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KANSAS INFORMATION AND REFERENCE SYSTEM
FOR HOUSING: PLANNING AND DEVELOPMENT PHASES

by

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I. INTRODUCTION

As a basic unit within the fabric of American life, housing serves a variety of social and physical needs, requires a number of basic and indirect services, and is affected by a variety of physical, social, and economic events. Therefore, in considering housing as a governmental program function, policy and program development could be expected to address a broad range of interrelated subjects. The housing process (i.e., the concept that housing is both a product and a process) involves numerous decisions related to both public and private resource allocation.

At this time, Kansas' recognition of the general needs and dynamics of the housing process is limited and selective. Currently, the location of the housing function is a division of the Kansas Department of Economic Development (KDED). Based, in part, on a number of consultant reports, work plans, and need projections, the state of Kansas has identified both a variety of needed and desirable housing activities and a course of action by which to achieve these goals. A state housing study conducted by the Institute for Social and Environmental Studies identified thirteen major state housing problems (1976):

1. Regional imbalances of housing supply and demand,
2. Inadequate supply of multiple-family and mobile homes in western and central Kansas,
3. Inadequate supply of low cost single-family dwellings in western and central Kansas has

created problems related to excessive use of mobile homes which, is further complicated by local service capabilities and development regulations,

4. Household shifts from older to newer dwelling units has created some neighborhood and community instability throughout the state,
5. Counties experiencing population growth have not had adequate housing production to meet demand over the last six years,
6. Over time, there will be a need to conserve and rehabilitate housing stocks in those areas where population has remained stable and relied on existing units, particularly in northwest and extreme northeast Kansas.
7. Within the production process the impact of building codes on housing costs, consumer resistance to industrialized housing units, and the lack of contractor interest in rehabilitation projects are seen as continuous production constraints,
8. The need for low cost single-family units to meet households with incomes less than \$12,900 is needed,
9. The private market cannot meet the need for multiple-family units to satisfy those households earning less than \$8,500 annually,

10. Land costs further restrict housing production,
11. Land cost, consumer demand, and land available for multiple-family housing limit production,
12. Low demand for modular or industrialized housing prohibits efficient production,
13. Mortgage refinancing has restricted rehabilitation efforts (Institute for Social and Environmental Studies, 1976:13-15).

The realization of housing goals has faltered in the absence of a strong state commitment. Given the fundamental importance of housing to the state's overall prosperity, a redirecting of state involvement in the housing process is imperative.

As government is the collective means by which its citizens choose to deal with common concerns, one assumes that government will respond to those issues which, through their nature, either concern the majority or are considered by the majority to be a social problem. Certainly, there are few issues which affect the total population as does the need for safe and adequate shelter. Therefore, housing is an issue to which state government should respond. Housing problems throughout the state have been documented; the state should respond to the needs of the people by comprehensively addressing the issue of housing.

Housing is related to virtually every concern of the state. Industry depends on a labor force that must be housed. Education is directed at students whose families

must have adequate housing. Public works serve the households in a community. Public officials serve their constituents; each and everyone of which has a home in Kansas.

The availability of suitable housing is also a major component in economic development. One of the site location criteria used by industries to evaluate potential new plant locations is the availability and suitability of a community's housing supply. Housing, therefore, is a significant aspect of a desirable social climate which also contributes to the community's economic base.

Housing is also a personal good which can serve not only the individual's safety and shelter needs, but provides social satisfaction. As a minimum, the housing stock should be sufficient to offer structurally adequate and affordable shelter for all residents. This standard goal could be expanded if resources were effectively organized to include variety and choice of location and style. This suggestion is directed at the notion of housing being more than a simple commodity. The assumption here is that, if the state's resources were more effectively used in housing programs, the social functions of housing could be incorporated into housing goals and objectives. And, in doing so, state residents would have greater individual choice in selecting housing.

In response to the broad issues related to the housing process, the Housing Division within the Kansas Department of Economic Development (KDED) was created in 1977. Assigned

a number of missions, the agency acquired the major responsibility to monitor and assist in meeting the state's housing goals.

The course of action chartered to achieve these objectives is contained in the Division's Five Year Program Plan (1977). As one element of that plan, an information system is programmed; a system which will serve as a resource to decision making. As there are a number of current reports which detail housing need areas, potential policy positions, and informational resources to support decision making, this report is directed at operationalizing a housing information system. To do so, this study examines the basic components of an information system and discusses their functional relationships.

The concept of a housing information system must be sensitive to, at least, two major considerations. The housing process in all its complexity should be recognized and, where possible, the paradigm incorporated into the actual construction of the data base. As Figure 1 suggests, the housing process is an intricate and interrelated process, involving not only a product, but describing a dynamic process among various markets and the public. These general elements in the housing process are representative of numerous other factors, all of which contribute to the changing character of the housing issue. They also suggest initial components of a housing information system. The second major consideration is that of the individual or agency

