. If the range of services is expanded to include more information areas, the center comes closer to fully utilizing the capabilities of modern computer, telecommunications, and information-handling technology. Some of the expanded services that could be considered are listed below.

1. Public Schedules

Notices of scheduled meetings of public bodies such as the City Council with agenda could be provided. Such information is now generally available in the conventional media, but it is difficult for any but the most dedicated citizen to keep informed on matters of interest to him. It also would be possible to provide an automatic notification service on selected subjects. Such a service would notify by prearrangement those citizens and civic groups that have an expressed interest in specific subjects. This would eliminate

the present need to depend upon personal contacts and to search for notices that are generally obscured.

2. Educational Services

A variety of educational services could be offered if terminals were available to interested members of the public. Some of these services have been developed by the University of Illinois, the University of Texas, the MITRE Corporation, and other educational, commercial, and not-for-profit institutions.

A description of an educational service is given by Baran in a report prepared for the U.S. Department of Commerce. See Ref. 20:

> "From a library of self-help programs available in this system, a computer in an interactive mode, would coach the pupil (typically adult) in a chosen subject. The computer tutor would be organized in the form of an electronic programmed learning text. The program would loop backward if the student appeared to be guessing at wrong answers--or move forward if the student were answering all questions correctly. Key features of such a computer tutor in the home would be the great variety of courses offered and the freedom to take lessons at the precise times most convenient to the viewer. Thus an adult interested in a course on transistors would be able to take the course in free odd moments and not be constrained by the usual hours and limited subject matter of a formal school. In its pattern of access, this service would be more like a book than a lecture, in that the user rather than a speaker would set the timing."

Baran was writing of a service to be provided through a home terminal. Though less convenient but at less cost to the user, the courses could also be given on terminals in a neighborhood Community Information and Services Center. This would make them available to all citizens on a shared facility basis.

3. Fares, Schedules, and Tickets

Baran also suggests that:

> "This service would provide, for all means of travel, all schedule, price, and availability information that presently exists in either automated or unautomated form.

For example, all schedules in the air travel guide would be included in the information bank of the service, as would data presently held in unautomated information systems such as bus and train schedules. While such a service is to some degree provided by travel agencies now, this new service would be more comprehensive and very much faster. It would instantly answer such questions as the differences between carriers with respect to service, menus, etc."

4. Legal Information

Quoting again from Baran,

"Our legal system was initially designed to provide excellent legal protection for a small percentage of the population. With economic development and changes in social customs, more persons are seeking full and equal access to the services of the courts, causing the judicial system to strain under the load. Many are discontented with the quality and cost of, and their differential access to, these services. When better information-retrieval techniques are developed and when the cost of information storage is reduced, it may become possible for better access to legal information to be provided by computers than is available today. This service would provide a directory of lawyers, as well as access to computerized legal counseling which would give precedent rulings in similar cases along with general interpretation. The primary users of such systems would be lawyers, for whom the system would reduce the time and effort presently spent in researching legal questions. In addition, the systems could be used to give the intelligent layman preliminary understanding of legal questions without his seeking formal legal advice. Today, laymen try to get information from law books, just as many read medical books searching for information they cannot afford to buy. A combination of a computer-based file plus a good librarian aide might provide more effective retrieval than would full reliance on machine retrieval of data". Ref. 20.

5. Weather Information

Baran points out that:

"Much more weather information is available than is presently transmitted because highly specific information

is of interest only to a few. (A weather service) would provide country-wide regional forecasts and special forecasts.... One would be able to determine the local weather forecast in the exact location of interest when requested, rather than having to listen to lengthy general weather reports. For example, if one were interested in the weather conditions of a particular ski location in the mountains, one could specifically obtain that forecast". Ref. 20.

6. Banking Services

There are some banking services which could be provided by a community information system. The "checkless-cashless society" concept cannot readily be implemented using only Community Information and Services Centers, since most business transactions take place elsewhere. The Community Information and Services Center, depending upon its location, could be more convenient than a bank for certain types of transactions which do not require the physical presence of the customer at the bank. For example, one or more conventional remote terminals arranged for connection to the bank of the user's choice could be located in the CISC.

7. Access to Government Data

The Community Information and Services Center could have remote access to specialized collections of data now available from government sources but no doubt underutilized because it is not easily accessible except by those who "know the system." An example is the geographic and demographic information that is now available from the Bureau of the Census and from other sources which rearrange Census data for special purposes. However, most members of the public neither are familiar with the variety of information which is available from Census data, nor do they have convenient access to such information. As a starter, the volume entitled "Statistical Abstract of the United States" could be stored and accessed by an appropriate number of key words. The current issue has 1,028 pages and costs $6.80. Initial access could be by listing the chapter title, then going into each chapter section and subsection as the user refined his query. Access could also be provided by showing the selected portions of the index on the cathode-ray tube (CRT) so that the user could request data directly by page number. Storage of even this relatively small volume of information appears practicable only by the use of electrical scanning of a page or two at a time for rapid entry into computer memory.

8. Expanded "Yellow Pages" Services

Information handling and communication technology could greatly increase the ease with which detailed information on availability of goods and services may be obtained. Geographic and other criteria could also be included in the search request. In a large city, for example, there may be many listings for a particular product or service but little additional information as to details of cost. Also there is no convenient way to find a supplier closest to the potential customer. An expanded Yellow Pages service could supply this information through a Community Information and Services Center and may even serve as a testing ground for the shop-at-home concept by step-wise increasing the information accompanying each listing.

9. Index of Services

A Community Information and Services Center would offer an index of its own services and the services of all resource providers associated with the center--local, State, Federal, and even commercial, if the information center concept is applied in its broadest sense. Thus, a client would feel free to approach the center without knowing precisely what information he needs to solve his particular problem. The index would be designed to help guide the client to a more definitive statement of his information needs.

D. Integration of Information and Referral Services

The information and referral function and the Community Information and Services Center were discussed separately above. Information and referral centers have been established to provide a single function, but the Community Information and Services Center is much broader in scope and could include the information and referral services as a component function. Such integration has the advantage of more efficient use of plant and staff but raises some policy questions which will need study and resolution.

Some functions of the center will be essentially governmental. Others could be commercial. In this case, will costs be allocated among those who benefit from the center's operation? Would it be prudent to allow income from commercial functions to subsidize the governmental functions? Should there be a government subsidy to commercial participants to encourage public benefits such as energy conservation, a better informed public, lower unemployment, and the like? Will management

responsibility rest primarily in government or in a commercial operator? These questions are illustrative only. More are likely to arise. All will have to be studied and accommodated. See Ref. 1.

E. Integration of Emergency Services

1. Introduction

Recently within cities, there has been a growing interest in emergency resource management. The emergency management center seems to answer the need for coordinated response to all types of requests for emergency public services. The functions of such a center could include:

a. Receiving all requests for assistance in emergency situations (such as fire, crime, automobile accidents, and acute illness).

b. Coordinating the dispatch of manpower and equipment needed to meet the emergency condition.

c. Inventory of manpower, equipment, and facilities used to respond to emergency conditions as well as temporary relocation of remaining resources.

d. Optimizing response to emergency situations.

e. Use and support the emergency operations of neighboring jurisdictions.

2. Federal Involvement

A number of federal agencies now have programs with state and local governments to improve the delivery of emergency public services. Included are the National Institutes of Health, Veterans Administration, Environmental Protection Agency, Defense Civil Preparedness Agency, National Highway Traffic Safety Administration, Federal Aviation Administration, United States Coast Guard, Law Enforcement Assistance Administration, and National Oceanic and Atmospheric Administration. In addition, the Robert Wood Johnson Foundation, through the National Academy of Sciences, is providing fifteen million dollars to state and local governments in the form of grants for the development of emergency medical communications systems.

Modern communications, of course, is the most important tool used in providing coordinated emergency services. It is not surprising, therefore, that emergency communications is receiving considerable attention at the federal level.

The Federal Communications Commission (FCC) has been studying the growing need for radio communications used for emergency medical services. In recent years, the FCC has been moving to provide the radio frequencies and a regulatory framework for hospital and ambulance communications. Major FCC actions have been taken under Docket 19880 and related dockets. Docket 19880 opened on 4 December 1973 with a Notice of Inquiry and Proposed Rule Making. These proceedings led to creation of a new Mixed Services category in the Special Emergency Radio Service, and the assignment of additional frequencies for medical services operation. These operations include paging, command and control, telemetry, hospital-to-hospital, highway call boxes, and general medical communications. Spectrum designated for emergency medical use is shared by government and nongovernment users under regionalized, coordinated medical communications plans. Ref. 16.

Of special interest at the federal level is a committee which serves as a focus for the varied federal involvement, the Interagency Committee on Emergency Medical Services. This committee was established by the Secretary of the Department of Health, Education, and Welfare (HEW) under provisions of the Emergency Medical Services Act of 1973. The committee evaluates the adequacy and technical soundness of all federal programs and activities relating to emergency medical services, provides for the exchange of information necessary to coordinate such programs and activities, and makes recommendations to the Secretary of HEW concerning the grants and contracts authorized by the Act.

3. The 911 Emergency Telephone Number

The implementation of the 911 nationwide emergency number is an example of the public benefit that can result from coordinated effort. Emergency situations discovered by or reported to law enforcement personnel require a variety of manpower and equipment combinations. Not all of this manpower and equipment, however, is under the control of law enforcement agencies. It became obvious that a central dispatch center would eliminate the chance of error due to relayed messages, would save time, and make it easier for the citizen to obtain help.

In 1967, the President's Commission on Law Enforcement and the Administration of Justice recommended the use of a single telephone number nationwide for citizens to use in reporting emergencies. The American Telephone and Telegraph Company announced in 1968 that it would cooperate by making the telephone number 911 available from a pay phone without depositing coins. Subsequently, the federal government announced a policy of support for 911 and urged its implementation. Supporting statements of policy have been issued by the Office of Telecommunications Policy in the Executive Office of the President (Ref. 22), the Department of Transportation (Ref. 23), the Defense Civil Preparedness Agency (Ref. 24), and the Law Enforcement Assistance Administration. In addition, some states have passed legislation directing implementation of 911; California is one such state with plans to have 911 implemented statewide by about 1984.

4. Community Information and Services Centers and 911 Deployment

Most communities have the basic elements of an emergency services system: hospitals, ambulances, police vehicles, fire equipment, and a variety of mobile communication equipment. Often, all that is lacking is integration and coordination of these elements that already exist. A CISC, using the 911 concept, can provide this coordination. It can also overcome some of the barriers that are slowing the nationwide adoption of the 911 approach to emergency public services. These barriers are technical, political, economic, and institutional. They are so intertwined, however, that it is hardly possible to separate the barriers into such clear-cut categories. Furthermore, a so-called technical barrier is often more a cost problem than one of technical feasibility.

Emergency services are paid for and supplied on a local, jurisdictional basis. Although political jurisdictions cooperate with each other to varying degrees, questions of cost, legal liability, and to some extent territorial pride work against consolidation of the service organizations in neighboring jurisdictions. While the providers of emergency services are strongly cognizant of political boundaries, the providers of phone service generally are not. If a telephone exchange and all of the phones served by it are coincident with the same geographic area served by the emergency organizations, there is relatively little problem in instituting a 911 emergency system. An example of this situation is New York City, where the borough boundaries and the telephone exchange boundaries match; the city was one of

the first large metropolitan areas to adopt the 911 concept. But where such a match does not exist, rearrangements in the telephone switching system are needed. These rearrangements can be primarily technical or procedural. If technical, the phone company must make changes in the equipment itself. If procedural, a system of operations must be agreed to by the jurisdictions involved so that emergency calls can be relayed with minimum delay and minimum chance for error. Analysis of agreements concerning liability and procedures for tracing guilt are especially needed since the fear of a liability suit in a situation where liability cannot be clearly assigned is strong among neighboring jurisdictions.

The Community Information and Services Center is a medium by which such problems can be solved. Agreements among jurisdictions to jointly manage a common information center can be the foundation for the basic agreements needed to operate a 911 service where exchange boundaries cross jurisdictional lines.

The Community Information and Services Center can be a place where jurisdictional and local jealousies can be set aside. It is also neutral in the sense that operations can be managed and errors analyzed without bias since the focus is on efficient management of public service. For further discussion on possible locations see Section I-D of Ref. 25.

The Community Information and Services Center offers a further advantage by providing follow up on 911 calls determined by operators as not requiring emergency action. Approximately one half of the 911 calls in New York City are for nonemergency matters. Situations have arisen where operators disqualified true emergencies due to the way they were reported. The CISC would provide nonemergency follow up to these situations.

As an example of what can happen when high volume use of 911 occurs, consider the following from the magazine Communications News for May, 1976:

> "911 has become a political issue rather than a technological solution to the problem of reporting emergencies. The irrational urge to rush into a 911 system together with the establishment of 911 centers as a substitute for and in parallel with existing report centers can cost billions of dollars and cause enormous confusion.
>
> Obviously, each small township cannot afford a separate 911 center so that one large center would be created to

cover 5 or 6 townships or possibly a whole county. Remember that 911 encompasses not only medical emergency service: including hospitals, volunteer ambulances, blood banks, eye centers, poison centers; but also civil emergencies: including flood, fire, hurricane, disaster...all these in addition to the usual police, fire, water, gas, electricity, and similar emergencies.

Thus the concept of 911 which greatly appeals to the politician is that the citizen needs only to remember 911 and he will get help in a hurry. NOT SO! If all the calls of a large suburban area are delivered to a 911 center, the center must:

First, take note of the emergency

Second, ask for telephone number

Third, ask for location of emergency

Fourth, find out what political subdivision is involved and refer to records

Fifth, either relay the message or transfer the call.

All this can take 15 minutes when time is critical. It is not a substitute for direct telephone connection to the correct local agency which is familiar with the geography of the territory.

A simple variation of 911 which is feasible with modern telephone central office equiment is to supplement 911 with 4 additional digits, as follows:

Dial	911 POLIce	911 BIRTh
	911 FIRE	911 AMBUlance
	911 POISon	911 HEARt attack or critical medical
	911 HOSPital	911 ELECtricity
	911 BLOOd	911 WATEr

As envisioned, the caller would dial the complete 911 POISon. If the poison center is activated and ready to receive calls, the call would be routed to it automatically. If it were busy or not in service, the 911 center would handle the emergency."

F. Detailed Analysis of Informational Content

This section contains the results of a preliminary analysis made to identify first the overall nature of the flow of information between citizens and their local government and then to go into specific detail as far as possible.

Since a CISC is a place where information is processed and transferred, it is highly desirable to have some ideas of the kinds and quantities of information needed to answer citizens' questions asked of their local governments.

An endeavor was made to identify those agencies or departments of selected city and county governments that are most frequently called on the telephone. The list of 28 cities and counties used is shown in Appendix A, and is based on telephone directories on file in the Library of Congress on 15 December 1975. The selection of cities was arbitrary. The most frequently called numbers were found in a small box at the beginning of the city or county listings. The agencies that corresponded to these phone numbers were tabulated and counted: Exhibit B-1 in Appendix B contains an alphabetical list of these agencies. Of the 182 separately identified city and county agencies, the following were listed five or more times; the numbers indicate the frequency of listing of each:

Ambulance	6
Animal Shelter/Control	9
City Hall	7
County Offices	5
Fire Emergency	16
Jail	12
Library	6
Police	15
Probation Office	6
Refuse Collection	5
Sheriff	9
Traffic Violations/Courts	5
Water Department	7

The total of the above is 105. The total in the table of Appendix B-1 is 334, almost 12/city or county. The above group is 31.4% of the Appendix B-1 total. This may be an indication of those functional areas considered more important by both citizens and municipal managements, and perhaps by the telephone companies involved.

The results of an effort to consolidate the 182 agencies into a smaller number of functional areas produced the information tabulated in Exhibit 1, using the 14 functional areas cited in

Ref. 5, pp. 104-106. These allocations are obviously arbitrary, and led to further analyses. Fire, rescue, and police are assigned to Area 2, Crime and Safety.

EXHIBIT 1

Functional Areas for
Most Frequently Called Agencies

1)	Consumer	6	8)	Housing & Maintenance	8
2)	Crime & Safety	13	9)	Legal Problems	
3)	Discrimination	1	10)	Miscellaneous	6
4)	Education	3	11)	Neighborhood	67
5)	Employment	8	12)	Public Assistance	9
6)	Financial	6	13)	Recreation	18
7)	Health	11	14)	Transportation	12

Since Area 11 Neighborhood has 67 agencies in this category, further analysis was made to identify the more or less well-known agencies of local government that were assigned here. Warner (Ref. 5, p. 104), under the topic Neighborhood, identifies the following eight specific problems or questions.

