

MFM Project

LVIV INTEGRATED INFORMATION HANDLING SYSTEM

By
MFM Lviv Office & the City of Lviv, Ukraine

Research Triangle Institute
1615 M Street, NW, Suite 740
Washington, DC 20036

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Municipal Finance and Management Project

L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Developed under US AID contract # CCN-0007-C-00-3110-00
by the L'viv Office of the Research Triangle Institute and the
City of L'viv Ukraine

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Preliminary Version for Discussion and Revision

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L'viv Integrated Information Handling System

TABLE OF CONTENTS

Introduction	1
Scope of Project for 1995 and for Following Years	1
Concept	1
Resources Needed	4
Participation	4
Present Situation	6
Proposed Situation	9
Phasing of Work	16
What is Involved in terms of people and processes	17
Outline of Equipment and Programs Needed for the 1995 Phase	21
General Performance Specifications For the Major Components	21
Power System	21
Communication System	21
Printing and Reproduction Equipment	22
Programs	23
Equipment	24
Grounding Electric Circuits	25
LIHS Specifications	27
Benefit of Proposal	29
Potential Budget for the LIHS	29
Potential Annual Operating Costs for the LIHS	29
Footnotes	29

List of Tables, Diagrams, and Appendices

Table I—Computer Equipment Presently Installed	6, 22
Table II—Emergency Dispatchers, Buildings and Offices to be Included in the Communication Network	13, 34
Table III—Additional Power Demand by the LIHS Equipment	21, 35
Table IV—Location of Copy and Printer Equipment	23, 36
Table V—Detailed Information Needed to Respond To and Monitor Emergency Calls	23, 38
Table VI—Detailed Information Needed to Respond To and Monitor Non-Emergency Calls	23, 39
Table VII—Detailed Information Needed For the Inventory of Housing and Commercial Space	23, 40
Table VIII—Detailed Information on the Data Bank For Applicants for Housing	23, 45
Table IX—Detailed Information on the Data Bank For City Personnel	24, 47
Table X—Potential Budget for the LIHS	29, 49
Table XI—Potential Annual Operating Costs for the LIHS	29, 51
Schematic Diagram I—Flow of Information and Decisions	1, 2
Schematic Diagram II—LIHS Preliminary Concept	1, 3
Schematic Diagram III—Organization Chart L'viv City Administration	4, 5
Schematic Diagram IV—Connections Between District Administration and City Administration	7, 8
Schematic Diagram VA—Concept of the Central Emergency Dispatch Service	13, 14
Schematic Diagram VB—Organization of the Information Flow	13, 15
Schematic Diagram VI—Conceptual Plan and Detail of Existing Cable System	22, 52
Schematic Diagram VII—Housing Waiting List Data Bank—Reference Modes	55
Schematic Diagram VIII—Housing Waiting List Data Bank—Data Base of Housing Fund	58
Chart I—Relations Between Departments	9, 10, 11
Chart II—City Dispatcher Service	18, 19
Appendix I—List of Organizational Units, Showing Major Functions	4, 61
Appendix II—Organization Charts of Various Major City Functions	, 67
Appendix III—Interrelationships Between Various Major City Functions	, 68
Appendix IV—"Ensuring the Longevity of Digital Documents" <i>Scientific American</i> 1/95	, 69

Municipal Finance and Management Project

L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

The Plan

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MFM PROJECT
L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Introduction

The United States Agency for International Development (USAID) Municipal Finance and Management (MFM) project is carried out in conjunction with the City of L'viv by the Research Triangle Institute (RTI). The MFM project has several aspects. The aspect covered by this report deals with the improvement of service to the citizens of the City by facilitating the way information is available to the citizens and to the public servants who staff the municipal government.

Scope of Project for 1995 and for Following Years

This 1995 portion of the L'viv Integrated Information Handling System (LIHS) has three purposes:

1) To track the letters, calls, personal visits from citizens to the City Administration, and by so doing to give better responses back to the citizen in a shorter time. Over the last year the volume known to the Administration has averaged 1,000 contacts per month.¹

2) To enable the City the Administration to shorten and improve the decision making process.

3) To create a data bank of the useable buildings in the City, and particularly the 160,000 unit housing stock, the 40,000 unit commercial space stock, and the list of 35,000 applicants waiting for public housing. (There are, in addition, 50,000 applicants for housing that is part of an enterprise.)²

To be effective the 1995 portion must be created within an overall City plan for the LIHS. This overall LIHS plan needs to be flexible. The plan needs to be reexamined at regular intervals. As the needs of the citizens of L'viv for city services will change, so must the LIHS change.