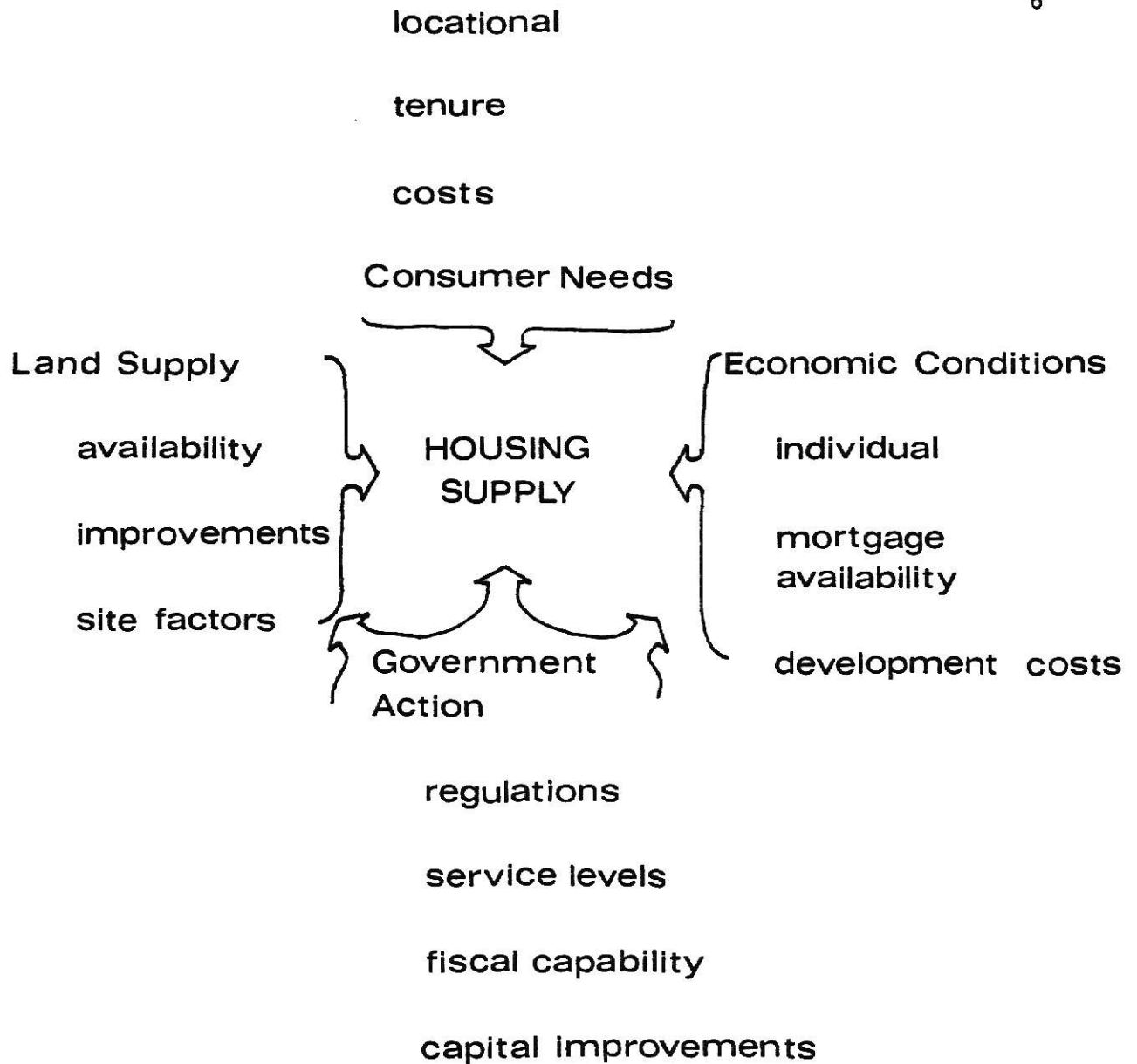


Figure 1. Factors Influencing the Housing Process

which will utilize and maintain the system. As a minimal design criteria, the system should be matched to the user's capability to assimilate and maintain data while, at the same time, maintaining an accurate and valid representation of the actual process.

II. TOPIC DEVELOPMENT: ISSUES AND CONSIDERATIONS

With greater capabilities to transmit information, produced at an ever increasing rate, the obvious limiting factor is the individual attempting to make use of that information. Lucus notes that information production and distribution currently accounts for approximately, "one-third to one-half of the current gross national product" (1978:3-4). This statistic is but one indicator of the "Information Age" in which we now operate. The significance of this activity represents the demand placed on the public to comprehend the growing complexity of the culture and society. To deal with the magnitude of available information, data bases and systems of organized knowledge, have been created. Increasingly, federal, state, and local governments are organizing and maintaining information related to their operating concerns. The use of information systems by government has provided it with the capability to monitor various public sectors and, thus, provide a sound base for policy and program decisions.

The planning and development of an information system is, in a sense, a value assessment process. This process examines the potential information needs of an activity and, then, evaluates possible strategies which seek to optimize the interface between the mass of available data and system users.

The Housing Issue

The cost of housing is one of many constraints facing the public in its search for adequate shelter. Inflationary trends influencing the cost of money, government regulations, and maintenance costs have lent additional burdens to both owners and renters. Changing household characteristics, raw material labor strikes, extreme weather conditions, and the world's energy supply are only a few of the divergent elements which impinge upon the production and utilization of housing. The sum total of these and other factors has resulted in a situation far beyond the control of consumers. It is this complexity which must be identified and monitored in order to deal with it effectively.

Information from which to extract conditions and trends is needed. Knowledge of changes in the housing stock and social and economic conditions is necessary for decisions concerning housing programs and policies. This requirement is complicated by "the need to process large amounts of data to extract small amounts of information (Lucus, 1978:16). Given the extent of available information relevant to housing, the amount, organization, and accessibility of data must be related to the capability of those utilizing it.

Kansas Housing Issues

There is both wealth and poverty in the state of Kansas; a wealth of housing information and a poverty of action. From 1970 to 1974, a total of eight studies were conducted

which analyzed housing conditions, housing problems, and housing needs in Kansas (Gerdorn, 1978). In 1975, a comprehensive survey of housing information available in the state was completed (Real Estate Research Corporation). This study identified thirty major sources of information by type and function which could be integrated into a housing policy and program decision making system. And, in 1976, a two volume study examining statewide housing problems recommended a detailed set of housing strategies (ISES). The need areas have been identified; there is ample statistical information to support policy and program development; yet, the problems persist.

As Figure 2 suggests, the development of an information system (or, the development of any policy or program, for that fact) requires management or executive branch support. As this report is directed at the technical components of system development, it is assumed that the management responsibilities of setting goals and objectives and describing system constraints (parameters), are those contained in the KDED Five Year Work Plan, (1977). Based on the internship guidelines, the primary user has been identified as the state's Housing Division. Therefore, the technical aspects of preliminary planning, system development, and operationalization are discussed within these constraints.

In summary, it is not the intent of this paper to identify or define the substance of housing needs or problems or solutions in the state of Kansas. Rather, let it suffice that there is a significant volume of descriptive housing