(1) Complaints about children

(2) Traffic and parking

(3) Complaints about neighbors

(4) City services

(5) Other undesirable conditions

(6) Complaints about dogs

(7) Complaints about rats

(8) Vacant lots and buildings, and abandoned cars

Further examination of the 63 indications of complaints, questions, or problems regarding city services produced the following categorical list of agencies based on the organization of the City of Baltimore. Exhibit 2 is based on the agency listings in Baltimore--except the CISC--as set forth in the 1964 charter revision (Ref. 26, with additions

and changes to 1973) and 173 of the 182 listings in Appendix B-1. The CISC was used when there did not seem to be an agency in Baltimore appropriate for queries represented by the Appendix B-1 list.

EXHIBIT 2

Possible Extent of Queries on the CISC

Agency	Frequency of Listing
Board of Estimates-Procurement	1
CISC	47
City Hall	1
Civil Defense	1
Civil Service Commission	6
Department of Assessments	6
Department of Aviation	1
Department of Education	3
Department of Health	13
Department of Hospitals	4
Department of Law	9
Department of Municipal and Zoning Appeals	1
Department of Planning	1
Department of Public Works	36
Department of Recreation and Parks	2
Department of Social Services	4
Department of Transit and Traffic	3
Department of Welfare	5
Fire Department	8
Housing and Community Development	8
Jail Board	4
Libraries	3
Mayor's Office of Manpower Resources	1
Mayor's Staff	2
Police	3

Further attention is invited to the document cited in Ref. 5. The authors' abstract contains the following statements: "An overview of relevant literature reveals that residents in urban areas apparently have a multitude of nonoccupational information needs which are not being satisfied within the constraints of existing information resources and systems." "The Baltimore Urbanized Area was chosen for the investigation, and extensive exploratory work was undertaken towards

the end of obtaining data." "The great quantity of data elicited were analyzed in terms of information needs, information-seeking strategies (behavior), and search outcomes. In a final exploratory testing phase an attempt was made to develop a methodology for assessing the capability of library and information agencies to deal with the problems/questions identified by residents in the earlier survey phase." The following abstracts and citations from Ref. 5 are relevant to the CISC concept:

Page 62: "Interviewers were to probe for up to four information needs without making any leading statements. Afterwards, respondents were directed to think about 17 topic areas."

These topic areas were neighborhood, recreation, health, education, consumer problems, drugs, family planning, legal matters, cultural activities, housing, day care, abortion, voting and registration, hobbies, public assistance, employment, and transportation.

"The list of topic areas, although arbitrary, was developed using classifications of requests received by various information services in Baltimore."

Page 96: Exhibit 3 is Table 5-8 of Ref. 5 and shows the importance of providing information in the CISC for citizen use in the first four topics.

"The 8,932 problems/questions mentioned by respondents were coded into 14 general topic areas (Table 5-8). The most frequently cited topic areas were neighborhood, consumer, housing and household maintenance, and crime and safety. These four topic areas accounted for 52 percent of all problems/questions mentioned."

EXHIBIT 3

Distribution of Problems/Questions Among Topic Areas

Topic Area	Number Cited	Percent of All Citations
Total	8,932	100
Neighborhood	1,440	16
Consumer	1,199	13
Housing and Household Maintenance	1,145	13
Crime and Safety	878	10
Education	583	7
Employment	568	6
Transportation	545	6
Health	513	6
Miscellaneous	487	5
Recreation	470	5
Discrimination	368	4
Financial Matters	316	4
Legal Problems	214	2
Public Assistance	207	2

Page 97: Exhibit 4 below is a copy of Table 5-9 of Ref. 5; it is included here to show the kinds of problems that the respondents identified with and without help from the interviewers.

EXHIBIT 4

Percent of Citations which were Aided and Unaided by Topic Area

Topic Area (1)	Total Number (2)	Total Percent (3)	Percent Unaided (4)	Percent Aided (5)
Total	8,932	100	19	81
Neighborhood	1,440	100	18	82
Consumer	1,199	100	23	77
H & H Maintenance	1,145	100	29	71
Crime and Safety	878	100	8	92
Education	583	100	9	91
Employment	568	100	12	88
Transportation	545	100	10	90
Health	513	100	20	80
Miscellaneous	487	100	36	64
Recreation	470	100	9	91
Discrimination	368	100	7	93
Financial Matters	316	100	25	75
Legal Problems	214	100	31	69
Public Assistance	207	100	45	55

"Although variations are evident for the different questioning procedures, three topic areas--neighborhood, consumer, and housing and household maintenance--were the most frequently cited regardless of the questioning procedure used."

Page 98: Table 5-10 from Ref. 5 shows the need for including in the CISC names and addresses of people needed for problem solution. Identity of these names will be a subject for experimentation, and will probably vary with the local community.

EXHIBIT 5

Rank of Topic Areas by Categories of Response

Topic Area	Rank (by number of citations) Total Problems	Unaided Problems	Aided Problems
Neighborhood	1	3	1
Consumer	2	2	2
Housing & Maintenance	3	1	3
Crime and Safety	4	9	4
Education	5	12	5
Employment	6	8	6
Transportation	7	11	7
Health	8	5	9
Miscellaneous	9	4	11
Recreation	10	13	8
Discrimination	11	14	10
Financial Matters	12	7	12
Legal Problems	13	10	13
Public Assistance	14	6	14

"While crime and safety ranked fourth in terms of frequency of mention overall, as well as for aided problems/questions, miscellaneous problems/questions rank fourth in frequency among unaided problems/questions. The relative frequency of miscellaneous problems/questions among unaided responses may be attributed to the use of the following probe for unaided responses: "...have you had trouble finding out where a particular person, place, or thing is located..." Problems/questions concerning the need for names and addresses were coded into the miscellaneous topic area."

Page 99: From Table 5-11, Ref. 5, Exhibit 6 below provides insight on the topic areas considered most important by respondents who cited more than one problem.

"When only one problem/question was mentioned by a respondent, this was coded as most important. The percentage of problems/questions selected as most important by respondents varied for topic areas and for aided and unaided responses," as shown in Exhibit 6.

EXHIBIT 6

Importance of Problems/Questions by Topic Areas

Topic Area	Number of Problems/ Questions	Percent of Total Designated as Most Important	Percent of Unaided Designated as Most Important	Percent of Aided Designated as Most Important
Neighborhood	1,440	22	27	23
Consumer	1,199	19	26	17
Housing and Household Maintenance	1,145	27	38	26
Crime and Safety	878	31	34	32
Education	583	22	35	21
Employment	568	26	40	25
Transportation	545	15	43	12
Health	513	22	23	23
Miscellaneous	487	13	14	14
Recreation	470	10	9	10
Discrimination	368	16	33	19
Financial Matters	316	19	21	19
Legal Problems	214	30	35	28
Public Assistance	204	33	52	19
Totals	8,932	22	30	22

"Considering all mentions of a topic area whether unaided or aided, a greater percentage of concerns about crime and safety, legal matters, and public assistance were considered most important when compared with other topic areas. Conversely, the miscellaneous were least likely to be designated as most important."

From Exhibit 6, "it may also be noted that a greater proportion of unaided responses than

of aided responses was considered important. In particular, public assistance, employment, transportation, and housing concerns were most likely to be considered important among unaided responses in these topic areas. Among the aided responses, mentions of crime and safety were the only ones more likely to be considered important when compared to the percentage for all aided responses."

Page 100: "In summary, the importance of problems/questions for respondents was related to the topic areas mentioned as well as to whether or not the problems/questions were mentioned spontaneously by respondents. Those topic areas mentioned most frequently by respondents in the sample were not necessarily those which were considered most important by them. For example, although public assistance was the least frequently mentioned topic area, 52 percent of all spontaneous (unaided) mentions in this topic area were considered most important. In general, problems/questions which were mentioned spontaneously tended to be considered important more frequently when compared with problems/questions cited in response to more directed questioning by interviewers. However, some topic areas (such as recreation and miscellaneous) were not likely to be considered important whether mentioned spontaneously or as as a result of more direct probing by interviewers."

Each of the fourteen topics were subdivided into a number of subtopics. These for the public assistance topic were: problems with the Department of Social Services 52% of the total citations, medical assistance 24%, food stamps 53%, social security 66%, unemployment compensation 30%, and other problems.

This information illustrates what is already well known, that public assistance is fragmented among many agencies, and probably very difficult to coordinate. This may be the reason for the expressed need for names and addresses as cited above in connection with Exhibit 4. This situation is seen as an opportunity for the CISC to assist in citizen dealienation. At the same time, this means hard work on the part of those responsible for setting up the CISC and training its personnel.

Pages 103-105 of Ref. 5 contain lengthy Table 5-13 that lists the fourteen topic areas, the specific problems and questions for each topic, and six columns of various tallies, percents, and ranks for each problem/question. This table is regarded as a prime source of hard data on the kinds of information needed by citizens in their daily activities. The six columns on the left side of this table are reproduced in Appendix C as Exhibit C-1; Column 7 is added, listing the author's estimate of the appropriate Baltimore agency to handle the problem. It is recommended that all who are involved in CISC data bank design study this table thoroughly. Also, the Baltimore Yellow Pages Telephone Directory dated June, 1975, contains approximately 34 inches of listings of social service agencies; very few of the 178 agencies listed are supported by the City. This means that these agencies' admission conditions and requirements should be itemized and arranged for computer data bank accessibility.

Page 115: Exhibit 7 is taken from the first three columns of Table 5-17, Ref. 5. It shows the rank order of the respondents' problems or questions and their associated topic area.

EXHIBIT 7

Rank (1)	Specific Problem/Question (2)	Topic Area (3)
1	General fear	Crime and Safety
2	House hunting	Housing & Household Maintenance
3	Rental problems	Housing & Household Maintenance
4	Complaints about children	Neighborhood
5	Traffic and parking	Neighborhood
6	Specific crime	Crime and Safety
7	Product quality bad	Consumer
8	Unemployed, looking	Employment
9	Complaints about school system	Education
10	Complaints about neighbors	Neighborhood
11	City services	Neighborhood
12	Food prices too high	Consumer
13	Other neighborhood problems	Neighborhood
14	Inadequate bus service	Transportation
15	Complaints about maladies	Health

Pages 116 and 120:

Most of the text on these two pages of Ref. 5 relate to eight of the topic areas cited in Column 3 of Exhibit 7. These comments are presented as additional background for use in CISC data bank design and development of organizational procedures.

"Crime and Safety: Concerns about crime and safety varied with occupation, education, and

median tract income. In general, those in the more prestigious occupations and with the higher levels of education and income were most likely to report a general fear of crime. Specific incidences of crime were, in a similar fashion, most frequently cited among those living in tracts with the highest median incomes.

"Housing and Household Maintenance: Demographic subgroups which were most likely to mention difficulties finding a place to live were the young, nonwhites, those with little education, individuals who were not working, and those living in tracts with the lowest median incomes. Rental problems were most frequent among the young and least frequent among the elderly.

"Neighborhood: Complaints about neighborhood children were most frequent among the elderly and those living in low income tracts. Complaints about neighbors were similarly correlated with median tract income. In addition, complaints about neighbors were frequent among those with little education. Traffic and parking problems in the neighborhoods were more frequent among whites than nonwhites. Housewives tended to complain about city services (e.g., sanitation) more often than other subgroups. It might also be mentioned that, contrary to expectations, complaints about city services were distributed evenly among respondents regardless of median tract income. Five percent of each of the subgroups based on income mentioned city services (data not shown).

"Consumer: The poor quality of products was of most concern to persons in clerical or sales positions while the cost of food was of great concern to the elderly.

"Employment: As might be expected, finding a job was of greatest concern to the young and those who were not working at the time of the interview (excluding housewives, and the retired).

"Education: Those individuals with the most education and living in tracts with the highest median incomes were most likely to complain about the school system.

"Transportation: Complaints about inadequate bus service were made most frequently by individuals in sales and clerical occupations and by those over 64 years old.

"Health: Complaints about illnesses were found most frequently among the elderly and retired persons."

"While these data may seem obvious and give rise to many post-hoc explanations, they do specify precisely which subgroups should be the primary target for the dissemination of specific kinds of information. For example, finding another place to live is of little concern to the elderly; however, children who cause disturbances in their neighborhoods have resulted in less than ideal housing situations for them. Obviously, the most appropriate solution for the elderly would be information on how to effect some changes in their present neighborhoods."

Pages 122-124: Table 5-20 of Ref. 5 contains information that shows needs for help as compared to needs for information or advice, both in relation to the fifteen most important problems/questions listed in Exhibit 7. This table is reproduced below as Exhibit 8 with most of the associated text.

EXHIBIT 8

Statements of the Fifteen Most Important Problems/Questions

Specific Problems/ Questions	Percent of Problems/Questions Stated as: Complaints	Needs for Information or Advice	Needs for Help
Total (N = 956)	93	20	17
Complaints about the school system	100	0	30
Complaints about neighbors	100	0	28
Food prices too high	100	0	0
General fear of crime	100	6	16
Complaints about children	100	3	4
Specific crime	100	6	11
Product quality bad	100	9	42
Other neighborhood problems	100	16	17
Complaints about maladies	100	13	18
Traffic and parking	99	3	15
Rental problems	95	19	22
City services	93	7	22
Inadequate bus service	93	8	21
House hunting	70	80	13
Unemployed, looking for a job	65	91	7

"Respondents seem to view high food prices as something they could do nothing about. All mentions of food prices were complaints while no such mentions suggested a need for information or a need for help. The fact that no respondents voiced the problem of high food prices in terms of possible solutions may indicate a feeling of helplessness in the face of rising prices as well as an inability to view this problem in terms of alternatives or possible solutions. In contrast to high food prices, other problems/questions which were uniformly stated as complaints were sometimes stated as needs for information or needs for help. In particular, complaints about the school system, about neighbors, and about product quality were often stated as needs for

help or assistance. Only two specific problems/questions were stated almost uniformly as needs for information--looking for a house or apartment and looking for a job. These specific problems/questions were also less likely than other problems/questions to be stated as complaints."

Pages 124 and 126:

Table 5-21 of Ref. 5 contains a tabulation of the needs for information or advice compared to those for help arranged by age, educational level completed, occupation, and median tract income. The text that accompanies this table is as follows:

"Some subgroups of individuals were less likely than others to state their problems/questions in terms of complaints. Specifically, individuals with the most education, those who were professionals or managers, and those living in tracts with the highest median incomes were least likely to articulate their problems/questions in terms of complaints. It may also be noted that problems/questions mentioned by these subgroups were also more likely to be stated as needs for information or advice. Similarly, young respondents and students were less likely to complain and more likely to express a need for information. The elderly and retired persons, however, tended to complain more frequently and to express a need for information less frequently than other respondents. Expressions of the need for actual help did not vary consistently for subgroups of individuals.

"These data tentatively suggest that when individuals see the solutions to their problems/questions in terms of information, they are less likely to display negative attitudes by complaining or lamenting their situations. This relationship between complaints and needs for information was also seen for two specific problems/questions (house hunting and job hunting) which were stated frequently as information needs. For subgroups of individuals, the inverse relationship between complaining and stating a

need for information or advice holds both for unaided and aided problems/questions (data not shown). Thus, the elderly were considerably more likely than young respondents to complain and less likely to consider information as a means to obtain an answer or solution for both unaided and aided problems/questions. One might hypothesize that if information were more frequently considered an effective means of obtaining solutions by individuals, some psychological barriers to problem solving might be removed."

Thus it appears that long term CISC acceptance may be influenced by the use of special procedures to ensure that the young and old are properly serviced.

Pages 126-128: A summary of Section 5 of Ref. 5 is contained on these pages and reproduced below.

"Overall, there was a high incidence of information needs among the sample population. Eighty-nine percent of the respondents mentioned at least one problem/question. These 1,945 persons mentioned a total of 8,932 identifiable needs--an average of 4.59 problems/questions per person.

"Some individuals were more likely than others to mention information needs to interviewers. In general, individuals who were young and those with the higher levels of education and income were most likely to report problems/questions. In addition, a high incidence of information needs was found for individuals who were gregarious, who considered themselves opinion leaders on a variety of topics, and who were members of a number of organizations. Ironically, those subgroups who would be expected to have the most needs (i.e., the poor, the least educated, the elderly, the socially isolated, etc.) reported the fewest needs. Although one might conclude that these individuals have fewer needs, it is more logical to attribute this finding to other factors such as the inability or unwillingness of these individuals to articulate their needs or to their resignation to a poor quality of life.