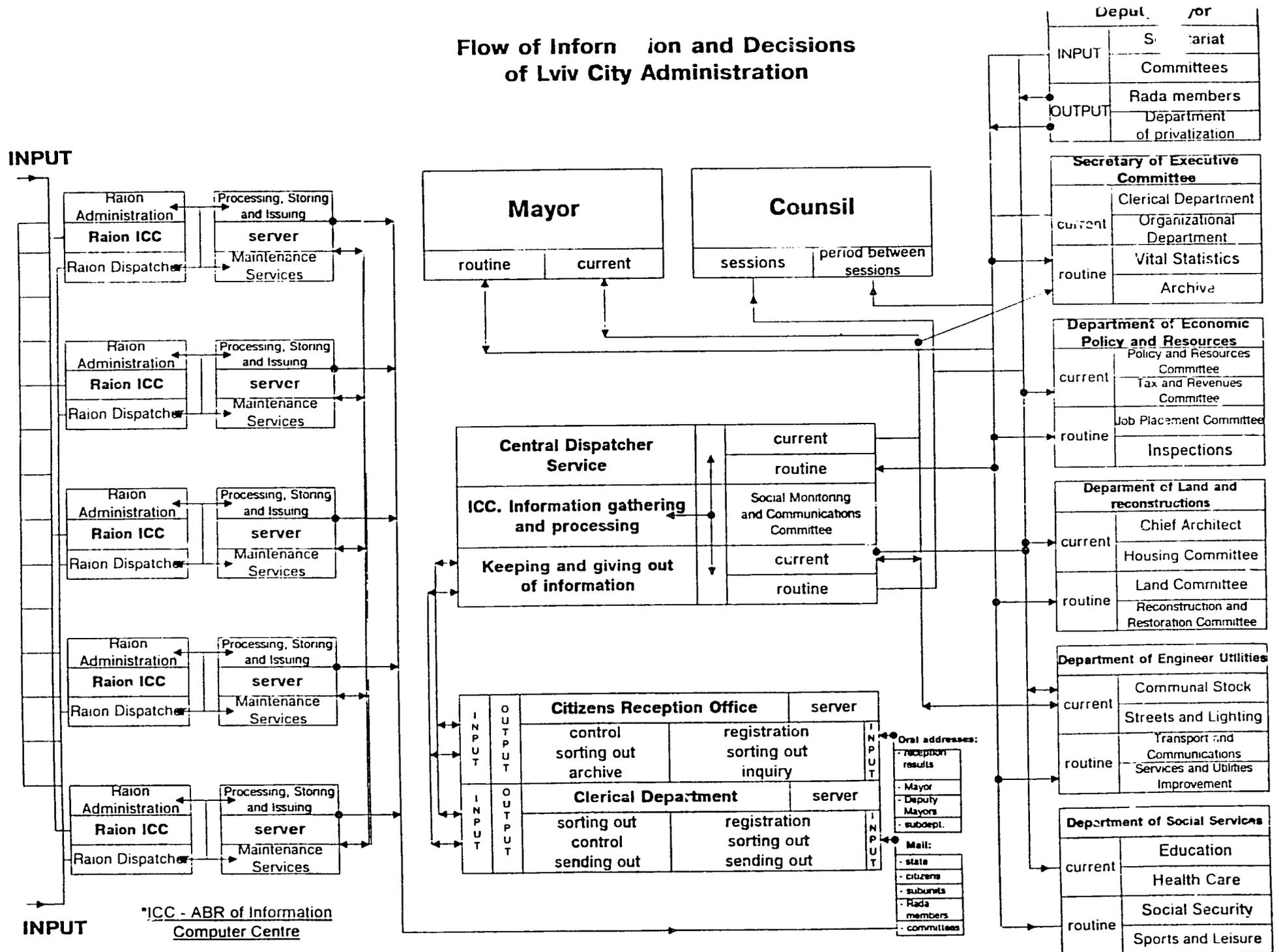
As an example in December 1993, after a six month study, the L'viv Polytechnic University submitted a report "Technical Task of the Creation of Integrated Informational Complex for the L'viv City Administration" covering 68 pages. This report was well done as a competent review of the city administration, at least that part of City Administration located in City hall. It is a good reference point, but in the relatively short span of 13 months since the date of the report, there are changes that have occurred which have an effect on the system needed for the conditions of today.