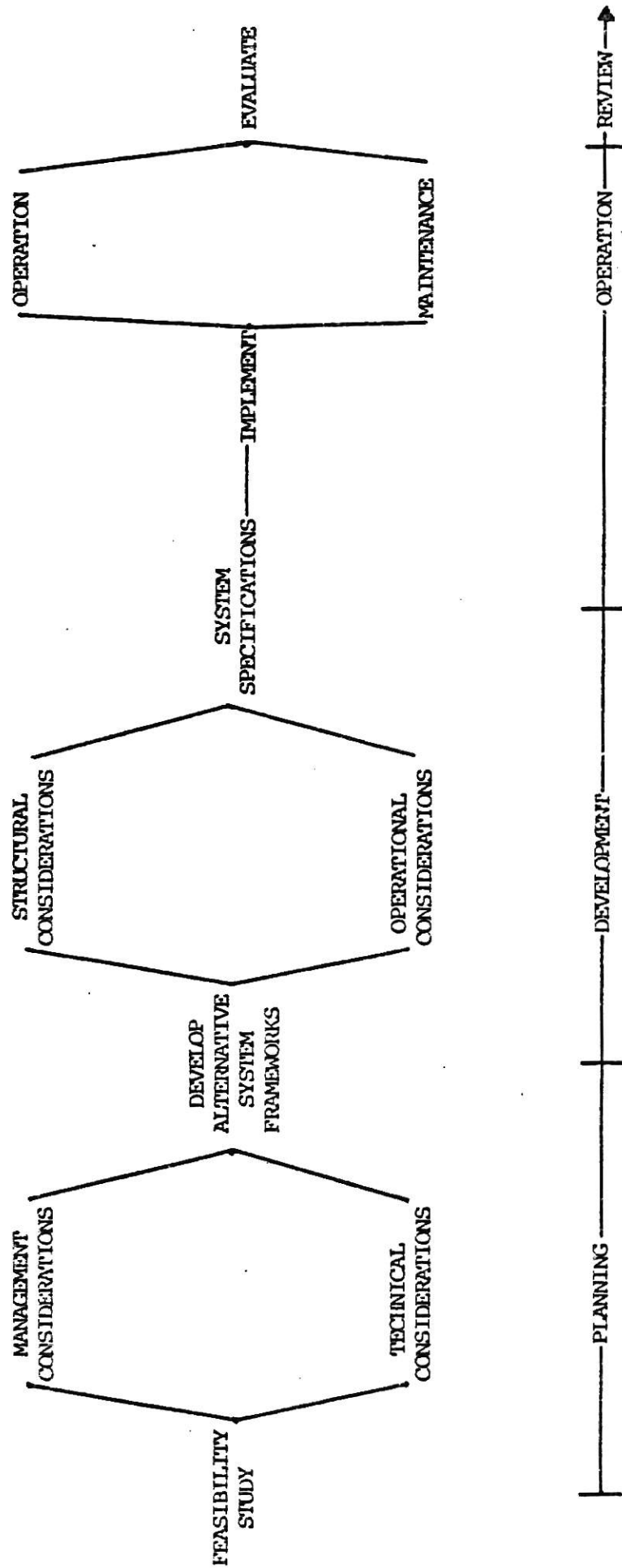


Figure 2. Information System Design Process

data available to state officials. The question addressed here is, if a commitment to ameliorating housing conditions is ever deemed an appropriate state activity and there is a willingness to actively pursue that goal, it would be highly desirable to organize existing housing information. Therefore, an understanding of the substance and structure of information systems would be of value.

Project Anatomy

This project is an outgrowth of an internship held by the author with the Housing Division of KDED. The intern project was broadly set forth in a statement of services which ranged from locating in-house data sources to general long range programming for that division. It became apparent that the scope of services far exceeded the parameters of a single internship. As the objectives of the project were of a general nature, preliminary work on developing specific project tasks was required. The basis of this report reflects the refinement process that took place during the project and subsequent research and evaluation of statewide housing information.

It is the housing data base and the process of compiling and maintaining that base to which this report is directed. As an organized information system should facilitate the decision making process, what is proposed is the planning and development phases of an information system to assist state housing officials monitor housing conditions in Kansas.

It is assumed that an understanding of actual state housing problems would facilitate housing policy, program, and resource distribution decisions confronting officials at the state level.

The report is divided into two basic areas. Although the total system development process could be considered in four phases (Figure 2), the first aspect examined in this report involves a description of planning an information system. The interrelationship of these elements is then discussed in terms of the information system design process. It is the basic intention of this report to clarify the substantive and operational considerations in the development of an information system. Combined with the existing housing information base, this report should assist state officials in planning and developing a state housing information system.

In the initial stage of the information system development process, there are parallel activities which are crucial to final system development. As represented by Figure 2, the planning process calls for a joint management and technical approach. Management is assigned the task of establishing the level and degree to which a system might be employed, allocating resources, and identifying project needs (in terms of time, personnel, and money they will consume). These constraints imposed by management shape final system design and establish the limits in which the information system will operate.

In conjunction with the management activity, there is a need to rigorously examine the technical aspects of an information system. The two primary activities here are the review of existing data and identification of users and user needs. The review of existing data relates to data generated either internally or externally of the agency. Identification of the type, location, and nature of data becomes extremely important for various evaluative situations.

The analytical framework in Figure 2 represents an introduction to the study design of this report. The development of an information system is a problem solving process, a planning process, in which clearly stated objectives concerning the collection and use of data are transformed into an operational system. As Dewey noted, "mere facts or data are dead, as far as the mind is concerned, unless they are used to suggest and test some idea, some way out of a difficulty" (1933:106).

III. INFORMATION SYSTEM LITERATURE REVIEW

In August of 1975, a report sponsored by the state of Kansas was submitted to the Acting Director of the Division of State Planning and Research (RERC, 1975). The Real Estate Research Corporation's (RERC), Housing Strategies for Kansas: Information and Data Requirements, (1975) inventoried housing information, and evaluated various information systems as part of a statewide housing program. Beginning in early 1977, a portion of that study's recommendations was operationalized with the hiring of a director for the newly created Division of Housing within the Department of Economic Development.

As the majority of the study's recommendations have yet to be operationalized, this report is an attempt to remove at least one hurdle in achieving the major objectives of the RERC study. It is hoped that an examination of the concepts and constructs of an information system, as it relates to housing in Kansas, will clarify the system implementation requirements.

Definition of Terms

A requisite to determining the informational needs of housing planning is the delineation of basic terms. The definitional question is not as simple as it may appear. Several factors suggest that the most basic terms are involved in both functional and structural information problems.

Data and Information

Although the literature abounds in definitional nuances, a differentiation between the terms data and information can be established. Data is generally considered observed facts or signals (Debones and Montgomery, 1974). Information may be considered as an ingredient in the problem solving process (Greenwood, 1979), "facts or figures ready for communication or use (Kent, 1965:21)," or an uncertainty reducing entity (Lucas, 1978). The distinction presented by Langefors and Sundgren is used in this report. They distinguish between the two by taking the view that,

"data are symbols used to represent and communicate knowledge and ... information refers to this knowledge (Langefors and Sundgren, 1978)."

The distinction between these two terms grows in importance with the scale of the information system. The data selected to provide information is a critical factor in developing the system. Data collection may exceed the informational requirements of a given topic, thus creating unnecessary bulk and cost to the system.

The data base is essentially, "the totality of data (information) available to the user (U.S. Department of Housing and Urban Development, 1968:18)." It represents the core about which an information system is developed. Simply defined, an information system has been construed as an, "organized method of using data for a specific purpose (Campbell and LeBlanc, 1965:1)." In contrast, some consider

an information system to be a "collection of computer programs and procedures under which information is collected, processed, and reported (Gruenberger, 1972:viii)." For this report, however, the definition given by Lucas will be used.

"An information system is a set of organized procedures which, when executed, provides information to support decision making (Lucas, 1978:5)."

This definition recognizes the various levels of sophistication that systems can or must represent. The key features of this definition are "organized procedures" and "support decision making." A distinction between an information system and information is the organized structure of the system. Furthermore, it is through a series of formalized, interrelated procedures that data are collected, stored, and processed to "support decision making."

Information System Terms

There are four basic, interrelated components which comprise the information system; data collection, organization, processing, and maintenance are fundamental components of an information system (Stuart). Although a number of authors and agencies have developed elaborate information systems, these four components are basic to all systems.

Data collection is the actual field collection of data or "capture" of information wherever it may be generated. Data organization represents a series of activities which translate the raw data into data bank components or records. Here, such considerations as data selection criteria, data item definition, and file organization are addressed.

base unit. For example, if total housing units are given by county, only, then all data items may have to be collected and stored by county. If this level of unit aggregation is not acceptable, an agency may opt to collect the specified data. This, however, represents an additional system cost.

The next higher level of data organization is the file. The sequential numbering or coding of data base units represents the file (also known as records in computer science). System files are collections of data base units describing some element of the study area. By numbering or coding these files, an individual has essentially reduced the amount of information needed to retrieve any given set of data. A library catalogue file is an example of an information indexing system.

Data processing involves a consideration of the hardware and software that will be used in the system. This is a mechanical consideration in that it relates to the manner in which data is entered or extracted from the data base. Whether a file cabinet or computer is used, the system's processing element should provide efficient data entry and display (retrieval). The software is the collection of rules for accomplishing this. The importance of a secretary filing information correctly or a computer programmer altering a data tape is critical to the functioning of the system.

Data maintenance is an equally important aspect of information system development. The continual updating of stored data is essential to the basic concept of the system.