"The most frequently cited problems/questions fell into the topic areas of neighborhood, consumer, housing, and crime and safety. These four topic areas accounted for more than half of the 8,932 problems/questions reported.

"Some topic areas were of more concern to some subgroups of individuals than to others. For example, the general areas of crime and safety was cited most frequently as most important among those at the upper income levels. Within this topic area, a general fear of crime and mentions of specific crimes were more frequently cited as most important by these individuals. The general area of housing, on the other hand, was cited most frequently by nonwhites and low income respondents. An examination of the more specific categories under housing revealed that house hunting was an important concern for nonwhites, low income respondents, those with little education, the young, and the unemployed. Within the general topic area of neighborhood problems, the elderly mentioned complaints about neighborhood children as most important. These data provide valuable information for pinpointing specific target groups with the view of disseminating information to meet specific needs.

"In looking at how respondents stated their problems/questions, an inverse relationship between complaints and statements implying a need for information was found. Unaided problems/questions were less frequently expressed as complaints and more frequently expressed as information needs than aided responses. Some specific problems/questions (i.e., house hunting and job hunting) were similarly less likely than other problems/questions to be stated as complaints and more likely to be expressed as needs for information. In addition, some subgroups of individuals--notably the most educated, those with the highest incomes, professionals or managers, and the young--were less likely to complain and more likely to express a need for information than other individuals. It is suggested that when the possible solution to a problem or question is seen in terms of

information some of the psychological barriers to problem solving (i.e., apathy, feelings of helplessness) may be removed."

The CISC may well be the interface between the local government and the citizen that could contribute to problem solution, thus restoring some measure of individual self-respect by reducing the apathy and seeming helplessness.

It is the author's opinion that technology is faced here with its greatest challenge and its greatest opportunity.

Page 149: Table 6-12 of Ref. 5 lists the organizational affiliation of persons used by respondents in seeking answers to their problems. Other governmental agencies were cited most by those with 1-6 years of education, with a family income of under $4,000, those not working, and those living in an area with a median tract income under $4,000.

Page 152: Table 6-13 of Ref. 5 shows the relative helpfulness of persons contacted for help or information by the respondents' education, family income, race, occupation, and median tract income. The point of emphasis here is that of the total number of contacts-- 2,601-- 43% were rated "Not Helpful"! From this, it appears that the CISC has an unprecedented opportunity to contribute to citizen dealienation.

Pages 163-167: These pages of Ref. 5 contain the summary and discussion of Section 6; this part of the report treats the information seeking strategies of the respondents.

"To summarize, an examination of the levels of information-seeking activity has shown that certain subgroups of individuals clearly emerge as information seekers. The highly educated, those with high family incomes, those living in tracts with high median incomes, and young respondents are more likely to attempt to solve their problems by seeking information; and, in doing so, use more sources of information than other respondents. Information seekers were distinguished by greater use of all sources of information-interpersonal sources, media sources, and

libraries. It may be noted that these findings are consistent with those of other studies which have reported a correlation between information seeking and education, income, and age. Active information seekers were also shown to be more gregarious than other individuals, a fact which increases their opportunities to make use of interpersonal sources of information.

"Although often the tendency is to conclude that low levels of information seeking can be attributed to a lack of education, other barriers to information seeking with respect to one information source--libraries--were noted. Physical barriers (e.g., lack of transportation, etc.) to library use were more prevalent among the low information seekers than among other individuals. Psychological barriers were also noted among those subgroups who were found to be active information seekers.

"In addition to variations in source use with respondent characteristics, the major types of sources used varied for specific problems/questions. The use of interpersonal sources appears to be associated with the specificity of the target of concern. For example, personal contacts were more frequent among those who had problems with their landlords than those who complained about high food prices. On the other hand, media use appears to be more dependent upon the frequency with which issues are discussed in the media (e.g., food prices, crime rates, etc.) rather than associated with active attempts to obtain information from media sources. Indeed, mentions of obtaining information from newspapers were more frequent among those concerned with the high crime rates than among those who were unemployed and looking for a job."

One of the specific problems/questions is Product Quality Bad, ranked 7 out of the 15 most important. Possibly one way to alleviate this situation would be to automate the annual and monthly issues of Consumers Reports and locate it in the central library. Some years ago, the author found a dogeared card file in the Los Angeles City Main Library indexing this

publication. This item alone might increase patronage of local libraries if they were connected to the main library via suitable telecommunications.

Chapter 7 of Ref. 5 contains comments on the search outcomes of the questioning process used in Baltimore to fix on the residents' needs for information. The idea of success or failure in getting information was used in trying to get an indication of respondent satisfaction in his information-seeking activities.

Page 168: "The criterion of success used in this chapter is based on responses to the following question asked of each respondent concerning the problem/question which he or she had designated as most important: 'In your opinion do you feel that you have gotten a satisfactory answer to your question or solution to your problem at the present time?' Responses were coded into four categories: 'yes, definitely,' 'yes, sort of,' 'no, still working on it,' and 'no.' However, for this analysis, the codes have been collapsed to produce a dichotomy of those who were definitely or at least somewhat successful and those who were definitely, or at least to date, unsuccessful. There is then, no absolute external measure of success--only the perceptions of the respondents."

It is the writer's opinion that if we want to know something about the effectiveness of any program, we should ask the program beneficiaries. In the final analysis, there is no other way to get answers to this important question: Ref. 27, p. 5.

Of the 1,945 respondents, only 26% reported success in their efforts to get information or solutions to their problems! We need look no further in trying to find reasons for citizen alienation or frustration. At the same time, this situation poses a considerable challenge to those who believe that technology has a contribution to make to the well being of the tion. This report describes the concept of a CISC to aid in the delivery of information and some services to all who ask.

Page 169 contains Table 7-1 that shows the percent of total respondents who reported success and a lack of it in their efforts to obtain information or solve their problems. This

table, reproduced below as Exhibit 9, also shows respondents' characteristics.

EXHIBIT 9

Respondents' Characteristics and Success in Obtaining Information

Respondent Characteristic	Total #	Total %	Percent Successful	Percent Unsuccessful	DK/NA
Total with problems/questions	1,945	100	26	73	1
Years of Education					
1 - 6	132	100	20	77	3
7 - 11	645	100	23	76	1
12	615	100	25	75	< 1
13 - 15	293	100	32	68	-
16+	259	100	35	65	-
Family Income					
Under $4,000	296	100	18	81	1
$ 4,000 - $ 7,999	338	100	22	76	2
$ 8,000 - $14,999	695	100	26	74	-
$14,999 and over	420	100	37	63	-
Occupation					
Professional/ managerial	285	100	34	66	-
Clerical/sales	339	100	26	74	-
Blue collar	515	100	26	73	1
Not working	801	100	25	74	1
Median Tract Income					
Under $4,000	75	100	10	90	-
$ 4,000 - $ 7,000	335	100	23	75	2
$ 8,000 - $14,999	1,407	100	26	73	1
$14,000 and over	130	100	35	65	1

The most frequently cited fifteen problems/questions are examined in Table 7-2, Page 170, for the success and failure rates of the respondents in problem resolution. This table is shown below as Exhibit 10.

EXHIBIT 10

Success Rates for the Fifteen Most Important Problems/Questions

Specific Problems/Questions	Total #	Total %	Percent Successful	Percent Unsuccessful
Total	947	100	26	74
Complaints about maladies	38	100	66	33
Complaints about school system	50	100	40	60
Complaints about neighbors	48	100	38	62
Specific crime	62	100	35	65
Traffic and parking	69	100	33	66
Food prices too high	40	100	30	70
Product quality bad	58	100	28	72
General fear of crime	133	100	27	73
House hunting	105	100	24	76
Rental problems	85	100	24	76
Complaints about children	71	100	23	77
Other neighborhood problems	45	100	9	91
Inadequate bus service	40	100	8	92
City services	45	100	7	93
Unemployed - looking for a job	58	100	7	93

One of the most important messages from Exhibit 10 is the low rate of 7% for those who had problems with city services. Whatever the reasons, it behooves cities and towns to remedy this situation by whatever means will do the job. Those local governments that do this are sure to obtain solid citizen backing for their programs.

These dismally low figures constitute a real indictment of present ways and means of city service delivery; the application of suitable technology should assist materially in this endeavor. Technology alone, however, will not be too effective; it must be coupled into the political process.

Table 7-3 on page 171 of Ref. 5 provides insight into the effectiveness of personal contacts in problem solution and the media used. This table is reproduced as Exhibit 11 below.

EXHIBIT 11

Success Related to Source Use for the Fifteen Most Important Problems/Questions

Success related to source use for the fifteen most important problems/questions

Sources	Total (N = 947)	Successful (N = 247)	Unsuccessful (N = 700)
Personal Contacts			
Percent making personal contacts	59	74	54
Average number of personal contacts	1.23	1.66	1.16
Media (use in percent)			
Television	26	26	27
Radio	14	12	14
Newspapers	38	40	37
Magazines	15	22	12
Books	7	8	7
Libraries (use in percent)	2	2	3

Note in Exhibit 11 that those who were successful had an average of 1.66 personal contacts while those who did not, averaged 1.16 personal contacts. It is the objective of the CISC to provide a place where the citizen may phone or come in person for information or limited service delivery.

The remarks below are abstracted from pages 187-188 of Ref. 5 where a summary is given of the strategies used by individuals in problem solution.

> "While the income level of the respondent of the tract in which he or she lived was highly predictive of success, some search strategies seemed to mitigate this effect. Specifically, making contact in person resulted in more success than other methods of making contact. Consistent with findings reported earlier, magazine use was another strategy related to success.

"Finally, with respect to the stated future strategies of unsuccessful respondents, it was encouraging to note that the subgroup characterized by the lowest success rate (i.e., those living in tracts with median incomes of less than $4,000) were least likely to be apathetic about continuing their searches. Nonwhites, while not characterized by a lower than average success rate, also could not be described as apathetic based on their responses. Hopefully, the stereotype of the apathetic poor and black population in the 1960's, will be a myth in the 1970's. On the other hand, the responses of the elderly in our sample were not as encouraging with almost half of them saying that nothing could be done and only a third planning to make further contact."

The final phase of the study reported in Ref. 5 was to develop and use a methodology "...for assessing the capability of library and information agencies to deal with the kinds of problems and questions identified by residents of the Baltimore Urbanized Area during the survey phase." The capabilities of five library and information agencies were quantified as far as their dealing with the most important problems/questions that were identified by the residents. "It was found that the capability of the individual agencies in handling residents' problems/questions varied significantly among them. However, 78% of the problems/questions posed could be handled by at least one agency. If these agencies had been linked together so as to have formed an 'information pool,' the community (comprised in this case of those agencies in the sample) would have scored as high as 78%. If the hypothetical chain of agencies, perhaps linked through a switching center, were expanded by adding member agencies, the theoretical score of the sample of problems/questions would probably have been higher. The assessment on this final exploratory phase of the professionals information-seeking behavior pointed to an apparent lack of cooperation (perhaps by omission rather than by design) among information agencies. There appeared to be no referral pattern among those agencies tested, implying that the development of a referral network and/or a prime referral agency might be considered."

The CISC as envisioned here and now, is that it would be such an information pool, functioning as a source of information and limited service delivery. In order to do this, it must of necessity also function as a sort of clearing house because any small group of information practitioners would be unable

to be sufficiently knowledgeable to answer all questions posed to them by the residents. For example, only the public works activity would be able to inspect and fix on the dates of specific street and waterworks repairs.

Three additional lists of possible services are presented below. Bortz--Ref. 28--has compiled the list shown in Exhibit 12 in considerable detail. Exhibit 13, from Ref. 29, contains a list with fewer entries and less detail than in Exhibit 12 but it could be provocative. Exhibit 14 is a list of the top ten national issues considered important by approximately 120,000 respondents to a recent questionnaire sent to over 600,000 residents in the state of Maryland. See Ref. 4. Logical development of any of these three lists could lead to major additions to the CISC data bank in addition to the wealth of material cited in this section from Warner in Ref. 5.

EXHIBIT 12

Bortz' List of Services

1. Consumer Protection - Better Business Bureau, legal recourse, product pricing information, consumer protection, safety information

2. Education - adult high school education for credit, local college-level courses for credit, major programs available locally--by institution, local hobby/skills classes, visiting guest speakers

3. Emergency Situations - ambulance service, medical crises, first aid training, needs for fire and police, storm-related flooding, civil defense emergency preparedness

4. Employment - jobs available with skills required, job referral agencies, part-time employment, temporary and youth-oriented employment, vocational training opportunities

5. Environment - noise abatement, weather/smog, refuse collection

6. Family - planning, counseling, recreation, day care, baby sitting, financial planning services

7. Financial - local banks' rates and services, brokerage houses, financial planning services

8. Government - service directory for federal, state, county and municipal departments, political parties, public interest groups

9. Housing - available housing categorized (with financial information, locations, prices, etc.), list of escrow officers, local realtors and housing agents, zoning map, tenant-landlord problems

10. Insurance - description of available policies, insurance requirements, list of local insurance companies, insurance services

11. Law Enforcement - list and description of law enforcement agencies and community groups, court services, juvenile delinquency, complaint procedure, traffic safety and violation inquiries

12. Legal - public defender and prosecutor's offices, legal aid, ACLU, information on the various courts, consumer advocacy, and specific types of problems such as divorce, personal injury, contracts

13. Medical - emergency referrals, first aid instruction, dentistry, standard medical examinations, X-rays, blood banks (added by the author is vocational rehabilitation matters)

14. Recreation - local programs, recreational areas such as parks and beaches; sports and outdoor recreational activities such as hunting and fishing; special recreation such as arts and crafts, music, dance, drama, gardening

15. Transportation - bus rates, routes and schedules; taxi services; airline and train information; car pools, driver training; classes for mechanics; aid to handicapped drivers

16. Volunteerism - Boy Scouts, Girl Scouts, Red Cross, blood bank, teacher's aides, "Block Parents," YMCA/YWCA, police reserves, clothing, food, household donations, donations of self, volunteer nurses, Campfire Girls.

EXHIBIT 13

List of Possible Referral Services

Determination of service availability
Maintaining and updating records
Coordination of social service agencies
Social service information to the general public
Employment referrals and information
Neighborhood information
Public affairs information
Information on rights and anti-discrimination procedures
Information to welfare recipients
Hotlines for referral and counseling
24-hour service centers
Crisis intervention
Centralized referral from home inquiry
Public health information
Nutrition information
Pharmacy services
Drug education

EXHIBIT 14

Top Ten National Issues in Maryland

1) Crime	26%	6) Government Regulation	4%
2) Inflation	21%	7) Environment	3%
3) Economy	19%	8) Education	2%
4) Government Spending	16%	9) Health	2%
5) Energy	7%	10) Unemployment	(1%)

Attention is invited to the active program of the Bureau of Libraries and Learning Resources, Office of Education, U.S. Department of Health, Education, and Welfare in several projects leading to the activation of Neighborhood Information Centers (NIC's) or in providing information basic to such places: see Refs. 14, 16, 29, 30, 31, and 49. The project summarized in Ref. 30 relates how ten neighborhood libraries "...clearly demonstrate(d) that the urban branch library is uniquely situated and equipped to provide information and referral services," "...a local answer to a local problem." Kitchens--Ref. 31--tells the story of what has happened in Olney, Texas since 1972 when the citizens "...voted to abolish the separate school libraries and the public library, and to create a unified, coordinated information delivery system to serve the entire community." Six problem areas are treated: administrative, legal, social, education and evaluative, financial, and physical. Ten advantages are cited at no additional cost other than the summer salary of the coordinator and that of a half-time teacher's aide. "The unified program represents the first steps in reaching its original objective of creating a more efficient source of information services to its total citizenry." Brooks in Ref. 31 relates the activity of New York City in computerizing their production of directories of social services, a massive project dealing with an incredibly complicated subject; the appropriate directories are for use in over 180 separate neighborhoods of the city!

Parker and Dunn in Ref. 32 make the point that unless the providing of information is "blind" with respect to the personal characteristics of the receiver such as age, sex, race, and religion, then the "information rich" may reap the benefits while the "information poor" get relatively poorer in an information society. A widening of such an "information

gap" might lead to increased social tensions. The CISC can then be used for good or ill as can some other technologies. CISC's should be placed in all neighborhoods, not just the neighborhood of those who are already information rich. Once this is done, then the actual providing of information via electronic means does become "blind" to the characteristics of the receiving individual.