It is absolutely essential that everyone who will be involved in the system have an opportunity to offer suggestions about the development of the system. Unless that opportunity is offered, the chance of success becomes quite small. Accordingly, RTI has been working with groups of people from all segments of the City government to produce and flesh out a concept of the overall LIHS.

Concept

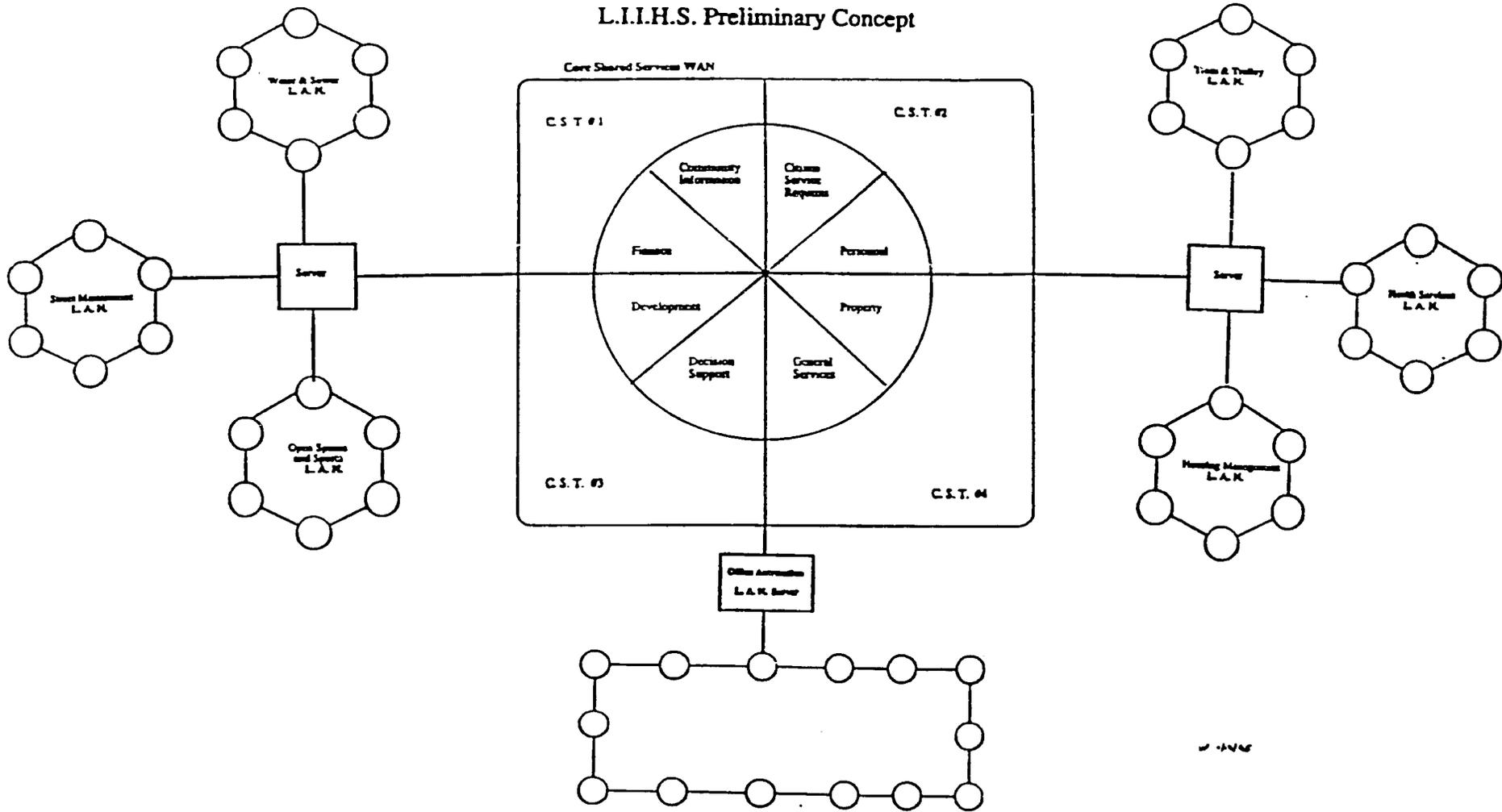
The concept of the LIHS consists of three elements; **Core** subsystems—those operations shared by all parts of the city government, **Satellite** subsystems—those operations which are the essence of a single part of city government, though shared on a need basis, **Platform** subsystems—the daily routines which can make the city government more efficient, effective, appropriate and transparent to the public. The Schematic Diagram I—Flow of Information and Decisions on the next page was prepared by Ivan Fediv, Secretary of the City Administration. Schematic Diagram II—LIHS Preliminary Concept is on the following page.