Data selection criteria, as suggested earlier, is a critical process in which informational needs are dissected to identify the optimal data input. What Langefors and Sundgren (1978, 49-51) refer to as "sucedence analysis" is essentially a general systems examination of how any datum may be used to supply information. The caution here is to avoid over or under description of information attributes. That is, what data (statistics, qualities, or quantities) are needed to provide an adequate description of some event, condition, or process? (Is number of persons per room adequate for determining overcrowding?)

Data item definition has both internal and external considerations for a potential information system designer. Internally, the system design should consider the data base unit. This is the level at which data is collected (eg., each individual in the study area, data summarized by each community). Winter defines the data base unit as, "the smallest entity in the data base, about which all data items are assembled (Winter, 1970:5)." The data base unit defines the level of aggregation at which data is collected. Hence, the unit in total population by counties is the county. Externally, data availability may represent the delimiting factor in determining the data base unit. The agency operating the system will most likely rely on outside sources for some data items. As the format from these external sources is bound to vary, so to will the data base units. Of these, the datum of least disaggregation may well define the data

A regularized program of updating would be enhanced by interagency agreements which would allow for direct links between data sources (eg., savings and loans, census bureau) and the information system operators. Another aspect of the maintenance function is documentation. As a subset of maintenance activities, there should be documentation whenever: 1) data is collected or received from an outside source, 2) there is a change in the data base, 3) file organization is altered, or 4) there is an entry or retrieval from the system (HUD, 1968). Maintenance is critical to the system; reliability, accuracy, and usefulness are directly related to this function.

These components represent the basic structure of the information system. They also represent the process by which raw data may be transformed into information for decision making. However, integrating information into the decision making process involves an overall framework which efficiently and effectively coordinates the information system with the decision maker. As was pointed out earlier, the process of system development requires both a managerial and technical component. Much like a bullet without a target, an information system which lacks clear goals and program objectives is meaningless.

IV. INFORMATION SYSTEM PLANNING: INFORMATION AND MANAGEMENT ANALYSIS

The development of an information system involves several major work elements. Figure 3 indicates a procedural interrelationship in the development and design of an information system. As it suggests, there are two major levels within the total design process--management and technical.

Preliminary Analysis

The first phase of developing an information system involves the basic survey of conditions and establishment of purpose. Samuelson et. al., describe the technical aspects of this process as literature review and identifying users and user needs (1964). Lucas also describes this process, suggesting that the initial development activities involve a preliminary survey and feasibility study (1978). Both suggest that the initial work in the systems development examine present information handling, information generators and consumers, and informational needs. For the purposes of this study, these tasks have been organized under two activity headings--management analysis and information analysis.

In identifying information availability, two sources, the KDED Central Library and the Real Estate Research Corporation's, Housing Strategies for Kansas, (1975) were utilized. These two sources represent, respectively, the information available within the primary agency and the information available from outside sources. The library

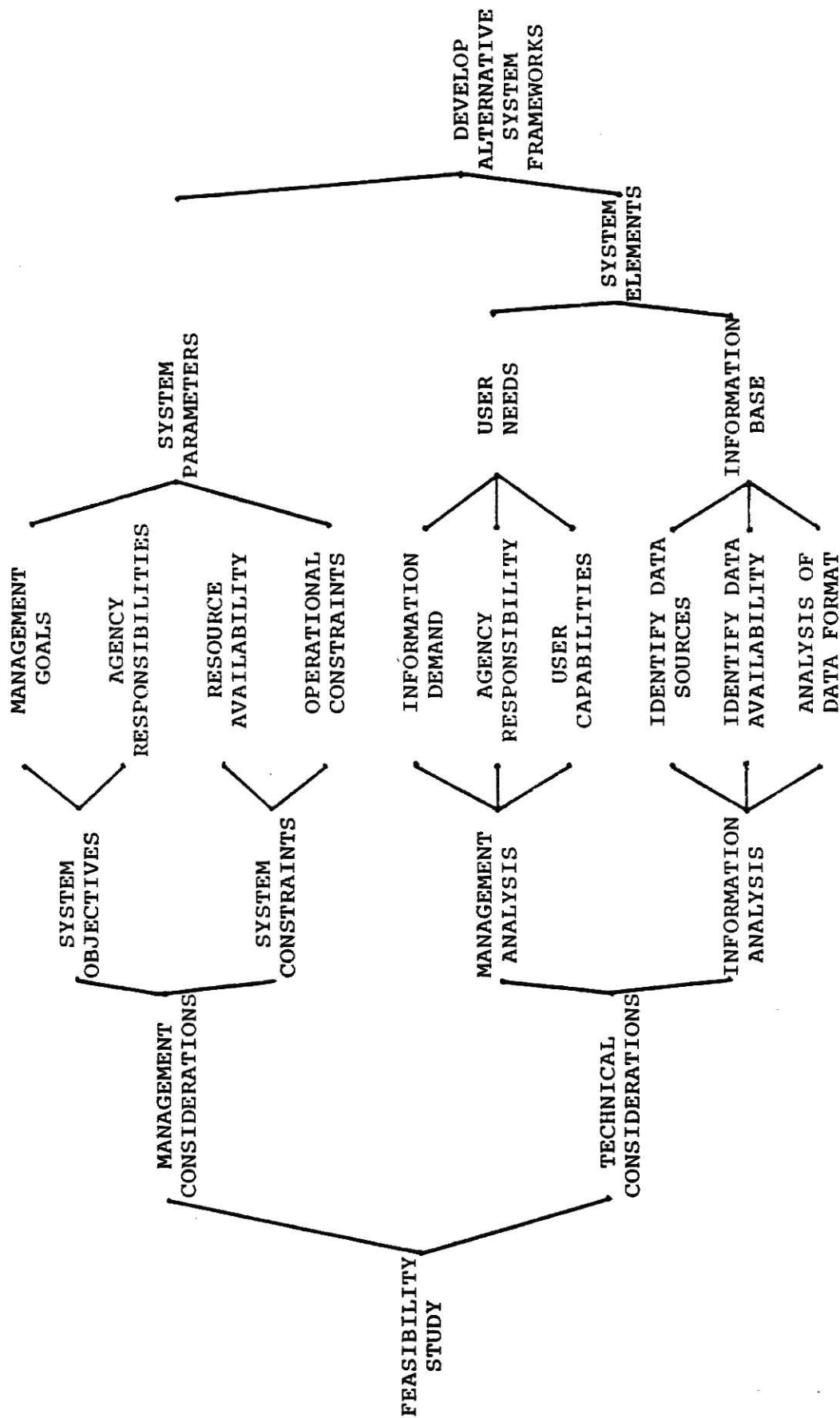


Figure 3. Information System: Planning Phase

yielded over two hundred books, documents, and periodicals related to both Kansas and national housing issues. An annotated bibliography was prepared for each item, categorized by major subject heading, and, then, reorganized within the library system. This material was then organized and published in, Development of Housing Information System (1978). The Real Estate Research Corporation's (RERC) study examined data availability at both the state and federal level. The RERC study identified thirty major data sources which were organized into four general data profiles (1975).