G. Evaluation

This section contains some ideas on how to gauge the worth of a CISC or other comparable program.

According to Ref. 33, the term "evaluation" refers to (a) the numerical or mathematical value, and (b) the examination and formation of judgment concerning the worth, quality, significance, amount, degree, or condition of the subject matter.

How is the impact of any social program to be assessed numerically, particularly since any opinion or judgment is based on subjective evidence. Furthermore, since the subject matter of science is verifiable information, there seems little likelihood of obtaining reproducible quantified data on the effects of social programs.

In Ref. 27, the author suggests that one way to try to quantify program impact is to use the recently perfected techniques of psychophysics to evaluate--in any of the senses cited above--the opinions of program recipients regarding program payoff. In other words, ask those who benefit from a program to express their opinions about the program. As Professor Stevens put it in 1972, "For those who must build their science on consensus based on one or another expressions of human judgment, the way stands open for an effective ratio-scale quantification, provided the experimental subjects are given unconstrainted freedom to match numbers, loudness, length of line, or some other variable directly to the items of interest". See Ref. 34. Also in Ref. 27, the idea is advanced that citizen interrogation before and after CISC activation should yield some useful inferences about its payoff if the test instruments--the list of questions--is constructed, administered, and the results processed from Steven's point of view. The assumption was also made that both test instruments would be the same. This assumption may not be entirely valid since citizens won't have opinions about a CISC until after it has been in operation for a time: Powers makes this point--Ref. 16. However, references to pending CISC activation can be made in the first test instrument and followed up in the second. Great skill must be used in test

instrument design. Ref. 27 also has a section devoted to the legal issues that could arise in connection with such an evaluation as well as two examples of test instruments used in the field for opinion measurement and lists of categories that could be included in survey question construction. Ref. 25, p. 8 contains a list of desirable basic characteristics that are useful in constructing measures of performance.

Since any program supported by public funds should be evaluated in terms of how it contributes to the satisfaction of certain human needs, ways and means of measurement of need satisfaction must be devised. It must also be kept in mind that luxuries of one generation are the commonplace of the next, and are more or less fundamental requirements of the ensuing generations.

SECTION V

COMPUTERS AND PROGRAMMING FOR AUTOMATED CISC'S

A. Introduction

A community information system need not be automated; however, given today's technology and sufficient resources, it could be fully automated. The preceding discussion of Community Information and Services Centers made no reference to the degree of automation which is either possible or desirable. But the question is an important one for two reasons.

The first reason is the obvious need to reduce costs. Automation requires capital investment and presents the risk of obsolescence in a rapidly changing technology. Nonautomation requires higher labor costs, which include not only salaries but training costs as well. The best balance between the two will continue to change since equipment will continue to increase in efficiency, with unit costs going down and capability increasing.

The second reason for dealing carefully with automation is the client acceptability factor. That is, will the client be scared away, resentful, or simply incapable of using automatic equipment? To what degree will a human intermediary be needed between the client and the equipment? Today, the airline traveler still needs a human intermediary to make a reservation and buy a ticket. But many bank customers are accepting the automated tellers installed by some banks for routine transactions any time of the day or night. Very few have had difficulty learning to operate a television set which is of comparable complexity; also many learn quickly to operate computer games which are becoming popular.

B. System Requirements

Five problems are identified that challenge the more rapid introduction of automated information systems:

1. Management understanding and commitment, Ref. 35;
2. Need to consolidate service management, Ref. 35;
3. Need for further user familiarity and cooperation, Ref. 35;

4. Need for more effective and higher volume communications between the communities served and the State, regional, and county jurisdictions that manage the service organizations, Ref. 36; and

5. Need for common data base, Ref. 35.

The data base problem is probably the most serious in the long term. The other problems will no doubt yield to education and human adaptability as the value of automated information systems is proved. An example of a most effective high-volume, data-handling system is that in operation at the Lane County Courthouse, Eugene, Oregon, by the Regional Information System organization, a joint activity of Lane, Benton, and other Oregon counties. The City of Portland also participates in this activity that is managed by Paul Weber, the Regional Executive Group, and the Lane County Commissioners. See Ref. 37.

Baran points out in Ref. 20, that once a system has been established, another set of problems surfaces:

1. Large programming backlog and frequent schedule slippage,

2. Poor documentation of system characteristics and programs,

3. Costs higher than anticipated,

4. Poor operations monitoring, and

5. Inflexible programs.

These problems are common in most computer-based activities; they must be identified in detail and solved as they arise.

C. Costs

City expenditures--as of 1974--for automatic data-processing equipment ranges from about $5.00 per person for the smaller cities (5,000-10,000 people) to about $1.00 per person for the largest cities (over 500,000 people). For the small cities, equipment costs approximate personnel costs while for the largest cities, personnel costs are about 50 percent greater than equipment costs.

State expenditures for automatic data-processing equipment averages about $2.40 per person. The costs for personnel are about 40 percent greater than equipment costs.

Virtually all states and cities of over 500,000 people use automatic data processing. Usage decreases to 25 percent of cities between 5,000 and 10,000 people. A break point appears at approximately 100,000 persons per system. Above this number, over 96 percent of the cities use automatic data processing with costs of less than $1.50 per person in the population and remote terminals are used. Below this number the percentage of users starts to drop, cost per capita rises rapidly, and remote terminals are seldom used. Also 75 to 80 percent of cities over 100,000 use equipment made by the same major manufacturer, while most cities below this size use other makes.

From Ref. 35 it is found that primary uses of communicating terminals in state systems are for:

Highways and transportation	Public health
Mental health	Public aid and welfare
Public instruction	Legislative reference
Retirement	Hospitals
Vehicle registration	Social services
Information systems	Human relations
Employment and vocational rehabilitation	Board of Health--management activity
Environmental protection and natural resource management	Public safety, law enforcement, and correction

D. Computer Size

Arguments appear on both sides of the question of whether to use a single large computer at greater cost to take advantage of capacity, speed, and economies of scale, or several smaller, cheaper, and possibly more specialized computers. A large computer such as the IBM System 360 Model 195 would cost approximately $6.5 million (1975) for the central processing unit with 17 million bits of core and a cycle time of 756 nanoseconds per 64 bits giving a rate of 8 million instructions per second. An IBM System 360 Model 3 would cost approximately $58,000 for the central processing unit with 0.13 million bits of core and a cycle time of 57,600 nanoseconds per 64 bits giving a rate of 0.007 million

instructions per second. The guiding principle applicable here is "maximum use of minimum facilities." That is, the computer should be just large enough to perform the task at hand in the time required taking into account probable needs for future expansion and compatibility with other elements of the system. Leasing arrangements should be considered as well as the use of mini- and microcomputers to assist in countering equipment obsolescence and cost escalation. See Section VII.C for information on equipment and software requirements, and Section VIII on project costs.

E. Examples

The concept of the community center has been proposed in several forms.

Dr. Peter Goldmark, in his report to the U.S. Department of Housing and Urban Development, proposes a community communications center for rural communities to give them some of the advantages of a large city. The objective is to provide the rural community with educational services, health services, and cultural and entertainment activities by means of advanced communication systems. See Ref. 38.

The National Academy of Engineering considers a "Community Information and Services Center" equipped with a minicomputer of the PDP-11 class with disk storage and communicating terminals. This information center would "provide a wider range of readily accessible city services and information to the citizen, close the communication gap between the city administration and citizen, particularly the citizen in the inner city, and provide the city administration with a ready source of information on citizens' needs and problems". See Ref. 10.

The City of Baltimore like Boston and other cities, is starting to use multiservice centers in a plan to decentralize its government services. The centers do "for necessary public community services what shopping centers and department stores do for retail and other consumer services." However, the centers cannot supply all city services. Nor is there enough trained staff to provide a full range of services at each center. The Mayor's Office of Telecommunications in Baltimore is now studying cable communications comparable to that used for cable television to expand the center's services and activities. Some priority areas for expansion are education and library services, housing and community development activities, and public safety services. Note Ref. 39. Other communities are considering using such centers connected to the various city offices to provide an ombudsman function.

The MITRE Corporation--Ref. 40--with support from the National Science Foundation and the U.S. Department of Health, Education, and Welfare, is developing an interactive cable system to bring a variety of services directly into the home. Along with entertainment channels, there will be teaching and library services, appointment records, financial and message services, and computational capabilities as well as others.

F. Computer Programming

1. Introduction

Programming has already surfaced as a problem in implementing the Community Information and Services Center concept. Besides the obvious problems of rapid information entry, there are design questions of what language should be used, standardization questions of how can the programs be made transferable to other communities, basic planning questions of who should access the system, and can they handle the language?

A number of computer languages have been used to program urban and regional information systems. The languages differ in their technical and functional characteristics and in their suitability for certain applications and users. Incompatibilities already have made the transfer of programs from one computer to another difficult.

Machine language is the natural language of the computer and therefore different for each type of machine. Such languages require tedious programming, but are preferred for their efficiency. The use of arbitrary symbols to represent instructions and storage locations makes machine language somewhat easier to use and modify. The result is called a symbolic assembly language.

User-oriented languages allow a programmer to represent the problem in a manner more closely related to its application. This type of general purpose programming language is procedure-oriented in that it permits a programmer to readily identify the operations and sequencing necessary to perform a task. Some commonly used procedural languages have been modified for use in urban and regional information systems.

Within the past four years a number of municipal governments have developed general purpose software with federal assistance. For the most part, the software has been developed by the computer operator--municipal or state agency--in conjunction with the computer vendor.

Consequently, general purpose software development has been tailored to particular user requirements and particular operating systems.

2. Present Usage

While there are advantages in tailoring systems and programs to specific needs, the greater the variability among systems, the less transferable the programs become. Loss of compatibility among systems may preclude easy interchange of data among the systems or sharing of equipment.

Over two hundred urban information programs, written in twelve programming languages have been identified in a recent survey of urban information and referral projects. The languages used and their extent of usage are shown in Exhibit V-1. The most commonly used languages are COBOL (Common Business Oriented Language), and IBM Assembly (a language which symbolically represents machine language). There is an increasing demand by urban information systems for "on-line" capability, and suitable software is being developed by the various urban agencies in conjunction with various vendors. In all cases, the operating environment coupled with the biases of the computer vendor are the determining factors in software development.

By far the most frequently used equipment by municipal governments is that built by International Business Machines (IBM). The computer operator is generally a state or local government agency, providing centralized facilities and services on a reimbursable basis to other state and local agencies and, in some cases, to nonprofit organizations.

Because of the high cost of developing programs, there are obvious advantages to increasing their transferability. This is especially true in the case of the general purpose programs used in urban and regional information systems. See Refs. 41 and 42.

Developed with Urban Information Systems Inter-Agency Committee (USAC) support at the Regional Information Systems Department, Lane County Courthouse, Eugene, Oregon, "the Telecommunications Data Management System (TCDMS) is a major step forward in control or supervisory software development. It was designed to meet the specialized needs of the data-processing installation in the public domain. The TCDMS integrated, data-management component enables its users to store and manipulate large amounts of information in an efficient and economical manner. Its telecommunications component brings the resources of the computer to the desks of

CITY	INSTALLATION TYPE			SYSTEM TYPE				COMMUNICATIONS				SOFTWARE			SYSTEM OPERATOR	FUNCTIONAL PROGRAMS (number)
	Centralized	Functional	Single User	CPU	Core Size	Storage Tape	Storage Disc	INPUT Batch	INPUT On-Line	OUTPUT Batch	OUTPUT On-Line	Primary Language	Teleprocessing	Monitor		
New York	X			370/145	VM		X	X	X	X		DRS	CMS	OS	New York City Planning Agency	Proprietary Package
Philadelphia	X			H2000C	32K		X		X	X	X	H.P. BASIC	?	?	School District of Philadelphia	?
Atlanta	X			360/50 65 370/145	350K 1 Meg	X	X	X	X	X	X	COBOL		DOS	State Department Administration	?
Seattle	X			NCR ?	64K		X	X	X	X	X	COBOL	NCR NEATS/3 Level 2	DOS	Easter Seal Society	15-20
Louisville	X			360/45 370/135	1 Meg		X	X	Plan	X		COBOL (NIDMS)	Video 370	OS	State owned Facility	35
Chattanooga	X			370/145	250K		X	X	X	X	X	COBOL	CICS	DOS	City of Chattanooga System	100
Des Moines	X			370/?	VM		X		X	X	X	COBOL	CICS	DOS		?
Madison	X			360/50 370/155	200K	X		X		X		COBOL		OS	State System	25-35
Manchester	X			Syst 3	24K	X						COBOL				11

I & R SYSTEMS CHARACTERISTICS
IN SELECTED CITIES

EXHIBIT V-1

its users. Together, these two elements provide the most powerful and effective nonproprietary system of its kind available anywhere". Ref. 43.

A number of organizations, both government and nonprofit, are converging on the idea of operating a clearinghouse for software developed by or for government with government funds. These agencies are discussed below.

COSMIC

Founded at the University of Georgia in 1966, the Computer Software Management and Information Center (COSMIC) is a "transfer point" between government agencies. COSMIC's first contracts to disseminate software were with NASA; they now include software developed by the Department of Defense. Occasionally, nongovernment organizations also provide COSMIC with programs for widespread distribution. NASA publishes a quarterly indexed journal entitled, "Computer Program Abstracts,"--Ref. 7--listing documented computer programs arranged in five sections. The first section contains program citations and abstracts arranged in thirty-four subject categories, followed by four indexes: subject, originating source, program number/accession number, and equipment requirements sections. Computer programs and related documentation listed can be ordered at a cost ranging from $25 to $650 for the program and $2.50 to above $100 for the documentation only. The programs available from COSMIC are technical and scientific and, hence, not generally applicable to the urban and regional information systems.

NTIS

The National Technical Information Service (NTIS), Department of Commerce, now operates a program clearinghouse, similar to COSMIC. A distinct difference between the two operations, however, is that the COSMIC service has programs that are technically or scientifically oriented, while the NTIS programs are more varied. Programs available from NTIS are listed in Ref. 44; this document is an annual publication.

Justice Survey

The diversity of computer systems and programs in use by local governments is illustrated by the compendium--Ref. 45--of automated criminal justice information systems used by police, courts, correctional, and other agencies. Over 450 systems are listed, with a description of system functions and software languages used. The compendium is a result of a survey by the National Association for State Information,

Systems (NASIS) in cooperation and support of the Law Enforcement Assistance Administration. NASIS plans to extend the compendium to include all local government computer systems as funds are available. This agency is located on Iron Works Pike, Lexington, KY 40511; the address for mail is Box 11,910.

URBIS

Attention is invited to two up-to-date directories of computing in local government. They are the Municipal Information Systems Directory (Ref. 41), and the County Information Systems Directory (Ref. 42). These directories were produced by the Urban Information Systems (URbIS) Project at the Public Policy Research Organization (PPRO), University of California at Irvine. Computer applications are listed by specific governments and include information on program development and transferability as well as a computer mainframe index by manufacturer and users. The URBIS Project is supported by a National Science Foundation grant and is carried out with cooperation from the International City Managers Association, The National League of Cities, the National Association of Counties, and Public Technology, Inc. Directed by Dr. Kenneth Kraemer, PPRO performs policy research and provides advice on public policy questions of interest to State and local governments. See Section V.F.3 below for abstracts from Refs. 41 and 42.

Since software costs may well exceed hardware costs, every effort must be made to use most effectively what has been done.

3. Compatibility, Convertibility, and Standardization

In achieving the cost advantages of transferable programs, the choice of programming language is, of course, critical. But the choice of language and the characteristics of the hardware are interdependent. There may be difficulty in sharing software between computers even of the same model if the system configurations are different. General purpose languages are characterized by their ability to be machine independent. However, almost without exception, these programs are modified to meet unique applications. As a result, language dialects develop and compatibility problems persist.

Relatively minor incompatibility can be overcome by use of translator programs. These add cost to the programming phase and add time to the operations phase of a system.

A more difficult conversion problem is translating from one language tc another. This task is simplest when the languages are similar and support identical logic. If the languages are different, but support the same type of logic and have similar capabilities, it is possible to recode programs from one language tc another. The automatic conversion on a statement-by-statement basis for a less powerful language to a more powerful one is not efficient, and the conversion of a more powerful one to one less powerful is not feasible. Hence, translation (automatic or otherwise) between languages is most useful for languages that are similar and at the same level.