Flow of Information and Decisions of Lviv City Administration



*ICC - ABR of Information Computer Centre

L.I.H.S. Preliminary Concept



J-1006

City of Seattle

In outline, the 1995 portion of the LIHS represent two core subsystems and a satellite subsystem. These three subsystems will be interconnected between the central administration offices, four major department clusters, and five districts of the city. See Schematic Diagram III—Organization Chart L'viv City Administration on the following page, and Appendix I—List of Organizational Units, Showing Major Functions.

Resources Needed

The LIHS will require both human and material resources.

The human resources include:

People who understand the entire system, are capable of explaining it to others so that it may be used satisfactorily, and who can guide the implementation of additional aspects of the LIHS.

People who are able to create the data bank of necessary information

People who are able to use each of the portions of the LIHS to accomplish the intended results.

The human resources involve continual training and rejuvenation.

The material resources include:

1. An adequate power system to support the electrical equipment involved
2. A communication system for both voice and data which covers all the offices in the City Administration building and the essential emergency services
3. Printers, copiers and related reproduction equipment
4. Programs capable of manipulating the data involved in a way that will satisfy the aims of the program
5. The equipment capable of supporting the communication and data manipulation needs
6. A system of safeguarding persons and equipment from the danger of electric shock

Participation

The City will provide:

1. The outline of what is intended to be accomplished with the LIHS
2. Staff needed to input the data bank information
3. Staff needed to operate the LIHS
4. Staff needed to support and maintain the technical aspects of the LIHS
5. Material and supplies needed for the ongoing use of the LIHS
6. A budget for the acquisition of items not included in the original LIHS installation. At the beginning this will include furniture.

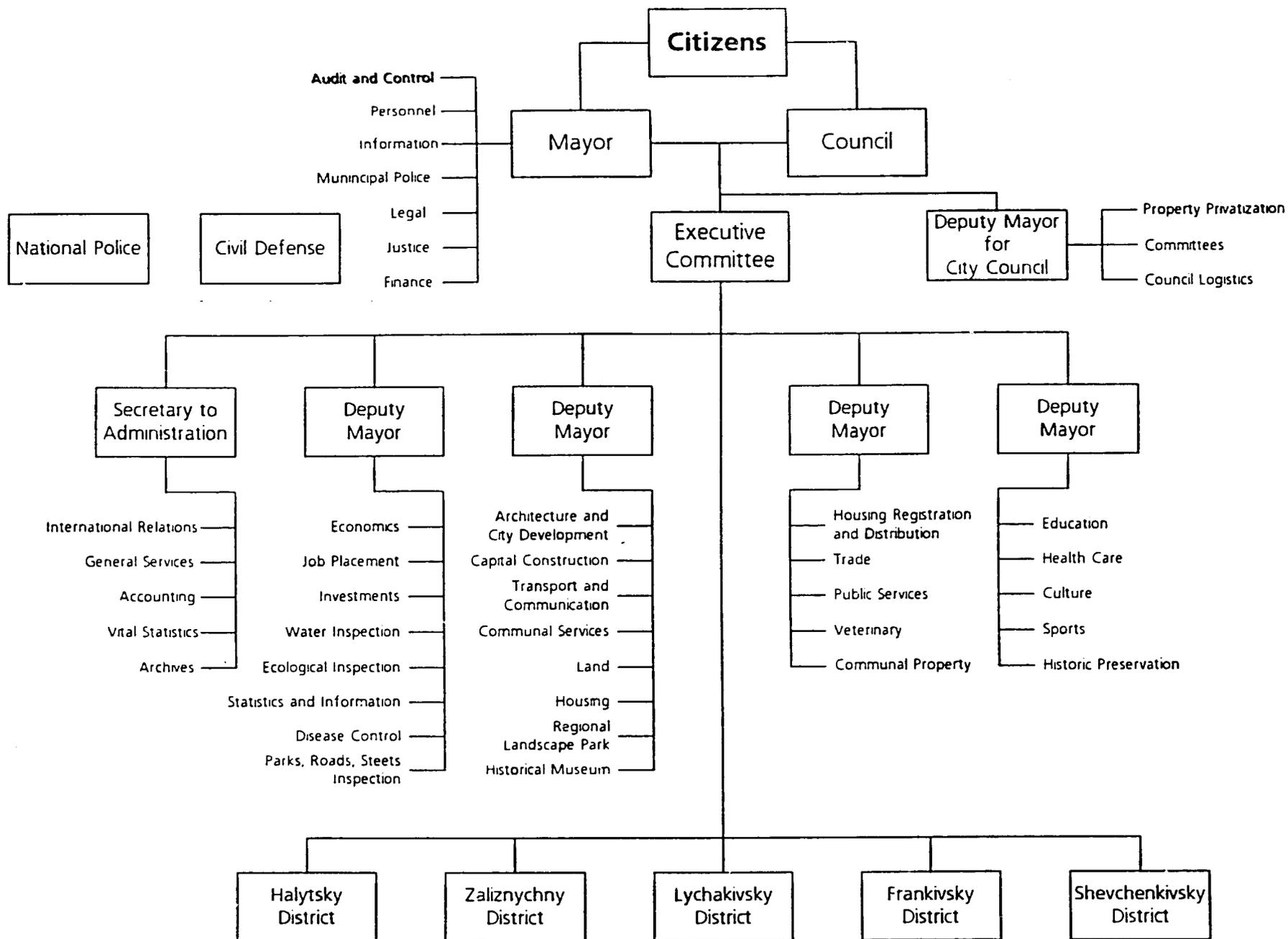
USAID/RTI will provide:

1. A budget from which certain basic equipment for the LIHS can be obtained
2. Technical assistance in developing the specifications for the LIHS
3. Basic training for City employees in the use of the LIHS
4. Basic documentation for the LIHS

In outline, the process in creating and implementing the LIHS includes:

Needs Assessment
Requirements
Specifications
Bid Process

Lviv City Administration



Present situation

The City of L'viv has had at least 114 computers, at least ~~100~~⁹¹ of which are active, installed in several locations over the last few years. The impetus for these installations has come, largely, from within the departments. The introduction of more equipment has been hampered by the lack of funds. The leadership of the various organization units presently using computers has been inventive in creating programs to solve existing process problems. This leadership is to be commended. The scientific and technical excellence for which L'viv is famous has made an obvious impact in many of the sectors of City Administration.

A list of the location of existing computer equipment and the functions for which this equipment is being used, is shown in Table I—Computer Equipment Presently Installed

Management Decision Process

All decisions are based on the availability of information, real or assumed, using information in the broadest possible sense. The more rational the people making the decision, the greater is the desire for information that is reliable. Part of the information process involves the availability of the information—information which exists but is not readily available at the time the decision must be made is the same as, or even worse than, no information at all.

The present city administration, just as the administration before it, feels hampered by the fact that most topics for which a decision is needed call for information which is not readily at hand. The decision makers know the information exists within the 11,874 person city organization, and that the information could be obtained, given enough time, but in today's world, that time is not available before the decision must be made.

Because a start has been made in automating certain records, such as the housing records of some housing management units, or certain accounting records of the Water Canal, it will be possible to make data from these beginnings available now (see the list of functions presently automated in Table I—Computer Equipment Presently Installed)

Citizen Initiated Service Concerns -Emergency Dispatch

There is no single dispatching service for emergency situations in L'viv. There is a housing emergency service that deals with maintenance problems occurring in citizens' apartments, like water leaks, sewer stoppages, roof leaks, etc. There are emergency fire, police, gas and ambulance services. Each of the utility services have their own emergency response systems.

All these services are equipped with different telephone numbers listed in the city telephone directory (numbers for fire, police, gas and ambulance are posted on most telephones used by the public). Each service has its own system for receiving calls from citizens and dispatching the required crews. Fire, police, gas and ambulance services use radio equipment to establish and maintain immediate connection with their crews. The housing emergency dispatching service and utilities use regular telephone lines for dispatching and the crews that are assigned to deal with any case use regular phone lines to report back to the dispatcher. Knowledgeable persons can reach a work crew directly, bypassing the dispatching service. The utilities can be contacted in two ways: direct telephone call to the gas service, or by call to the housing emergency dispatching service.