To assess both informational demands and user needs, a management analysis technique was developed. The analysis technique was devised as a means of identifying actual informational demands encountered by the Housing Division staff and to clarify agency responsibilities. The technique was comprised of three basic components; staff interviews, contact surveys, and content analysis of administrative and legislative documents. Interviews were held to gain staff perceptions of division responsibilities and goals. Also, post program reports were developed at the conclusion of programs, conferences, and other activities in which the staff participated. These were conducted over the duration of an internship in 1978. Contact surveys were based on content analysis of written correspondence and telephone logs. Content analysis was performed on all division correspondence in order to develop a general understanding of clientele perceptions and specific program and assistance requests from local, state, and national contacts. Telephone

logs were kept as a supplement to written contacts. Again, requests were recorded and aggregated into identifiable program and technical assistance categories.

The second purpose of the management analysis was to identify goals and responsibilities of the Housing Division. First, legislated responsibilities of the agency and other related housing statutes were examined and evaluated for general and specific content areas. This analysis established the general system parameters. Specific system parameters were obtained from a similar analysis of the division's goals and programs in the KDED, Five Year Work Plan (1976). The work plan charges the division with these goals:

Provide a better quality of life through assisting Kansans in obtaining a decent home and suitable living environment.

To act as a state clearinghouse for housing information.

Assist communities in being able to evaluate and fulfill their own housing needs and problems.

Work toward the development of state policies, strategies, legislative and administrative proposals, and evaluation techniques necessary to accomplish state housing goals and objectives.

Promote research and the testing of innovative construction methods.

Work with the private sector to provide functional housing at the lowest possible cost (KDED, 1976:52).

Although a number of programs could be developed to achieve each of the above goals, only two programs were operational in the 1978-79 budget year. In 1978, two programs, "Community Service Administration" and the "Section

701 Housing Planning Program", were dropped leaving only two programs, "Housing Technical Assistance" and "State-Federal Information Exchange". The objectives of these two programs are:

Housing Technical Assistance
Workshops in "greatest-need" communities

Prepare "model" application grant

Participate in housing conferences

Evaluation of industrial impact areas

State-Federal Information Exchange
Communication link between HUD and other state related agencies

Develop calendar of events related to housing and attend appropriate functions

Maintain current mailing list of all local housing authorities, mayors, and county commissions

Establish contact with all related state agencies

Develop basic data for Kansas communities for identification of specific housing needs (KDED, 1976:105-08).

Conclusions

From the analysis of information demands and program responsibilities, several conclusions concerning user needs and information demands were identified. These findings represent the substantive components of the information system as well as the parameters for the structural aspects. The significance of this stage is the identification of monetary and personnel capabilities and constraints as they relate to information availability and demand. An understanding of what is needed based on what can be done with information, is a prerequisite to actual system design.

Existing Data Handling Procedures

The analysis of the staff's use of information and their handling of information is heavily tied to the individual's professional experience. That is, the two staff members have extensive experience in the field of housing. A great deal of the information they use is derived from this experience with limited use of other data sources. When information needs are perceived which are beyond their direct experiences, the use of an informal communications network is employed. That is, the staff contacts other individuals (usually outside the agency) who, in their experience, can address the information need. This existing system contains little or no formal documentation. As such, it is highly dependent on specific individuals.

Where documentation of information does occur, several handling and storage problems exist. A number of local, state, and federal documents are received by the division. Containing everything from statistical information to management plans for local housing authorities, these documents may be handled in any number of ways. They can be: 1) kept in the staff member's personal office, 2) shelved in the central library, 3) filed in the combined Community Planning and Housing Division files, 4) stored on vacant shelves throughout the KDED office area, or 5) circulated to other department personnel who may deal with the material in any of the above methods. As a result, available information is not readily available and, may even be lost within the organization.

This analysis of existing information handling procedures provides information concerning data handling and storage needs. The first, and most obvious, conclusion is the need to consolidate the in-house data resources. In conjunction with this recommendation, formalized information handling is also suggested. These two steps are vital in providing a reliable data base. Although it is important that incoming information sources be circulated among those who may find it useful, it is equally important that they be consistently and readily available. Specific recommendations concerning these design aspects should relate to the actual use of the information. This suggests a formal information circulation policy which has definite parameters and a monitoring function. Once a piece of information has circulated, it needs to be stored in such a way as to assure future users of its location. Ultimately, the functioning of such an activity would depend on the monitoring function which would insure consistent adherence to procedures.

Existing Use of Information

This section examines the actual use of information within the division. From the management analysis, it was discovered that data and information have both a substantive and functional aspect. That is, the division received demands or had responsibilities for certain types of information, and responded to these request by supplying information in certain formats.

The previously described management analysis was employed to provide parameters for the substance, or content, of the data base. Based on the survey of informational demands placed on the division, the following describe the contents of a data base which could support the agency's responsibilities:

Energy Conservation

Government Housing Programs

Housing Construction and Building Systems

Housing Finance and Economics

Housing Planning (local, regional, state, and multi-state)

Management Programs (local housing authorities, grant programs, etc.)

Mobile Homes and Industrialized Housing

Population Characteristics

Program and Policy Development

Rehabilitation and Conservation

Relevant Laws and Standards

Rural Housing

These twelve categories represent the substantive structure of the proposed information system. These are a general means of categorizing information either currently being used or necessary to fulfill the agency's stated goals. A further purpose can also be extracted from these categories, namely, the system's parameters. What subjects should the agency, and, hence, the system address? as no specific management statement exists, the results of the

management analysis have been utilized for "delineation of system boundaries (Samuelson et. al., 1964:17)." These data base categories represent a content structure which could be employed in organizing both data collection and storage.

The information survey also revealed three major functional characteristics of data utilized in the division. The major content areas were accessed for data which supplied information in a statistical, educational, or referential format. Statistical information represents aggregated data which provides a qualitative or quantitative description, or, with further aggregation and analysis, provides greater information on specific conditions. Educational or informational materials are those which describe courses of action, program requirements, or general considerations. Reference materials range from theoretical to technological advances and serve to supplement staff expertise.

An important consideration at this point is the relationship between the substantive and functional aspects of the information system. Here, functional characteristics represent a description of the format in which data represent information, and how that format relates to use. What the survey indicated is, of the types of information collected by the agency, the formats utilized in problem solving could be categorized in one of three ways. The format needs, therefore, relate to:

- 1) the type of information collected within each substantive area,
- 2) parameters for storing data (so as to facilitate usefulness when retrieved), and

- 3) The method which the user employs in acquiring data from the system.

To demonstrate the relationship, assume the agency receives a request concerning possible state involvement in regulating manufactured housing (an element of the Mobile Homes and Industrialized Housing content area). The staff determines that to address this request it should, first, attempt to provide definition of what is manufactured housing (educational/informational format). They would also attempt to describe the existing situation both within the state and nationwide (a series of statistical descriptions of who, what, and where). And, finally, they would provide various alternative policy stances which might be adopted (from reference materials related to manufactured housing policies and staff expertise).

The usefulness and accessibility of data in an information system are readily identifiable at the point of retrieving information. The importance of system inputs and outputs to the total system cannot be overstated. A viable system should allow the user to retrieve the type of information needed, and in a format which supplies the greatest possible information to a specific question.