While adoption of a standardized language for information centers would have some obvious advantages in compatibility and transferability, standard language also limits the freedom to adapt to local needs or equipment. Even in the case of general purpose packaged programs, there will be costs for training operators, integrating the package into the rest of the system, and testing it in its new environment. Ref. 46.

It is not clear at this time that there should be a single standardized language for universal use in urban information systems. For the present, it seems more appropriate to recognize a limited number of languages with different operating characteristics that are applicable to local needs. A report dealing "...principally (with) the technical aspects of computer program transferability" is cited in Ref. 47.

From Refs. 41 and 42, pages 8 and 9, the following useful information on computer program transfer may be found:

"HOW TO ASSESS THE POTENTIAL FOR TRANSFERRING COMPUTER APPLICATIONS

"Data processing managers and user department heads frequently need to assess the potential for transferring computer applications, especially given the cost and time lapse involved in the process of designing and developing new applications in-house. Yet, aspects of transfer are not generally understood at the present time.

"The best way to look at transfer is to view it as a continuum, starting with the transfer of information about applications and moving to the complete adaptation and implementation of systems. Levels of this continuum are spelled out below.

"Levels of Transfer

1.	Information	Identify computer applications of interest and potential sites for transfer.
2.	Ideas	Exchange ideas and experiences with users of the specific application.
3.	Documentation	Exchange documentation on detailed systems design and functional specifications for a particular application.
4.	Computer programs	Exchange actual computer programs and modify as required for local conditions.
5.	Computer transfer package	Obtain experience of other cities, their documentation, such as executive summary, management guide, technical reports; computer programs, technical assistance in implementating the programs on-site and training for data processing and users.

"Costs as well as benefits must be considered in the transfer of computer applications since some costs are incurred in every transfer case.

"The transfer of computer programs (levels 4 and 5) is the most costly level of transfer. Here, the less costly transfer usually involves a generalized package with purchase price as the only up-front cost. An example would be a statistical package, or a reporting system, such as UFIRS, Uniform Fire Information Reporting System, which was developed and distributed by the National Fire Protection Association and the Department of Housing and Urban Development.

"Even these generalized packages beat additional costs, such as those incurred in the training of users, the integrating of the applications with the operating system, and the testing prior to production.

"The transference of another city's computer program is the more costly alternative at the fifth level of transfer, especially if the programs require extensive modification before the application can be used in a new situation.

"A city that obtains a payroll system from a similar city, but needs to add labor distribution capability to the system illustrates one way transfer modification costs are incurred. Or, consider a city that transfers a regression model for property assessment. In this case considerable data must be manipulated prior to implementation in order to "tune" the model to another city's conditions.

"Potential savings over the cost of designing and developing a system in-house, is the obvious benefit from transferring computer applications. Another benefit is the advantage to managers, who can assess the operating cost/benefits of the application through discussions with managers in the originating city. Another benefit to the recipient government comes from the interchange of ideas and discussions of common problems. Such information exchanges can help the recipient avoid many errors, including the omission of important components.

"The cost and benefit of transferring computer programs versus developing them in-house can and should be estimated. The key is to carefully investigate costs and benefits at the other levels of transfer (levels 1 to 3), prior to actual transfer of computer programs. While the cost of purchasing such programs is easy to determine in most cases, the determination of costs involved in modification during transfer is quite difficult, as illustrated above.

"In a few cases, accurate costs and benefits for a generalized program package can be predicted prior to the commitment to implement. Examples of such packages include those developed by federal agencies, national professional associations, software consulting firms and computer manufacturers. Unfortunately, few computer applications of this type are available for cities."

See Refs. 37 and 43 regarding availability of a powerful data management package in the public domain.

SECTION VI

STAFFING

The human mind is capable of amazing feats of memory in providing information services. But to develop such abilities requires highly dedicated people to devote several years to this task, and such skills require several years of experience by highly dedicated people who are emotionally able to deal with the often impatient public for long periods. Cities find it very difficult to obtain and keep such individuals for long enough periods to make them really effective in their jobs, although there are some outstanding people performing in these jobs. The role of technology in a CISC is not, at least at this stage, to replace the human function in the provision of information services. Rather, it is to make it possible for motivated staff people to perform the information functions without requiring the years of experience and patience with the public that are now required under present operating procedures. Ref. 16.

In any labor intensive service--such as human service delivery--it is important to shorten the training period as much as possible consistent with the requirements of the job. But it is especially important in the case of information services, because it is reported that those who deliver these services often grow "stale" on the job after a few years because of the continued strain of contact with often impatient members of the public. This effect probably becomes more important the more the public identifies the information provider as personally responsible for solutions of the problem. Thus, the more closely identified with the city administration the CISC is in the minds of the public, the less patient the public is likely to be with CISC personnel when the pothole in the street has not been filled six weeks after a complaint was first called in. And the sooner it will be before the CISC person loses patience with the job and either resigns or becomes impatient in his or her turn, thus defeating in part the purpose of the CISC as a mechanism for reducing alienation between the citizen and the city administration. Ref. 16.

It would therefore appear almost self-evident that (a) if automation technology can enable the rapid delivery of information service to the general public without excessive emotional strain on the information practitioner at the interface, and (b) if there is follow up and accountability in the

sense described in Section II, then the practitioner at the interface, the service receiver, and the city administration should all three derive satisfaction from work well done. Some problems will of course arise in the operation of such an enterprise that will initially tax the management because of their first occurrence.

Related to the problem of training people for the complex task of helping citizens get the information they need, and the role of CISC technology in making the information practitioners "smarter faster," an article in the Harvard Business Review points out that productivity of employees in the local government sector is assuming greater and greater importance as the number of people employed there increases. Nearly 13 million people are employed by governments in the United States, 80% of them in state and local governments. This represents "...more than the aggregate employment of all the durable goods manufacturing industries, including...autos, electronics, steel, and heavy machinery." Ref. 48.

A recent report of the Federal Council for Science and Technology, Ref. 6, contains the following statements on page 17:

> "After a disappointingly slow rate of growth in productivity in the 1965-1970 period (2.1%), the rate rebounded in the two-year period, 1970-1972, to 4%. National concern with productivity, however, has not abated. The continuation of this real concern is based on the large percentage (64%) of the labor force in the Service Sector and the corresponding difficulty of increasing productivity in this highly labor-intensive sector.
>
> "Government services, especially at the State and local levels, seem plagued by low productivity. Action to change this phenomenon is paramount because these latter levels of government are now responsible for the major part of the increase in government spending in general and because they feel the most pressure by Americans for a better quality of living.
>
> "The concept of 'productivity bargaining' appears to offer real hope in achieving higher productivity through the introduction of automation and other technologies as well as providing income or job security for workers. The revision of work rules must accompany productivity bargaining. Examples already exist of successful practices of productivity bargaining."

Staffing for operation of a prototype CISC differs in two respects from that for routine operation:

(a) The prototype would probably operate during normal business hours only, while a fully operational CISC could well operate 24 hours a day, 7 days a week.

(b) The prototype would have one or more operations analysts and human factors specialists to carry out a penetrating evaluation of the experiment. The prototype would also have a computer programmer to maintain the software and to thoroughly document all changes. When the CISC became fully operational, these people would return to their regular places of service.

Most municipalities have a number of telephones that are regularly used by citizens to request services. The most frequently used of these phone numbers by the general public may usually be found in a black-bordered box at the beginning of the municipal listings; note Appendices A and B in this connection. This means that there are a few people whose regular activity is to answer these phones and to thus interface with the calling citizens. An enumeration of these operators should be made as soon as their assignment to the experiment is evident. Since most of this ongoing activity will probably be in answering calls to the Public Works Department regarding streets, utilities, and related problems, it is of the utmost importance to maintain this routine call-answering service. If a move to new surroundings with new switchboards or other new equipment is to be made, the information practitioners must be properly trained on the new equipment and information with time for shakedown. The workload in the new location should not be increased with new categories of information until all are thoroughly familiar with their equipment and procedures. One additional practitioner for relief and backup should be provided for every three assigned.

In view of the concepts set forth in Sections IV.C, IV.D, and IV.E above regarding the integration of expanded services, information and referral services, and emergency services, it must be emphasized that these services are complicated enough when delivered separately, so that when they are combined for delivery by the same agency in the same location, much planning and training of personnel must be carried out with sufficient lead time prior to initial activation. One way to carry out this integration is to add each service to the CISC at different times so that all concerned will have adequate

time to become familiar with the operational features of each before adding a new service.

According to the original estimates of the National Academy of Engineering, the project team would include five permanent professionals, three specialists, and six information practitioners. The permanent employees include a project director, a computer systems analyst, an operations research analyst, a computer programmer, and a clerk typist. The three specialists include one on human factors and two operations analysts. See Ref. 10. The project director should be the first individual assigned to the project and the last to leave after the final report is delivered. The project director should approve all the other employees, and be assigned responsibility for overall direction which should include but not be limited to an overall design study, system definition, data bank content definition, hardware and software procurement, procedures development, operator training, and shakedown prior to cutover as well as operation. A major output of this experiment is to provide proper documentation to enable other municipalities to profit by the experience accumulated from operation of the prototype. It is therefore important that the staff collaborate to produce a final report that is adequate in every respect including photographs and possibly a documentary motion picture.

Attention is invited to certain recent and ongoing work that has followed and is related to that reported by Warner and others as cited in Ref. 5. Dervin and Zweizig at the University of Washington are engaged in research on the development of strategies for dealing with the information needs of urban residents. Ref. 49. Phase I was designed to determine how urban residents state and perceive their information needs, what expectations they have for need resolution, what actions they are requesting from agencies, and what information-processing strategies they prefer. Phase II is designed to determine how information practitioners see citizen need statements, requests for action, expectations for need resolution, and information-processing strategies. Phase III will develop and test a set of training devices to help information practitioners (librarians in particular) deal with citizen needs. This work is of considerable basic importance to those who operate CISC's since practitioners who interface with irate citizens in the CISC context are usually under emotional tension. Thus the information practitioner must be carefully trained in order to avoid identifying with the personal frustration and exasperation of the questioner. As noted above, the research of Phase III deals with the interface between questioner and respondent. So far, the indication is that there is a shortage of those at the

interface who can engage in skilled and directive listening. It frequently happens that the requester has a need that is not met by just an objective answer only.

As an indication of the extent of interest in such matters, a training program for community information practitioners is conducted at the graduate level by the University of Toledo. Program objectives are "to develop 1) an understanding of and sensitivity to the information and related needs of people in various kinds of communities, 2) an understanding of the functions and information needs of the social, business, and governmental agencies serving communities, 3) an insight into the potential of the public library as a social institution and as a distinctive facet of the community's communications network, 4) an understanding of the city, and 5) a feeling for the quality of life among community residents." See Ref. 50.

Janowiak in a recent paper on new venture management makes the following statements that are relevant to the innovative situation of the CISC:

> "Implementation of a new venture requires a great effort from the staff. From my experience, the new venture group must be highly motivated and willing to work long and hard. Where everything is new, there is a frontiersman-type spirit. This spirit must be felt by the whole organization. A venture manager must know his people and their activities. There is little time for error. Therefore, the team must work closely together in all aspects of the operation.
>
> "Probably the most important characteristic of the new venture management challenge is the tremendous number of decisions which must be made by a few individuals. This differs from an established organization where decision-making is diffused". Ref. 51.

SECTION VII

CISC LOCATION, EQUIPMENT, SOFTWARE, AND SPACE

A. Introduction

This section contains information on the physical situation of the CISC. Appendix D consists of a short paper on the Systems Process that could be used to define the center in as much detail as is needed to enter into specific procurement and operational activities. If this route is followed, the project director should carry out the study or be very closely associated with it.

B. Location

The National Academy of Engineering report that describes this project has the following statements on CISC location:

> "The project should be located in a major urban area. The neighborhood location should be in a community of moderate to low income families. Areas composed predominately of welfare families should be avoided to eliminate a biasing of the entire project toward servicing welfare-related inquiries. Housing the project in an existing public building may or may not be feasible depending on local circumstances". Ref. 10.

Ways and means of locating a CISC within a community are set forth at length in Ref. 25; for those who are confronted with this problem, it is recommended that these ideas and procedures be studied assiduously. The procedures outlined are intended to enable the planner or project director to become thoroughly familiar with his municipality and its various local neighborhoods and to become immersed in the operation of local political affairs. In this way, the first CISC can be placed where it is the most needed and it has a reasonable chance of succeeding. Also, the actual transfer of technology can be thus readily advanced by coupling it to the political process. This coupling is almost a requirement if transfer is to occur.

Among other candidates for the actual sites of CISC's are the public libraries. There is an active movement among libraries to take on information functions much broader than just the distribution of printed and recorded materials. Representative of that movement is the neighborhood

information centers project, which established two neighborhood information centers in two branch public libraries in each of five major cities. See Refs. 29, 30, and 31. Libraries in many parts of the country have been among the most active institutions in planning for how cable television might best be used to provide better information services to the public. Ref. 16.

C. Equipment and Computer Software

The equipment needed for this experiment is a minicomputer and sufficient peripheral devices to enable rapid storage and retrieval of what is deemed necessary by those who select the information.

According to the National Academy of Engineering, Ref. 10, the following listed equipment is needed to start the experiment:

Quantity	Device
1	Computer compatible to a PDP-11
1	Disc or drum storage for 2 million bits
1	Paper tape reader punch
1	Teleprinter with tape punch and reader
6	Terminals with TV tube displays

At 8 bits/character, 5 characters/word, and 250 words/page, the suggested capacity of 2 million bits can store 200 pages. At 55 lines/page, 11,000 lines are available. This compares with some 7,000 lines, each referring to a single entry in the manually operated index used at the Government Information Center at San Diego, described briefly in Ref. 17. Each line in this index has at least one phone number for the topic listed. One publisher of equipment listings, cited in Ref. 53, has these comments on the minicomputer situation: The difficulty of trying to decide on what is or isn't a minicomputer is illustrated by the fact that the term "minicomputer" is no longer synonymous with either minicapabilities or minisoftware support. Powerful mini-based systems with impressive software now abound, and the classic large "number crunchers" are also being marketed to original equipment manufacturers and sophisticated users with special needs. "The net result of all these happenings is, more often than not, confusion--at least when one tries to grasp the meaning or direction of the industry in any overall sense. The confusion may well be compounded when one sets out to satisfy a known in-house need and ponders where to begin

looking for a specific minicomputer that will satisfy that need at the best available price." According to one source--Ref. 53--there were in September, 1975 "...189 commercially available minicomputers from 54 manufacturers." Page M11-384-322 of Ref. 53 contains a list of six different PDP-11 configurations that cost from $10,395 for a minimum unit to $230,000 for a typical large-scale system. Since the NAE report cited a PDP-11 or comparable equipment, the following information on this machine is provided from page M11-384-301 of Ref. 53. Most of the PDP-11's originated in the early 1970's; this machine is now the industry's broadest series of processors with a family of peripherals, operating systems, and applications software. Customers can build a system to meet their needs for speed and power. The PDP-11's are in four groups:

1.	Microcomputer:	LSI-11, a microprocessor
2.	Minicomputer:	PDP-11/04, 11/05, and 11/10 for dedicated applications
3.	System Computer:	PDP-11/35, 11/40, and 11/45 for multitask applications
4.	Multifunction Machines:	PDP-11/70 for simultaneous, real-time, batch, and time-sharing applications

Further information on this equipment and that of other manufacturers may be found in Ref. 53, Section M11. Another idea is also worthy of consideration, based on computer hardware that has become available since the NAE report was released in 1971. The technology of large-scale integration (LSI) of electronic circuit components into very small volumes has given rise to a generation of small electronic devices that may well impact the lives of most citizens as time goes on. A well known example is the small hand-held calculator selling for a few dollars. This same technology has now been applied to digital computers of more sophistication than the hand-held unit; these devices are appropriately called microcomputers or microprocessors. They are based on complex circuitry formed onto a small element called a chip that is perhaps 5 mm or 1/4" square; the chip is then soldered or plugged into a circuit board with proper in-out circuits; the power supply may be on another board. The programming instructions can be hard wired on one or more Programmable Read Only Memory (PROM) circuit boards that are plugged into the small computer assembly. These PROM boards can be provided for a variety of operational tasks such as payroll preparation, tax assessment lists, information storage and

retrieval, and the list goes on and on. The computer with some core memory can thus be housed in a cabinet of about two cubic feet contents. The PROM's can be changed as the need for task performance varies. The microcomputer can thus be made to resemble, both electrically and in performance, much larger machines. Magnetic tape, disc, and drum storage as well as suitable in-out devices can be added to handle the load. Basic microcomputers are available in either kit or assembled form. An attractive way to obtain a useful computing installation is to obtain the adequately supervised services of local technical school students for system assembly. Commercially available television sets, with some modification, can be used for displays and keyboard units are available in kit form, also. In this way, a municipality can obtain at least a set of prototype hardware through what might be locally labelled Operation Bootstrap but only after thorough planning at all levels including the thinking through of the matters of data definition, system design, software, and maintenance to list only four of the many problems; see Appendix D--the Systems Process--for a guide to system acquisition. The total cost for such a microcomputer with perhaps four terminals could be as low as $6,000 (June, 1976) for equipment only. The industry trend is toward small single-function, stand-alone machines that are almost completely self-contained and housed in enclosures comparable to ordinary office desks. Technology transfer could receive a powerful assist by this mode of procurement in addition to keeping local dollars at home and training local people.

Since it is closely related to computer equipment, some brief further comments on software are in order. This term refers to the one or more programs that tell the computer what to do. There are two general categories of software: supervisory programs and application programs. The term supervisory refers to programs that control the actual use of the applications programs, telling the computer in detail what program to process next as well as controlling the data transmission links. The term applications refers to programs that carry out a specific data processing function; for example, a citizen complaint tracking program, or attendance reporting for secondary schools, Ref. 54. In addition to those cited in Refs. 41 and 42, two more typical software directories are cited: Minicomputer Data Services, 20 Coventry Lane, Riverside, Connecticut 06878, Ref. 55, and Datapro Directory of Software, Datapro Research Corporation, Delran, New Jersey 08075, Ref. 9. From the introduction to Ref. 55, it may be found that this document "...is an independent source of information for minicomputer software services, with information on availability of application packages, minibased systems, consulting and design services, custom and contract

programming services, and fully operational turnkey systems for a wide range of data processing requirements." This directory is updated three times a year, and is divided into five sections: User Guide; Supplier Directory; Applications/Software Services; Geographic Locator for Supplies; and a CPU (Central Processing Unit) Section containing a list of suppliers who have software experience with specific hardware. On page D03-100-001 of Ref. 9, the introductory sentence is as follows: "Datapro Software Directory represents the latest and most wide-ranging independent information service dedicated to comprehensive coverage of all varities of proprietary software offered for sale to the user community." This directory is intended for use as (1) a selection tool for product choice, (2) a current awareness publication, and (3) a planning guide. The basic directory in Ref. 9 is in eight sections: D01 Indexes (there are four), D03 User's Guide, D05 Inquiry Service, D07 Vendor Listing Forms, D09 Feature Reports, including application product reports by category, D97 an updated list of vendors, and D99 Software News. The Applications Section contains formal statements in twenty categories about each product, including pricing. In Section D09 in the chapter on "Software--Make or Buy?" the statement is found that in 1974 the cost/line of fully debugged and tested software was $10, "...a significant factor in in-house software development." As an example of the kind of information issued monthly by one computer industry news vendor, Ref. 56 informs the reader that "ASSIST-11, running under RSTS/E in a PDP-11, permits telephone operators (public or private) to call up directory information directly on a CRT screen instead of fiddling with paper or microfilm. License fees begin at $5,000." This feature should be useful in a CISC to assist the information practitioners in providing rapid response to callers. Note Refs. 37, 41, 42, 43, and 44, as well as the paragraph on TCDMS in Section V.F.2 above.

D. Space

If the original CISC is based on using an ongoing information operation in the municipality such as that used by the Public Works Department, this activity can be used as the point of departure. One way to get started is to survey the numbers of telephone positions used by Public Works for this purpose, noting their configuration and the call load handled by each information practitioner. An analysis of this workload should be made to ascertain the numbers of the various kinds of calls, their length, and their distribution by time of day and day of week. With this information at hand, and after a thorough study of Section IV above, it should be possible to

decide on the initial configuration of the CISC. The need to have room for expansion must be kept clearly in mind.

Each information practitioner--with telephone headset--is expected to be seated at a computer terminal that is equipped with a display screen or cathode-ray tube (CRT) to enable operator inspection of the message entered as a result of each call. There are a number of manufacturers of these terminals as can be seen by studying Ref. 52, a document that lists and describes computers and their peripheral equipment. It is estimated that each terminal would occupy a space of 40 to 60 square feet, including space for the practitioner's chair. If each practitioner has access to a rotating bookcase for rapid reference, then an additional four or so square feet must be added for this furniture adjacent to the terminal.

The numbers of information practitioners will of course depend on the peak load encountered. The departments to be included in the CISC should be surveyed to identify the expected number of calls/hour by time of day and day of week. These numbers should be adjusted from experience to provide some capability to handle the expected emergencies. This analysis should provide the basis for estimation of the initial load on the CISC; see Section III above for ideas on the operational plan.

Computer storage obviously depends on the expected load and its disposition as reflected in machine capacity. If the city already has an automatic data processing (ADP) center, circuits must be provided for data flow between this center and the CISC terminals, unless a separate machine is to be used for CISC operation. The interface equipment should be at the central computer site. The NAE report--Ref. 10--contains the suggestion that a minicomputer comparable to the PDP-11 should be adequate for the experiment. This unit and the peripheral devices listed in Section VII.B above require about 400 square feet of space:

	Sq. Ft.
1 computer	30
1 storage unit	10
1 paper tape reader punch	10
1 teletypewriter	20
6 CRT terminals with desks and chairs	300
	370

The spaces listed include about 2 feet on each side for clearance and working area. Prior to installation, a scale drawing of the installation should be made showing the space

allocated to each device and including that needed for cabling, electric power, chairs, wastebaskets, storage locker, secretarial support, and any other needed space. There is no substitute for forward-looking planning.

It is quite likely that an experimental CISC could be located in an existing building, possibly a structure with a store front. Whatever the nature of the structure, it is important that there be adequate facilities for air conditioning, counter space or other arrangements to provide pleasant surroundings for direct service to the public, sufficient electric power distribution, wiring for the planned equipment including illumination, telephone, and data circuits, and office space for the staff. This service can usually be provided by the City Engineer's Office. When arranging for CISC space, it is important to include wiring and its related terminations for multichannel cable television to provide for its later installation when the municipality is wired; this will greatly facilitate face-to-face interactions. See page 2 of Ref. 14 and Ref. 25.

Thought should also be given to the active possibility that the experimental CISC could well become a permanent part of the municipal operation. In this case and within five years, it is distinctly possible that room for expansion will be needed. The problem then is whether to expand in situ or move to other space. Expansion means more information practitioners, their terminals, possibly more computer storage, and other computer peripheral devices such as a high-speed printer.

It would be a mistake to close this section without inviting attention to the paper entitled Performance Guidelines for Planning Community Resource Centers; it is cited in Ref. 14. Its general content is described in the following excerpt from page ii in the Introduction:

> "Although organizational, managerial, and financial considerations are reviewed, the focus of this guide is on developing planning criteria for spaces required to house the activities. Included is a series of illustrations which traces the users of community resource centers as they move through the spaces, and describes the spatial requirements for particular activities. To be sure, the resolution of political, philosophical, managerial, and financial issues comes first, but after these are resolved, the physical and spatial needs are an integral part of the solution. They are offered as a reference for any community interested in serving the information needs

of its people and in planning warm and friendly places for carrying on the activities chosen."

The Introduction to Ref. 14 also contains a wealth of background material including summaries of the operation of the British Citizen's Advice Bureaux and activities of the French in this area. On pp. 47 and 48 it is found that potential users are divided into four groups: (1) persons with a simple information need who telephone; (2) persons with a simple information need who walk in; (3) persons with a difficult general information need who want to consult the staff face-to-face; and (4) persons with a difficult private information need who want to consult the staff face-to-face.

Appendix A of Ref. 14 is a summary of user needs; attention is invited to fourteen categories:

1. Low income blacks
2. Spanish speaking
3. Mexican-American and their youth
4. Women
5. Those who are geographically remote
6. The elderly
7. Youth
8. Prisoners
9. The deaf or blind
10. The generally disadvantaged
11. American Indians and Eskimos--nonurban
12. Appalachians
13. Low income whi and their youth
14. Migrant worker

A matrix is provided showing each of these potential users' problems, needs, services, facilities, programs, and prototypes, with space for the reader to add his or her own ideas. Appendix B contains a checklist for furnishings and equipment, Appendix C contains an Environmental Guidelines checklist, and Appendix D is entitled "Additional Information Sources." An extensive bibliographical listing is also provided. If modern telecommunications are combined with the information management part of the center proposed in this milestone paper, a major contribution can probably be made to the relieving of tensions in the urban part of cities.

Definitive guidelines for CISC design, definition, procurement, installation, and operation can be developed using the procedure outlined in Appendix D.

SECTION VIII

COST ESTIMATES

The estimates given below are based on those in the National Academy of Engineering Project Outline--Ref. 10--for an experimental CISC with the dollar values updated to 1976.

This estimate is in two parts, one for hardware, the other for personnel. A 2-1/2 year project is envisioned.

Hardware

A PDP-11 minicomputer or its equivalent with disk storage can provide the required capability and flexibility. This equipment can be either leased or purchased. In view of the experimental nature of this project, leasing with an option to buy would be attractive because of the relatively sort term of the project, coupled with possible obsolescence if the installation becomes permanent. Estimated purchase prices are listed below.

1	PDP-11 or equivalent minicomputer with a communications interface	$25,000
1	Disk or drum storage device for about 2 megabits	12,000
1	High-speed paper tape reader punch	5,000
1	Teletypewriter ASR33 with reader punch	1,200
6	Cathode ray tube terminals with buffers	30,000
		$73,200

Personnel

The project team should consist of five permanent project personnel for the 30 months of project duration, three specialists for 18 months, and six information operators for 10 months. The costs listed below include salaries, overhead, administration, and other costs.

Project Director	$6000/mo. for 30 mo.	$ 180,000
System Analyst	$5000/mo. for 30 mo.	150,000
Operations Research Analyst	$5000/mo. for 30 mo.	150,000
Analyst Programmer	$4000/mo. for 30 mo.	120,000
Secretary	$1800/mo. for 30 mo.	54,000
Operations Research Analyst	$4000/mo. for 18 mo.	72,000
Operations Research Analyst	$4000/mo. for 18 mo.	72,000
Human Factors Specialist	$4000/mo. for 18 mo.	72,000
Information Operators (6)	$3000/mo. for 10 mo.	180,000
Total Personnel Costs		$1,050,000
Total Travel and Other Costs		25,000
Total Hardware Costs		73,200
TOTAL ESTIMATED PROJECT COST		$1,148,200

SECTION IX

SUMMARY

This report describes an experiment for the operation of a Community Information and Services Center (CISC), a place designed to contribute to improvements in the quality of life of urban residents. The basic objective of this program is to provide a prototype for duplication throughout the country.

The experiment, based on application of modern telecommunications technology, is designed to identify, process, store, retrieve, and deliver quantities of information that are needed by urban residents in the conduct of their daily affairs and in relations with their municipal governments.

In a 1971 report to the U.S. Department of Housing and Urban Development, the National Academy of Engineering recommended the activation of an experimental CISC. Based on results of a survey of over 300 cities, the CISC was of the highest priority. Computerized information handling via remote terminals was the basis of the experiment.

Increasing demands for more services and lower taxes is causing municipal managements to look further to modern technology to assist in meeting these requirements. In 1961, Lewis Mumford wrote that "...there are surprisingly few effective channels of communication between local officials and the community at large." The CISC is viewed as a means of trying to bridge this gap and contribute to reduction of urban tension.

A CISC is a place where residents of a community can receive answers to questions that arise from their relations with the local government and their environmental situation. The long-range CISC objective is to enable a much more rapid and satisfying exchange between residents and local government using modern automated telecommunications and information-handling technology. Specific purposes in activating a CISC include

1) More responsible and expeditious delivery of existing city services

2) Information and referral on services not presently offered by the city

3) Information on plans, proposals, and activities of the city government

4) More rapid feedback of citizen attitudes to city officials

Such interaction is now mostly one way, and is a highly labor intensive activity. It is therefore reasonable to expect that a collection of one or more appropriate computers, peripheral devices, and remote terminals could aid in making this interaction more tractable and efficient.

A preferable location for an experimental CISC is in a neighborhood that contains neither all middle class nor all welfare recipients so that the experiment will not be biased. Access to the CISC is by telephone, walk in, or via one or more remote terminals. Since the CISC represents the city government to its clients, it is essential that the response be such as to convince the caller that he or she has come to the right place for talk at least leading to problem solution. With this mode of operation and an hourly call load of about 100, it is a requirement that computerized information handling will be needed by each information practitioner. For lower call rates, the manual operation of the Government Information Center in San Diego is cited where Federal, State, county, and local governments are represented. Approximately 235,000 calls per year are handled; about one-half are for information on Federal matters. See Ref. 17.

An important feature of a computerized CISC is that it enables the exercise of accountability on the part of city management, as the city is responsible to the residents for services delivered. Since the Mayor is, in the eyes of the citizens, responsible for the city's activities, the computerized assignment of requests for service to the appropriate department for action and the tracking of the resulting activity can provide top city officials with the necessary information to actually manage the flow of service. When a call for service is received, a computer-generated serial number and date-time group are assigned, and while the caller is on the line, the problem is transmitted to the proper department on a three-way conference call, with the citizen getting a response date. An entry with these data and departmental identification is made on the computerized Mayor's summary as well as in the CISC and departmental records. When the work is done that satisfies the service request, a suitable entry is made in the computer record and either a written report or phone call is made to the requester. In this way, the caller finds that the city management is listening to his or her problems and trying to

respond. Further, the Mayor has a means of holding his department heads responsible for the work assigned to them.

Other functions of the CISC include the answering of innumerable questions from the citizens. Section IV contains probably more than needed abstracts from the survey by Warner, Murray, and Palmer, cited in Ref. 5, on the information needs of over 1,900 citizens in Baltimore, Maryland. This milestone document must be studied by those who design and activate such a data bank. Nine functions of a CISC are detailed, and the relation of a CISC and a municipal Emergency Operations Center is discussed.

Section V contains comments on the all-important matter of computers and programming for CISC's, including code transferability from one machine to another. In view of the massive output of the Urban Information Systems Inter-Agency Committee (USAC), U.S. Department of Housing and Urban Development, this topic is particularly relevant.

CISC staffing problems are discussed in Section VI. Included are comments on the work of Dr. Brenda Dervin at the University of Washington, Seattle, in training information practitioners, those all-important people who respond to requests from citizens. The problem is to enable the practitioner to listen all day to complaining citizens without becoming frustrated, possibly leading to resignation. The virtue of patience is of the essence in these positions. This training project was supported by the Bureau of Libraries and Learning Resources, Office of Education, U.S. Department of Health, Education, and Welfare under the direction of Paul Janaske.

Brief remarks are provided in Section VII on CISC location, equipment, and space requirements, leading to a project cost estimate of about $1.1 million in Section VIII for the 2-1/2 year project. The basic equipment cited is a minicomputer, following the NAE recommendations. Consideration should be given, however, to the microprocessor since one of these relatively inexpensive machines can be made to electrically resemble a much larger computer. This technological advance has occurred since the NAE report was issued in mid-1971. Use of an existing large computer for on-line time sharing should be considered if the municipality has access to such a machine.

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APPENDIX A

LIST OF SELECTED U. S. CITIES AND COUNTIES FOR FREQUENTLY USED TELEPHONE NUMBER LISTINGS

The telephone directories containing the listings of the cities and counties named below were used to identify the agencies with the most frequently requested telephone numbers. In each case, these agencies and their phone numbers were set off from the remainder of the city listings by a box with black borders. Regarding the South Bay area of Los Angeles County in southern California, the only directory used was that issued by the Pacific Telephone and Telegraph Company; the GT&E directory was not used.