Summary

A synthesis of Stuart (1968) and Samuelson (1964) suggests that the first phase of information system development is a preliminary survey. The survey consists of identifying existing procedures, determining information availability,

analyzing information demands, determining user needs, and establishing system parameters. The study has revealed a need for formalizing and centralizing the existing information handling procedures. It also suggests that rules and procedures for collecting and storing data should be established and monitored.

The 1975 study completed by the Real Estate Research Corporation provides a detailed review of information availability. Also, the annotated bibliography and information survey completed by the author identifies informational resources within KDED. A management analysis revealed twelve substantive informational categories which address the division's information demand considerations. These were also used to establish the general boundaries for the system. And, three general uses of information were identified as the extracted format in which information is utilized.

V. INFORMATION SYSTEM DEVELOPMENT: SYSTEM SPECIFICATIONS

The next step in the information system design process, given the parameters and elements, is the development of system specifications within a functional framework. The essential question addressed here is the transformation of determined information needs and agency constraints into a systems framework which can be operationalized. The process is one in which structural and operational considerations are evaluated within the needs and constraints established during the planning process.

Each of the findings derived from the feasibility study (program areas, information resources, etc.) are the fundamental pieces from which the system structure should be developed. The demands placed on the collection, organization, processing, and maintenance subsystems will be the design criteria for the total system's specifications. The remainder of this report examines the four structural components of an information system as they relate to a proposed housing information system.

In order to examine potential specifications for developing a housing information system, this portion of the report analyzes the process as an interrelated set of structural and operational considerations. Diagrammatically, this process is represented in Figure 4. Each of the four fundamental system components (collection, organization, processing, and maintenance) is evaluated in terms of both considerations.

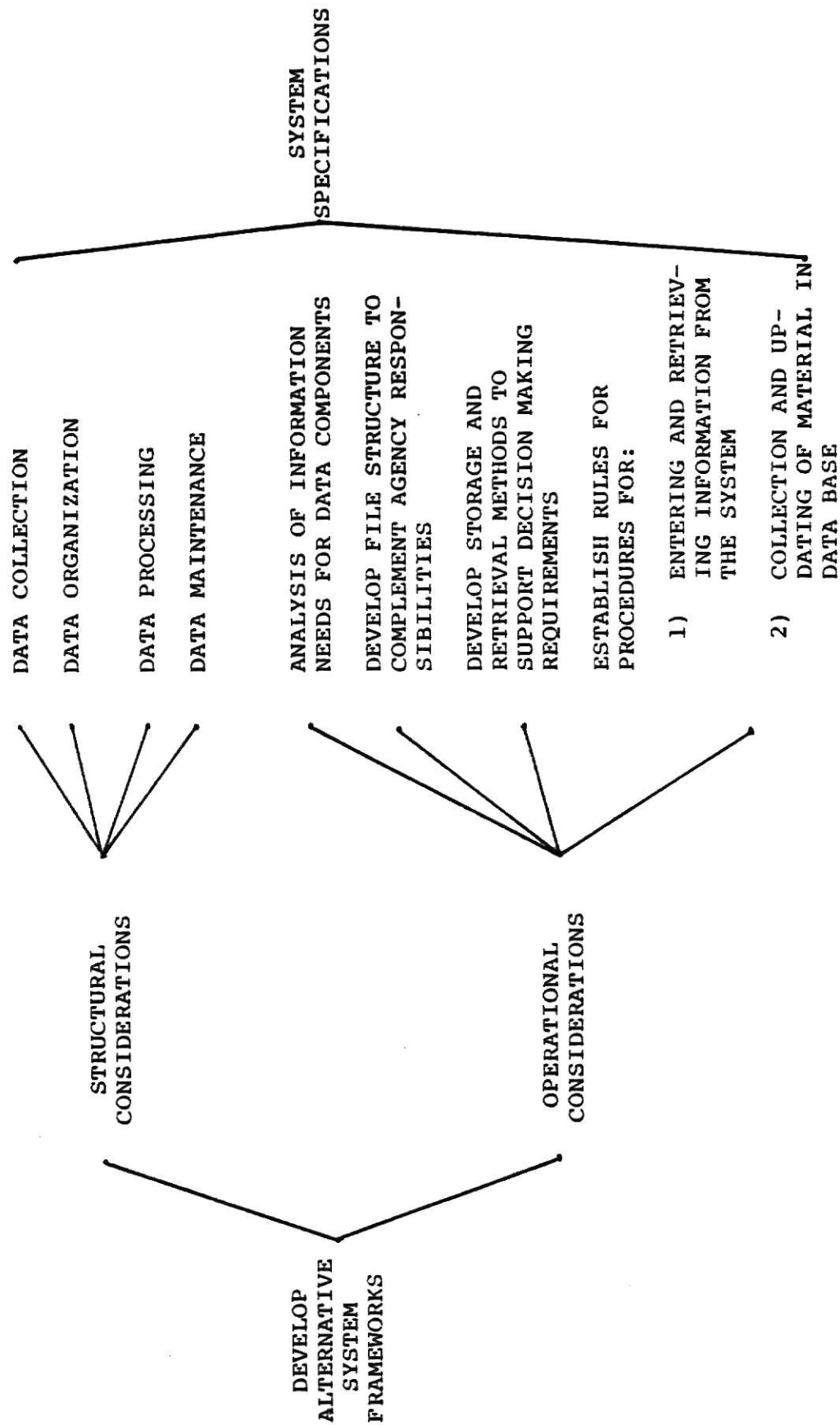


Figure 4. Information System: Development Phase

Certainly, one can say an information system, based on the previous definitional discussion, exists within the Housing Division of KDED. That is, individual and department files, program descriptions, publications, and, to some extent, a central department library function to maintain informational resources. A major consideration, in fact, the central question to be resolved here, is the level of effectiveness of the existing system as it relates to stated program responsibilities. Restated, does the available data, organized and maintained in the existing system, address the decision making requirements of the Housing Division.

Real Estate Research Corporation, it should be noted, has compiled an extensive survey of informational resources (1975). Also, this study suggests relationships between information resources and program needs. Rather than duplicate this work, the intention here is to supplement that basic ground work with the operational and structural consideration confronting the Housing Division staff. As noted earlier, the potential data base available for a housing information system is adequate. However, there is an apparent problem in operationalizing such a system. Therefore, in conjunction with the RERC study, this discussion of the system's planning and development process may present the necessary information for implementing the system.

Data Collection

Given the types of data input required to effectively address program goal and policy decisions, a series of questions concerning where and who has or generates the specified data and in what format should be developed. If the data determined to be essential to program operations has never been collected or is inadequate in its present form, then alternative strategies to generate that data should be developed.

Data, in a sense, can be considered as a resource. One might make the analogy between the use of raw materials used in the production of goods in industry to the use of data in the planning function. Data is "consumed" by planning activities to produce information related to problem solving. A housing program at the state level needs access to data in order to produce a reliable and effective set of responses to housing needs. And, just as in industry, the quality and quantity of consumable resources must be in appropriate and balanced proportions. One can also expand this analogy into the costs associated with imbalanced or excessive supply, inefficient use of resources, and scale of operation. In any case, the extration and collection of data, if an optimal system is to be created, should be related to the ultimate goals and responsibilities of the specific planning function.

The results of the previously described survey, suggest the types of information which sould be collected by the

Housing Division. Based on this study, twelve data categories are recommended. The exact content of each of these data categories is, of course, dependent of the exact nature of the Housing Division's program responsibilities. Once these are specified, the management and informational analysis procedures previously described could be employed to identify the precise data entities needed to support decision making activities. Also, collection of the specified data would be facilitated by the RERC study. This study identifies the type of format of various kinds of housing data, who collects it, and how it relates to the decision making process.

A question related to data collection is the selection of the data base unit. The unit is the level of aggregation about which data are collected and organized. The RERC study (1975) indicated that reported data base units varied in their level of aggregation. That is, some data are reported by subcommunity elements (blocks), by total community, or by county. Because it is generally possible to aggregate data, but not disaggregate, it is recommended that available data be collected at the reported level. This recommendation is made in light of the fact that a number of basic housing indicators are collected on a community-wide basis. Using subcommunity elements as the unit of analysis would involve considerable manpower and financial support to be adequately tabulated. Furthermore, in some smaller communities this expense would be difficult to justify. Should specific information be needed at the subcommunity level, it may

then be reasonable to conduct the necessary in-depth analysis. An alternative to this would be to fund those local agencies willing to conduct such a survey if a standardized reporting format were used.

Data Organization and Processing

The previously described categories represent the content of the proposed data base structure but are insufficient without an organizational framework. The feasibility study also identified three major organizational categories. These three categories (the statistical data base, educational and informational materials, and reference materials) are interwoven with: 1) the physical format that data are received in and, consequently, the format in which they are used; 2) the manner and mode in which they are stored; and 3) the nature of demand on the information, transformations which it goes through, and its relationship with the decision making process. This suggests that each of the three organizational categories be constructed within each of the twelve content areas.

Statistical Data Base

Generally, the statistical data base would be composed of numerical data of a variable nature. This component would be necessary to provide essential data and statistics for program analysis and evaluation, need identification, and community assistance. Also, statistical substantiation is a requirement of the Community Development Block Grant

and Department of Housing and Urban Development's Section 701 programs. Although the extent of data initially collected may not immediately encompass all available data, computerization is recommended from the outset. This component could be manipulated to integrate with the Kansas Policy Database System (KPDS), a state-wide information system developed by the Institute for Social and Environmental Studies (1978).

The organizational format for this component would be the previously described content areas. An alternate format discussed in the RERC study (1975:10) may be used but lacks significant breakdown of file content. That is, the RERC study suggests four content areas (general characteristics, socioeconomic-demographic, housing stock, and institutional factors). The recommended format is more descriptive of the actual file content, yet is general enough to accommodate the range of potentially available data. However, if the division were to utilize the KPDS, through ISES, it may be desirable to structure the data base in a KPDS compatible format.

Although computerization may not be initially possible or cost effective, any manual system of data storage should be designed to minimize future conversion problems. Given the increasing affordability of computer systems and the pervasiveness of the subject area, conversion to some type of computer system is likely. If a manual system is initially adopted, standardized reporting and coding procedures

should be developed. The issue of standardization may necessitate modifications in the collection and reporting procedures of agencies outside the Housing Division. This subject is discussed in detail in the RERC study and includes proposals for changing various collection and reporting procedures.

Educational and Informational Materials

As part of the clearinghouse and technical assistance functions, the Housing Division would be involved in educational document preparation and distribution. Also, stimulation of appropriate housing development consists of some formal and standardized procedures. The development of applicable manuals, brochures, handbooks, etc., which describe generalized procedures, could reduce unnecessary duplication of efforts. These would be added to those educational and informational materials currently handled by the Housing Division.

As dissemination of information is an identified responsibility of the division, these materials could, in a sense, extend the staff's assistance output. That is, a number of communities need to prepare similar documents, undertake similar work activities, or meet certain, identical requirements. Documents which describe a "cookbook" approach to these activities could conserve staff time for more demanding technical input.

Another reason this organizational construct is suggested is related to the unique format often associated with

educational materials. Some of the potential materials would be in an audio or visual format which would not lend itself to general file or computer storage. Another aspect is that some informational brochures, by their sheer quantity, would not be appropriate for normal storage procedures. As multiple copies may be produced for some materials, a dual system for storage and reference is suggested. For those materials which, due to size, for example, would not lend themselves to conventional storage systems, an index should be prepared which adequately describes the material's content, its location, and quantity.

Reference Materials

Fundamental to all work program elements is the need for basic reference materials. Information concerning program requirements, current research, or available assistance is needed to apprise the staff of both current and historical events. Also, as communities develop planning documents, the Housing Division should acquire such material. The reference material component will be the major source of such items as standards, conceptual approaches to problem solving, and current housing program requirements.

The format for this section would, by the nature of the material, be in the form of documents, periodicals, and current government program regulations. To assist in the location and referencing of these materials, it is suggested that an organized library be established and the Inter-Library Loan Program be utilized. The current KDED library

does not serve this function. There is no individual or department policy for using or maintaining materials in that library. As a result, materials may not be returned or reshelved appropriately, there is no uniform system for regularly indexing material, and the new materials acquisition policy is inadequate. It is suggested that one person be assigned or hired to maintain the total department library. That individual would have the responsibility to prepare and maintain a subject-author index system, maintain subscriptions to necessary periodicals, and solicit suggestions for new materials acquisition.

The Inter-Library Loan Program represents a system which would complement any type of information system developed for the Housing Division. Linked to a national reference system, this computer based reference service could augment the reference capabilities of the division. At the present time this service is utilized on an infrequent basis. However, with definite program responsibilities, this service could allow for additional "storage" capacity, particularly for those references needed on a one time basis. Located in the State Library, this component should be integrated into the proposed system either by a formal working relationship for installation of an Inter-Library Loan Search terminal within KDED.

Another storage medium which should receive careful consideration is the previously mentioned KPDS. Developed by the Institute for Social and Environmental Studies at

the University of Kansas, this system is designed to provide data support for state policy decision making. Remote terminals located in the Housing Division could utilize the hardware and software facilities located in Lawrence. The total system was developed for general users with no previous computer experience. The system's structure and potentials for application are discussed in, Technical Bulletin No. 3: KDED Application of the Kansas Policy Database System (KPDS) (1978). Some of the major features of the system are:

It has an "assist package" to guide user's by describing available options and operating procedures.

Data generated by federal, state, and multi-state agencies are used.

Various programs allow for data compilation, new file creation, statistics or manipulations, and display of data.

New files can be created and stored on a long-term basis.

Programs provide for display of data in numerical form, scattergrams, boxplots, or histograms in either standard formats of preselected ranges.

The data are organized within a functional area basis (KDED, 1978). Consideration of this system should be evaluated for eventual integration with the Housing Division's informational activities.

Data Maintenance

As no organized data base currently exists, this discussion is oriented toward the general considerations associated with data maintenance. The total data management and maintenance aspect can be conceived as four interrelated

activities (Department of Housing and Urban Development, 1968). Considered as a whole, these four aspects (documentation, compatibility, release policy, and acquisition strategies) represent a framework equal in importance to the total system. A lack of timely and reliable maintenance could jeopardize the entire system's integrity. And, as with all the other components of the system, maintenance considerations should be addressed throughout the entire planning and development stages.