1. Atlanta
2. Baltimore City
3. Baltimore County
4. Boston
5. District of Columbia
6. Inglewood, California
7. Long Beach City
8. Los Angeles City
9. Los Angeles Northwestern
10. Los Angeles South Bay
11. Los Angeles West
12. Los Angeles County-Airport
13. Los Angeles County Long Beach
14. Los Angeles County Northwest
15. Los Angeles County South Bay Pacific T&T
16. Los Angeles County West
17. Miami Beach
18. Miami, City of
19. Newark
20. New Jersey, State of, in Newark Telephone Directory
21. Salt Lake City
22. Salt Lake County
23. San Diego City
24. San Diego County
25. San Francisco
26. Seattle
27. Washington-King County
28. Washington, State of, in Seattle Telephone Directory

EXHIBIT B-4

AGENCIES OF THE
MOST FREQUENTLY REQUESTED TELEPHONE NUMBERS
OF SELECTED U. S. CITIES AND COUNTIES

	TOTALS
Administrative Offices	2
Adult Problems	1
Air National Guard	1
Air Pollution Control	1
Airport	1
All Emergency Calls	1
Ambulance	6
Animal Shelter/Control	9
Assessor	3
Auditoriums	1
Auto Licenses and Titles	1
Baseball Stadium	1
Beach Patrol	1
Beach Weather and Surf Report	1
Beaches Department	2
Birth and Death Records	2
Blind Rehabilitation	1
Broken Traffic Signals	1
Building and Housing Services	1
Building and Safety	2
Building Division	1
Building Inspector	1
Business Licenses	1
Central Library	1
Childrens' Services	1
Citizens Service Bureau	1
City Employment Office	1
City Hall	7
City Hospital	1
City Light--All Customer Services	1
Civic Center Ticket Office	1
Civil Defense	3
Civil Service	1
Community College District	1
Community Relations	1
Complaints	2
Consumer Affairs	2
Consumer Complaints	2
Consumer Protection	1
Convention Bureau	1
Convention Center	1

EXHIBIT B-1 (Continued)

MOST FREQUENTLY REQUESTED TELEPHONE NUMBERS

	TOTALS
County Attorney	1
County Clerk	1
County Offices	5
Courts	1
Customer Services	1
Cyclorama	1
Dead Animals	1
District Attorney	2
Dog and Cat Licenses	1
Dog Shelter	1
Drivers' Licenses	1
Drug Abuse and Help	1
Drug Abuse Hot Line	1
Election Supervisor	1
Emergency Sewer Repairs	1
Emergency Street Repairs	1
Employment Security Information	1
Employment Services	1
Environment and Streets	1
Environmental Action	1
Expressway Obstructions	1
Federal City College	1
Ferries Schedule	1
Fire and Rescue	1
Fire Emergency	16
Fire Headquarters	1
Franciscan Treatment Room	1
Garbage and Trash Service	3
Gas Department	1
Government Information Center	1
Harbor Department	2
Health Department	4
Highway and Flood Control	1
Highway Department	1
Hospital Patient Information	1
Hospitals	2
Housing Authority	1
Housing Codes	1
Human Rescue Information Center	1
Human Resources Information Center	1
Human Rights Commission	1
Humane Society	1
Icy Streets or Expressways	1
Income Tax Office	1
Industrial Injury Claims	1

EXHIBIT B-1 (Continued)

MOST FREQUENTLY REQUESTED TELEPHONE NUMBERS

	TOTALS
Information Operator	1
Jail	12
Jobs	1
Juvenile Hall	1
Landfill	1
Landlord-Tenant Relations	1
Lead Poison Control	1
Leaf Collection	2
Legal Aid--Downtown	1
Library	6
License Department	1
Life Guard Service	1
Liquor Control Board	1
Lorton Reformatory	1
Lottery Winning Number	1
Marine Stadium	1
Marriage Licenses	4
Mayor's Office	3
Medic One	1
Miamarina	1
Miami Baseball Stadium	1
Motor Vehicle Division	2
Municipal Auditorium	1
Municipal Construction	1
Municipal Courts	3
Municipal Employees Credit Union	1
National Capital Housing Agency	1
Operator	1
Orange Bowl Committee Ticket Office	1
Orange Bowl Stadium	1
Paramedic Rescue	1
Parks and Recreation	3
Personnel	3
Planning Department	2
Police	15
Police Headquarters	1
Policia	1
Prison and Livestock Farm	1
Probation Office and Parole	6
Prosecuting Attorney	1
Public Advocate	1
Public Assistance	1
Public Defender	2
Public Library	2
Public Schools	2

EXHIBIT B-1 (Continued)

MOST FREQUENTLY REQUESTED TELEPHONE NUMBERS

	TOTALS
Public Social Services	3
Public Utility Commission Claims	1
Public Welfare	1
Public Works Complaints	2
Public Works Information	2
Publicity and Tourism	1
Purchasing	2
Rat Eradication	1
Recreation Department	2
Recycling	1
Refuse Collection and Disposal	5
Registrar of Voters	1
Revenue Department	1
Road and Street Repairs	1
Rumor Control	1
Sanitation	1
Senior Citizens	2
Sewer Division	3
Sheriff	9
Social Services	3
State Police	2
State's Attorney	2
Storm Drain Repairs	1
Street Cleaning	1
Street Department	2
Street Lights	2
Suicide Prevention	2
Superior Court	1
Supervisor of Elections	1
Surveyor	1
Tax (Ad Valorem)	1
Tax and License Information	2
Tax Information	1
Taxes and Assessments	1
Trader's Licenses	1
Traffic Citation Bureau and Courts	5
Traffic Signals	1
Trash Collection	1
Trees Down in Street	1
Unemployment Compensation	3
Violations Division	1
Voter Registration	2
Water and Power	1
Water and Sewer	1
Water and Sewer Bills	1

EXHIBIT B-1 (Continued)

MOST FREQUENTLY REQUESTED TELEPHONE NUMBERS

	TOTALS
Water Bills	1
Water Department	7
Welfare Division	2
Youth and Family Services	1
Youth Service Center	2
Zoning Information	2

Exhibit C-1. Universe of specific problems/questions cited by topic area

Topic Area (1)	Percent of Total Problems (2)	Percent of Total Most Important Problems (3)	Specific Problems/Questions (4)	Total Citations: Number (5)	Total Citations: Percent Unaided (6)	Relevant City Agency (7)
1) Neighborhood	16	17	Complaints about children	327	14	DSS
			Traffic and parking	287	12	TT
			Complaints about neighbors	237	18	CISC
			City Services	235	38	CISC
			Other undesirable conditions	137	12	CISC
			Complaints about dogs	112	15	H
			Complaints about rats	73	21	H
			Vacant lots, abandoned cars and buildings	31	10	PW
			All Neighborhood Problems		18	
2) Housing and Maintenance	13	16	Rental problems	343	25	HCD
			House hunting	306	15	CISC
			Barriers to housing change	113	10	CISC/HCD
			House needs repairs/improvements	97	40	HCD
			Utilities service	81	68	PW
			Housing regulations	63	40	HCD
			Housekeeping concerns	44	67	DSS
			Public housing	39	36	HCD
			Housing loans	33	13	HCD
			Other housing problems	19	60	HCD
			Other maintenance problems	8	63	HCD
			All Housing and Maintenance Problems		29	
3) Crime and Safety	10	14	General statement of fear	379	3	City Legal Office - CISC
			Specific crime	210	12	Police - Nonemergency
			Lax law enforcement	130	13	Police - Nonemergency
			Drugs or narcotics	96	8	Health Department
			Need more street lights	48	4	T & T
			Other crime problems	15	40	Refer by CISC: City jail; Traffic violations; Clerks of Courts
			All Crime and Safety Problems		8	
4) Consumer	13	11	Food prices too high	288	3	CISC
			Product quality bad	240	15	H
			Prices too high	159	4	CISC
			Complaints about rip-offs	106	43	CISC
			Service quality bad	97	27	CISC
			Need information on services	93	75	CISC
			Need information on products	87	34	Library
			Services unavailable, inconvenient	70	51	CISC
			Products unavailable	42	43	CISC
			Other	17	35	CISC
			All Consumer Problems		23	

Exhibit C-1 continued

Topic Area (1)	Percent of Total Problems (2)	Percent of Total Most Important Problems (3)	Specific Problems/Questions (4)	Total Citations: Number (5)	Total Citations: Percent Unaided (6)	Relevant City Agency (7)
5) Employment	6	8	Unemployed, looking	186	12	MOMR - Employ. Off.
			Present job	121	14	CISC - Counseling
			Barriers to employment	86	5	MOMR
			Want change	67	5	MOMR - Employ. Off.
			Summer jobs	58	7	MOMR
			Other employment problems	34	41	CISC - Counseling
			Job training programs	16	20	MOMR
All Employment Problems					12	
6) Education and Schooling	7	7	Complaints about system	220	3	These nontrivial problems require a center, jointly operated by the 20 or so colleges in the Baltimore area. The City School system requires a center where inquiries can be handled also, for elementary, junior high, and high schools.
			Information about education	148	16	
			Financial aid	56	4	
			Parent/teacher/student conflict	38	16	
			Busing comolaints	38	--	
			Adult education	34	21	
			High cost	26	12	
			Other education problems	24	29	
All Education Problems					9	
7) Health	6	6	Complaints about malaises	124	14	Health Department
			Need information or advice	98	17	Health Department
			Health insurance	87	30	Health Department
			High cost of care	83	2	Health Department
			Unavailable/inadequate care	75	12	Health Department
			Mental health	33	39	Health Department
			Other health problems	13	15	Health Department
All Health Problems					20	
8) Public Assistance	2	4	Problems with Department of Social Services	56	52	DSS
			Medical assistance	51	24	H - ambulance, etc.
			Food stamps	43	53	US Dept. of Agr.
			Social security	29	66	US Social System-into number/CISC referral
			Unemployment compensation	27	30	US Social System-into number/CISC referral
			Other problems	2	100	CISC
All Public Assistance Problems					45	
9) Transportation	6	4	Inadequate bus service	292	3	T & T
			Other transportation problems	65	5	T & T
			Need information on public transportation	39	29	T & T
			Auto insurance	31	42	Library
			High-cost public transportation	31	10	T & T
			Fear of using public transportation	28	--	T & T, police
			Road maintenance/markings	22	45	PW
			Barriers to use of transportation	17	18	T & T
			Car/repair financing	10	--	Library - Consumers Reports, etc.
			Inadequate emergency services	9	33	T & T
All Transportation Problems					10	

Exhibit C-1 continued

Topic Area (1)	Percent of Total Problems (2)	Percent of Total Most Important Problems (3)	Specific Problems/Questions (4)	Total Citations: Number (5)	Total Citations: Percent Unaided (6)	Relevant City Agency (7)
10) Discrimination	4	3	Racial tensions	79	11	These problems demand one or more locations where these tension generating problems can be resolved. (Refer by CISC-City Legal Office to be included as well as the Consumers Office in State Attorney General's Office.)
			Racial discrimination	69	9	
			Sex discrimination	49	6	
			Blacks moving in	45	9	
			Other problems	43	5	
			Blacks charged more	42	7	
			Too much to blacks	40	--	
All Discrimination Problems					7	
11) Financial Matters	4	3	General gripe--insufficient money	106	8	CISC - safety valve
			Property tax too high	57	23	Assessor's Office
			Loan or credit difficulties	53	25	CISC
			Need information on income tax	41	46	IRS and State Offices
			Acquiring/selling properties	22	59	City Legal Offices
			Other problems	22	45	CISC
			Stock market/investments	11	27	Local banking assoc.
			Need information on retirement	4	--	City, State, and Fed.
All Financial Problems					25	Civil Service Comm.
12) Legal	2	3	Need for legal services	69	46	City Legal Office-
			Contracts	60	23	Public Defender, Public
			Divorce	41	12	Interest Lawyers, local
			Legal documents	28	54	law school CISC refer
			Other legal problems	15	--	to Legal Aid Bureau, Inc.
All Legal Problems					31	7 phone numbers.
13) Miscellaneous	5	3	Need child day care	111	11	DSS and private agencies, (make lists)
			Discussion of news events	108	30	CISC refer to local CC, senior citizens clubs
			Need names, addresses	103	88	CISC, Library
			Need birth control information/advice	67	4	Health Department
			General care/well-being of children	35	34	Health Department
			Other miscellaneous	26	88	Health Department
			High cost of child care	18	--	CISC - H
			Other birth control problems	10	30	Health Department
			Other child care problems	9	--	DSS, other local, and
All Other Problems					36	State agencies.
14) Recreation and Culture	5	2	Too little for children and teens	200	7	P & R, Planning
			Too little for adults	111	--	P & R, Planning
			Need information about recreation available	77	26	P & R
			Poor quality	32	--	P & R
			Other	17	47	P & R
			High cost	17	--	P & R
			Lack of supervision	16	19	P & R
All Recreation Problems					9	

APPENDIX D

THE SYSTEMS PROCESS: AN EXPOSITION

It is the objective of this short paper to invite attention to the Systems Process, its concepts, its essential nature, limitations and capabilities, and its output.

Introduction

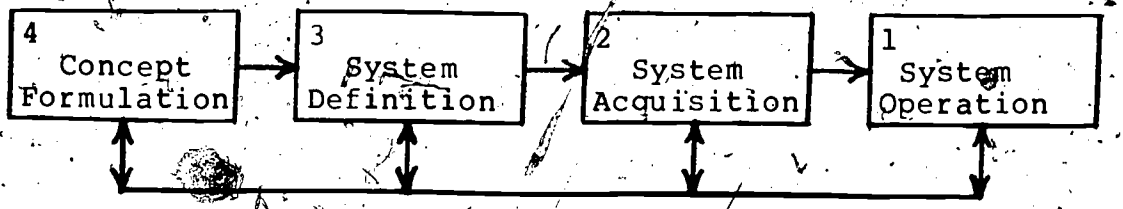
According to Parker, "The systems approach basically applies the scientific method to the solution of practical problems;" Ref. 1. Concepts of the systems process vary from regarding it as the most powerful intellectual tool ever devised to "...the vacuous systems approach..." Historically, some of these ideas were applied to the activity used during World War II by small groups of people in trying to solve problems that were beyond the capacity of one person in the available time, such as initial applications of radar in the defense of Britain, bombing effectiveness, and antisubmarine warfare. Larger business firms have used comparable processes for many years in pooling the efforts of management to maintain or improve their profit margins. The process began to get widespread public recognition shortly after Robert S. McNamara became Secretary of Defense; he brought in a group of technical people, who after some effort were able to break up some of the massive military problems into pieces that could be profitably worked on by individuals of different professional backgrounds. Their results were then combined and modified by operational people so that the solutions were relevant to the real world. Some duplication was taken out of the military services, and great efforts were made to obtain maximum results for the resources allocated, giving rise to cost-benefit and cost-effectiveness schemes.

There are other labels applied to the systems process. Some of these are systems analysis, systems engineering, operations analysis, operations research, management analysis, management science, and so on. Others say that this process is really an application of the digital computer to a large and complicated problem. The use of one term or another usually reflects the points of view and interests of those doing or responsible for the work rather than hard and fast definitions that are widely held. It is the writer's opinion that some distinguishing characteristics of the system process are (1) the continuing statement of objectives, (2) consideration of all points of view, (3) quantitative evaluation of alternatives, (4) synthesis of an operationally practicable system, and (5) system detailed definition, procurement, installation, and operation. Examples of the application of this kind of

thinking are the Polaris submarine weapon system, the B-52 weapon system, the electronic handling of mail, and the widespread delivery of health care. Of course, no claim is made that all applications of the systems process use all of the above elements; what counts is the intellectual attitude that combines them as the ideas and analyses unfold. In his book The Industrial State, Galbraith points out that problems are assumed solvable before the solution is in sight, that this is the essence of the research and development process. This is part of the background of early ideas--1968--in the electronic handling of mail. Lest the reader be led astray, let him not look for a professional designation of systems analyst in the sense used here since none exists; there are few courses in this "...vacuous system approach...": Ref. 2. Systems people should have at least some of the background and outlook of engineering or scientific generalists: Ref. 3. The system process is applicable to a wide range of activities; it is not a policy-making activity of, by, and for itself although it is used by management to produce an input for the making of policy, providing information that is needed in overall program formulation, guidance, and control. This process has evolved from what is called systems engineering in the military establishment; it was devised to enable needed weapon system procurement, installation, operation, and maintenance to occur according to schedule. Since much of engineering is oriented to hardware and less to people, it is inevitable that the phrase "systems engineering" came into use in the military context. However, in the civil sector, needs are generated primarily from more or less immediate human requirements, so the phrase "Systems Process" is coined to here indicate the application of analysis and technology to the satisfaction of human needs. It is a way of thinking, a tool to enable a logical and rigorous attack to be made on complex and interrelated problems of broad scope involving people and machines in a changing environment. Again, possible definition boundaries are from regarding it as the most powerful intellectual tool ever devised to "...the vacuous systems process."