Documentation

Data base documentation is a subcomponent which attempts to describe what data are in storage, in what form, where they are stored, and how they may be retrieved. Documentation should take place anytime new material is added to the system or material in the system is altered, reorganized, or expanded. Also, whenever existing data are transformed (aggregated or manipulated), documentation of the process should take place. A prime example of this is the card indices maintained in libraries. In this case, as materials come into the library, reference cards are prepared which contain information on the material's location, general content, and subject matter. This portion represents a descriptive catalogue of available data.

Compatibility

Data compatibility, although addressed to some extent in consideration of the data base unit, is an evaluation of

the datum for consistency with the total data base. A central question here is the ability to integrate new data with the existing base. Also involved is the need to maintain consistency in the coding and storage of those data which will be included in the system. Coding and storage rules should be established from the outset of system development and rigorously followed throughout the life of the system.

Release Policy

A data release policy which controls access to information within the system, should address several issues. The collection and storage of certain data items may require restricted access and release. The policy should also address general release procedures and authorizations for individuals permitted to access data. By establishing these procedures during the planning stages, system managers can provide some measure of integrity for systems operation.

Acquisition

Acquisition strategies are vital to the total system as they establish the periodic revitalization of the system. The informational value of some data items is relatively short. Interest rates for mortgages, for example, should be updated with each change in the money market. Establishing interagency data sharing agreements is another important aspect to be included in acquisition strategies. Obviously, no one agency can develop all the data necessary for its

informational needs. Cooperative agreements between agencies generating data and those who could utilize it in their own decision making circumstances, are one way unnecessary duplication of efforts could be avoided. By sharing those data items related to various agencies' responsibilities, a greater efficiency in staff and monetary allocations could be achieved.

Summary

The planning and development of an information system requires careful consideration of several interrelated factors. These factors have been discussed in a sequential process generally described as the feasibility study, system frameworks, and system specifications.

The use of an information system can be characterized as an organized set of data which can be used to provide information in making decisions. In order to achieve an efficient and effective system, the final specifications should be based on a detailed set of findings related to program responsibilities and user needs.

An information system can be conceived of as four basic subsystems. Each of these constructs (data collection, data organization, data processing, and data maintenance) represent a series of interrelated considerations in the development of system specifications. This phase of the design process raises several questions related to the final framework, such as:

amount of materials to be recorded,
compatibility of data with user needs,
informational demands which the data and system are
expected to satisfy for potential users,
the need for a single purpose or multifaceted system
construction, and
relationship of system design to a formal policy of
updating data and controlling access.

VI. SUMMARY: SYSTEM SPECIFICATIONS AND BEYOND

As the paradigm followed thus far suggests, the next step in developing an information system is the implementation of system specifications. The following discussion is a summary of the recommendations in this report and suggestions for further action.

Housing Assistance Goals

Implementation, however, is not accomplished solely on the basis of reasonable design. Therefore, it is imperative that the associated political and economic considerations inherent in establishing the system be carefully defined and evaluated. Foremost among the political considerations is the need to delineate the level of state involvement in housing. The question of an information system is irrelevant in the absence of a definite commitment to state housing assistance goals. Definite responsibilities, however, will in no way facilitate meeting these needs unless joined with equal administrative and monetary supports. Unquestionably, the first task in developing a statewide housing information system is to develop a statewide housing program consistent with Kansas housing needs.

Cost Considerations

Based on the above premise, the cost of developing an information system would be directly related to the supported

goals and objectives of the Housing Division. Previous studies have suggested that the initial development of a housing information system could range from \$3,000 to \$150,000, depending on the scope and hardware (Langston-Kitch, 1970; Langston-Kitch, 1971; RERC, 1975). Annual operating costs would also vary with a reported range of \$3,000 to \$32,000 (Langston-Kitch, 1970; Langston-Kitch, 1971; RERC, 1975). These costs reflect a wide range of operational capabilities. In developing specific cost estimates, it would be advisable to account for the costs of the four basic components of an information system, i.e., collection, organization, processing, and maintenance. The network diagrams presented earlier could be used, once a basic system was developed, as a guide for determining the personnel and hardware requirements of operationalizing a system.

Implementation Strategy

After a system framework is identified, the next major task is that of implementation. The operationalization of the envisioned system will depend heavily on the Housing Division staff presenting a clear concept of the system. The strategy employed by the staff will also depend on the scope of the proposed system. The following action agenda is intended to summarize some of the major implementation considerations.

I. Program Analysis

A. Conduct a housing needs assessment

1. Research past documentation

2. Summarize recent trends
3. Consider an informational survey of local jurisdiction information needs
- B. Evaluate current Five Year Overall Program Design
 1. Review of existing program
 2. Identify potential modifications or additions
- C. Evaluate current state goals and programs
 1. Review state housing goals
 2. Evaluate needs assessment and program capabilities
- D. Synthesize program analysis
 1. Revise Five Year Work Program
 2. Develop personnel and cost estimates
 3. Discuss concepts with key political and administrative personnel

II. Program Development

- A. Investigate data cooperation agreements
 1. Data source agencies
 2. Potential data users
 3. Potential assistance users
- B. Schedule system presentations
 1. Local agencies
 2. State agencies
- C. Develop program and budget request
- D. Encourage support of system development

This framework assumes that an information system would be an integral feature of an aggressive state commitment to housing assistance. Also, at least one additional position

is called for in this proposal. The individual would have the primary responsibility for operating and maintaining the system. As such, the position would:

provide technical assistance to other Housing Division staff;

be responsible for organizing and maintaining the system;

act as the information liaison between federal and state agencies, local jurisdictions, and the staff; and

provide in-house research to support program activities.

This additional position is recommended regardless of the configuration of the information system. As noted earlier, demands on existing staff are such that data collection and maintenance and in-depth research are limited. The new position would facilitate these objectives.

Summary

The design of a housing information system is subordinate to a commitment to assist the state's residents in meeting their housing needs. The potential for meeting those needs exist. This report, along with other related documents, provides the basis for action. The next step, the first step, begins with the commitment to act.

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KANSAS INFORMATION AND REFERENCE SYSTEM
FOR HOUSING: PLANNING AND DEVELOPMENT PHASES

by

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AN ABSTRACT OF A MASTER'S REPORT

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ABSTRACT

Although there is a wealth of housing information describing and identifying the nature of housing in the state of Kansas, little has been done to organize that material. This report evaluates a proposed process of organizing information and presents information for initiating this process. The report covers the planning and development phases of such a system.

An information system design process is discussed which suggests four basic phases in total system development and operation. A review of literature gives an overview of information systems and their basic elements. Fundamental definitions and the interrelationships of sequential phases are presented.

The planning phase of information system development is composed of two activities--management and information analysis. From these, system parameters can be developed for a systems framework.

Also examined are the four basic components of an information system. These are data collection, data organization, data processing, and data maintenance. An examination of the structural and organizational aspects of the system would be necessary in the development of system specifications.

The summary discusses the relationship of the system to ongoing political activities. An information system's cost and personnel requirements are discussed. Finally, an action agenda for implementation is suggested.