Discussion

At the risk of oversimplification, the process may be divided--for many applications--into four steps: first, Concept Formulation where system goals are identified, objectives at various levels spelled out, and alternatives weighed and selected; secondly, System Definition takes place, specifying exactly what is to be built or obtained; third, System Acquisition or procurement and installation; and fourth, System Operation. Arrangement of these steps in sequence provides the top level functional flow diagram. Note that the box labeled "System Operation" carries an Arabic one



as its numerical designation; this is done in order to emphasize the fact that reaching the operational stage is the most important part of the entire process. This means that the process is a tool to get a system into operation in the most efficient way. Identification of the boxes leads to the logical generation of first, second, and more subsidiary functional flow diagrams for each of the basic four functions. Feedback or feed forward of ideas and information occurs in and at all of these steps as those involved become more and more aware of what they are doing. This arrangement immediately leads to preliminary ideas of time schedules and levels of effort. Application of this process leads rapidly to a work breakdown structure, identifying tasks that individuals and small teams can easily accomplish; this process requires multidisciplinary inputs, and it is expensive as well as time consuming.

Further detailed comments on each of the four steps are in the paragraphs immediately below.

The first step as noted above is System Concept Formulation. A recent announcement--Ref. 12--of a 1976 summer course on the analysis of urban service systems contains the following instructive and useful information: "...use (is made of) the classic steps of an operations research study:

1) Define the problem
2) Specify objectives
3) Define criteria relating to the problem
4) Specify alternatives
5) Analyze alternatives
6) Compare alternatives
7) Present results
8) Implement recommendations."

As used here in this context, Step 7 would refer to briefings for management and others as well as the final report. Step 8 would refer in this paper to the other three steps in the systems process as defined here. (The Arabic numbers have been added by the author.)

It is during the early part of Step 1 on Concept Formulation that goals and objectives are sought, examined, weighed, and stated and restated, interfacing with all levels of management that can in any way contribute to the early establishment of problem definition. One of the main elements of this first

step is to write a scenario of the proposed operation, be it a plan to collect data at an active volcano or the general framework of a proposal to deliver health care to all. This document, however brief, should be produced at the outset so that the objectives and preliminary thoughts regarding the project can be assembled to stimulate further thinking. There is no limit to human ingenuity, and as invention has been said to be the correlation of the previously uncorrelated, so this activity should be started at the earliest. Needs analysis--Ref. 4--and requirements are studied and agreed on, and long-range planning is used if at all relevant. See Ref. 16. If transition problems from a present system, or a new or different one, are contemplated, the interests of the existing generation are defined and described so that nothing is lost in phase-out of the activity. Preliminary network schedules are also set up, and communications and training plans drafted for study. The requirements of all levels of government must be identified and included. Legal, social, and political attitudes, situations, conditions, and problems are identified for contributions of special attention. If the overall situation includes technology and government, then the technology must be coupled to the political process in order for transfer to occur. Sociometric measurements of opinions are included if needed--Ref. 6. Existing and expected general performance characteristics of relevant hardware and software are noted, along with items for special development or research effort. Decision theory and concepts of value are also drawn on: Refs. 8 and 14. Estimates of changes in productivity are also made and included. Gradually, the various proposed system configurations or alternatives become more clear, and as they are weighed against the current statements of objectives, their characteristics are defined and qualified. Matrix methods of analysis and presentation are useful at this point. This process leads to the use of measures of effectiveness (MOE), cost-benefit, and cost-effectiveness analysis that enable the selection of the more attractive or more practicable system configurations: what benefit at what cost? Some may be intangible--as in the more efficient delivery of municipal services. Budget and other fiscal estimates are made to provide for advanced fiscal planning. If a new data bank and its related automatic data processing (ADP) is to be set up for use by several departments, a joint data management group should be planned to define in detail what is to be done, thus anticipating interdepartmental operating problems before they arise later. This process may lead to a new position, that of Data Base Manager. See Refs. 15, 20, 21, and 22.

As an introduction to the available analytical tools, it may be found in Ref. 16 that "In examining complex problems, one must recognize the following classification of elements occurring repeatedly in their solution through the system approach:

1) A set of decision and state variables

2) An optimization model

3) A measure of effectiveness

4) Generation of alternatives and an optimal solution

5) Policy implementation"

Seely, in Ref.17, provides "...an introduction to many important aspects of systems analysis" giving background for application of the classical methods in electrical and mechanical systems that are, in simple cases, amenable to hand solution. Discussion of matrix and numerical methods is included, leading to computer problem solution. For the more mathematically inclined, Wymore contributes in Ref. 18 to the definition of systems engineering as well as to tools useful in its practice, and to "...development of a general systems theory." Ref. 19 provides much useful information on policy formation.

Included also in the output of this stage is (a) the general specifications, characteristics, and the required schedule of the proposed system, and (b) details of the operating characteristics and time for development of a new piece of hardware or software.

The output of Step 1 is a document that is the basis for the rest of the project, the basis for a management decision to go ahead, to seek another avenue of activity, or to locate another area for the application of resources. Note Ref. 13.

Step 2 in the process of system development is that of System Definition. The point of departure or input is a set of clear statements--a report that says "Do this" from Step 1--citing the general characteristics of the system that has been designated in Step 1. The output is a complete set of plans and specifications for system procurement, installation, and operation. Realistic and detailed system configurations are carefully examined in view of the available hard and software--if a computer is involved. Procurement, installation, and operating costs and schedules are carefully analyzed and compared with overall measures of effectiveness. Specific real estate, construction, and legal costs and fees are analyzed, as is the cost of capital and the money market. If it has not been done in Step 1, and is needed, the consideration of other ways to spend the money involved should be carried out here. A financial plan may be needed for the system that is finally selected so that the monies invested may be identified in relation to interest rates and rates of capital recovery. System output is compared with the current statement of needs, objectives, and requirements so that the

system as it eventually operates will be functionally useful and cost effective. It may be found in this step that development of specific components are required; the process described in Step 1 is then applied to this problem so that project schedules are met. The preliminary network schedules for system operation from Step 1 are reexamined and modified if required in view of the latest objectives and management requirements. Preliminary plans for personnel and their training from Step 1 are updated and refined in view of the final system definition as developed in Step 2. All machine and man-machine interfaces must be clearly identified and problems anticipated and resolved. System reliability may be estimated from component contributions. See Ref. 14 for an introduction to reliability matters.

Those who have participated in Step 2 of the process should retain some connection with the project through the next two steps as they understand the reasons underlying the selection of the configuration that is the output of this step.

Step 3, Systems Acquisition, is that phase of the entire program where the procurement of equipment starts, leading to site acquisition, construction, installation, and any required interconnection. If the system is of wide extent geographically, individual site schedules must be coordinated with plans for initial regional or overall operation. Hardware and software delivery, installation, and debugging must be correlated with the availability of sites. Plans for required personnel and their training must be coordinated with site occupation and equipment delivery. Master milestone schedules must be kept up to date, supported if necessary by PERT-cost or other comparable management networks. Interfaces between men and machines and between machines must be detailed down to the last wire, cable, and operating procedure in order to leave as few problems as possible for the operations people since they have trouble enough in new system shakedown. Wiring diagrams and instruction manuals must be carried to the final drafts and printing as well as adequate distribution so that instructional materials will be ready when needed. Special attention must be given to the needs of the general public if the system interfaces with large segments of the population; complete and adequate publicity must be provided with sufficient lead time so that problems of acceptability and use can be identified and resolved well in advance of the time when they could become acute. The interfaces between special professional groups, minorities, and government agencies must receive attention also, possibly by the use of specially trained intermediaries. The output of this step is an operating system, and the transition between this and the final step of System Operation must be more carefully timed than that between any of the other preceding steps.

The last phase of the four-step program is that of System Operation, and as noted above, is to be entered gradually so that extensive coordination with all involved can take place smoothly. Few if any large scale systems enter this phase without some disruption, and it is the major objective of this step to minimize the effects of all anticipated and unanticipated events. In addition to the proper functioning of the system itself, continuing attention must be devoted to the interfacing problems with the general public, since general acceptability and system effectiveness will be judged on this basis. As the system gradually becomes operational during Step 3, feedback and feed forward will begin to occur, and if the system is large, especially trained individuals who have a good overall knowledge of the system should be provided to foster this portion of the process; in this way, many situations can be identified before they become problems, both internally and with the general public. As the operation of the system becomes more and more self-sustaining, the systems design and development people begin to devote their attention to the next generation of refinement, and the next era of the Systems Process starts. Some of these people should be made available for advice and consultation with those in operations, however.

Limitations of the Systems Process

This process, or any other for that matter, is only as good as its inputs, assumptions, and the insights of those who do the work. It is not a panacea for the constant, diligent, and painstaking seeking and verifying of facts and objectives. Parker, on page 15 of Reference 1, provides an excellent summary of the systems process in the table below.

Summary

The systems process appears to this writer as a continuing specification of ignorance and the associated activity of remedying this situation. A more conventional view is that this process is an activity of a number of people who individually and collectively engage in a continuing examination of problems and their related objectives, the generation of alternative ways and means of reaching these objectives, and the selection of the most attractive on a cost-effective basis, hopefully tempered throughout by operational judgment and some intuition. The output may be a report that recommends a specific course of action to management, a document that recommends a selected design over others that have been considered, or actual system activation. From an overall point of view, the systems process is one that enables those carrying it on and those receiving its output to narrow the areas of the application of judgment and to focus more clearly on the basic issues involved. As in all human activity, this process cannot be substituted for direct

EXHIBIT D-1

Capabilities and Limitations of Systems Analysis*

Systems Analysis Can	Systems Analysis Cannot
1. Select from a wide variety of proved techniques those that are likely to provide possible solution of a problem.	1. Provide a simplistic set of procedures to arrive at incontestable conclusions.
2. Accomplish clearly defined and limited objectives with a high probability of useful results.	2. Do everything at once within available funds and manpower. But it can help in establishing a set of priorities and plans for future work.
3. Over the long term, build an inventory of tested methods to use in complex areas of policy and management.	3. Guarantee the transferability of techniques developed in other subject domains. The development of modified tools will take effort.
4. Produce models of one or more aspects of complex problems which can be validated and, in some cases, combine with other models to give increased analytical capability.	4. Provide, necessarily, a complete or completely integrated model of a complex domain. But attempts should be made to integrate models whenever possible.
5. Provide greater understanding of alternatives and their consequences to assist management in making decisions.	5. Replace judgment. But it can provide a basis for making better informed judgments.
6. Help to focus political debate on the merits of feasible alternatives.	6. Replace the political process. It can however, help to inform it and, to the extent that knowledge is valuable, improve it.
7. Analyze problems in terms of one or more sets of values, once they are identified and defined.	7. Provide a value system or a set of values that definitely implies objectives to be satisfied.
8. Increase the capability of an organization to accomplish its objectives.	8. Produce maximally useful results without active and continuing participation of the client organization(s).

*Source: Marvin Adelson, "The Systems Approach--A Perspective," SDC Magazine, October 1966, p. 3.

confrontation with the details of the subject nor for the hard work necessary to expose these details. One thing is certain; the application of the systems process educates and sharpens the perceptions of those who apply it.

The following list of references may prove useful to the reader who is contemplating the systems process for the first time.

1. John K. Parker, Introduction to Systems Analysis, p. 1, Report No. 298 of the Management Information Service, International City Managers Assoc., 1140 Connecticut Ave., Wash. D.C. 20036.

2. Richard J. Johns, What is Blunting the Impact of Engineering on Hospitals? Proc IEEE Vol. 57, No. 11, Nov. 1969, p. 1825, last line, first column.

3. Henrik Bode, et al., The Education of a Scientific Generalist, Science, Vol. 109, 3 June 1949, pp. 553-558.

4. Arthur D. Hall, A Methodology for Systems Engineering, D. Van Nostrand Company, Inc., Princeton, 1965.

5. ---, A 3-D Morphology of Systems Engineering, IEEE Transactions, Systems Science and Cybernetics Group, April 1969.

6. S. S. Stevens, Psychophysics and Social Scaling, General Learning Press, Morristown, NJ, 1972.

7. B.O. Koopman, Fallacies in Operations Research, J. Operations Research Society, Aug. 1956, pp. 442-426. Also the comments by Charles Hitch following this article.

8. Myron Tribus, Rational Description, Decisions and Design, Pergamon Press, New York, 1969.

9. Defense Systems Resources, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, $1.

10. Guide Book for Systems Analysis/Cost Effectiveness, U.S. Army Electronics Command, Mar. 1969. Available from the National Technical Information Service, Springfield, VA 22161.

11. Daniel Seligman, McNamara's Management Revolution, Fortune, July 1965, p. 117 ff.

12. Announcement of Summer Session, Analysis of Urban Service Systems, Course 11.64s to be held 23-27 August 1976, at

the Massachusetts Institute of Technology, 77 Mass. Ave., Cambridge, MA.

13. A typical table of contents of a report to reflect what has been done is the following:

I. Introduction
General statements in this section are about the background, setting, and expectations of the proposed system.

II. Statement of the Problem
What is it that absorbs the resources

III. Discussion
Why do it this way, why do it now, and why do it at all?

IV. Findings, Conclusions, and Recommendations

V. Summary

Appendices

A Data, Its Processing, and Analysis
B Mathematical Derivations

C Others as needed...

The original framework for this report started from this outline, which was modified to include specifically relevant sections as the subject was developed.

14. Siddall, James N., Analytical Decision Making in Engineering Design, Prentice-Hall, Englewood Cliffs, NJ, 1972. Bibliographies and Fortran program listings may be found in this book.

15. Attention is invited to the activity of the Regional Information Systems Department, Lane County, Eugene, Oregon, that produced the Telecommunications Data Management System (TCDMS). This many user system is an on-line multiterminal operation that was developed under the direction of Paul Weber, phone (503) 687-4370. This work was done with support from the Urban Information Systems Inter-Agency Committee (USAC), U.S. Department of Housing and Urban Development. The TCDMS program and documentation is available from the Computer Services Division, National Technical Information Service, Springfield, VA 22161. See Ref. 20.

16. Aguilar, Rodolfo J., Systems Analysis and Design, pp. 5-6, Prentice-Hall, Englewood Cliffs, NJ, 1973. The topics in

this book include systems analysis, synthesis, and design in engineering, architecture, construction, and planning. Bibliographies are at the end of each chapter.

17. Seely, Samuel, A Introduction to Engineering System, p. vii, Pergamon Press, New York, 1972. This book is divided into four parts: Models and Modeling, Interconnected Systems, Systems Response, and Selected Topics. The two column index is on 9-1/2 pages; 31 references are included.

18. Wymore, A. Wayne, A Mathematical Theory of Systems Engineering--The Elements, p. v, John Wiley and Sons, Inc., New York, 1967.

19. Kraemer, Kenneth L., Policy Analysis in Local Government, International City Managers Association, 1140 Conn. Ave., Washington, D.C. 20036, 1973. "This work pulls together various concepts, methodologies, experiencies, techniques and issues involved in the application of systematic analysis to urban public policy." Since policy may be regarded as a guide to action, this book is of use to a broader audience.

20. Nolan, Richard L., Computer Data Bases: the future is now, Harvard Business Review, Sept.-Oct., 1973, pp. 98-114. "The author's purpose here is to clarify for top management the essential facts about the nature of a data base, its construction and administration, in such a way that top managers can grapple with the notion and guide lower levels of management, especially in the EDP Department, to a standard of operations that is adequate to the company's need for management information." See Ref. 15.

21. Lyon, John K., The Data Base Administrator, John Wiley & Sons, New York, 1975. From the author's preface, it is found that "Ideally, this book is written for enterprise managers in the hope that they will be persuaded to recognize that the database is too valuable to be left unmanaged and, more important, that it is manageable. Pragmatically, the book is written for database administrators, designers, and data processing managers with whom the responsibility for the database ultimately resides."

22. Meadow, Charles T., Applied Data Management, John Wiley & Sons, New York, 1976. This book is concerned with a relatively "...new branch of the computing profession..." that of computer organizing of data, its storage and retrieval, the entering of new data, and the modification of data that is in the files. An overview of the field is included, as is a short tutorial on operating systems,

leading to data structures, data storage, the positioning and sequencing of data elements, file processing, and data communications. The following more general problems are also covered: the user interface, information systems, network-based data management, and privacy-confidentiality matters.

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A CISC is a place where urban residents can get answers to questions that arise from their relations to the municipality where they live. This report describes an experiment to test basic CISC concepts that were set forth in a 1971 report from the National Academy of Engineering to the U.S. Department of Housing and Urban Development. Telecommunications technology useful in this context is described as is data bank contents, an operational plan, basic CISC functions, and integration of a CISC with the 911 emergency center. Comments are made on staff training, space requirements, CISC location, and estimated costs of the experiment. A bibliography is included.

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