Accounting for all emergency calls that come in and measuring the performance of the many services in answering the calls is complicated. It is reasonable to assume that the resulting reports and statistics are subject to misinterpretation. It is obvious why there is no up-to-the-minute information for the City Administration

The structure for dealing with routine (non-emergency) citizen concerns is on a major department by major department basis. A concern expressed by a citizen and the resolution that is made by the city agency of any given concern, is recorded manually with a over-the-top non-detailed review.

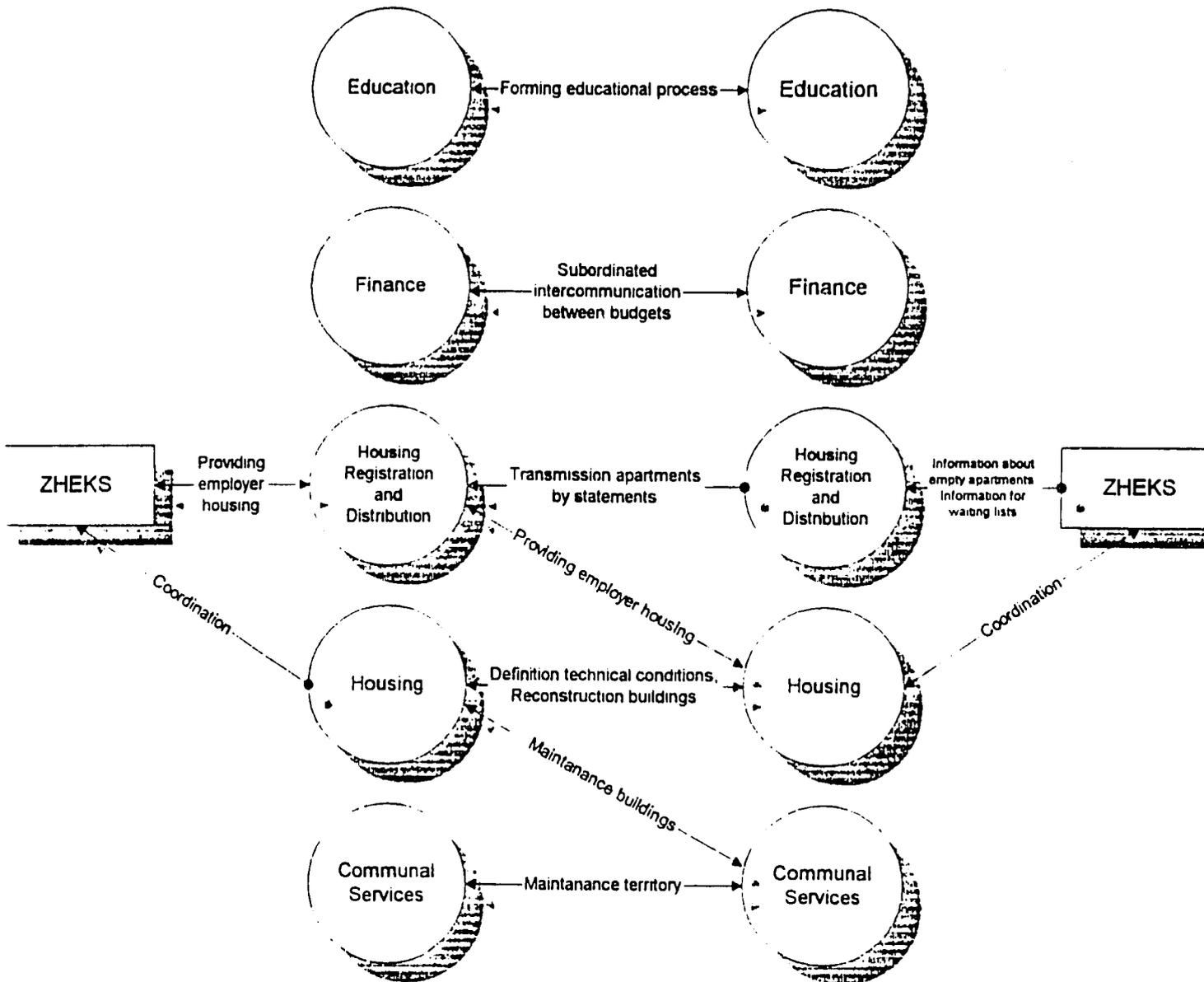
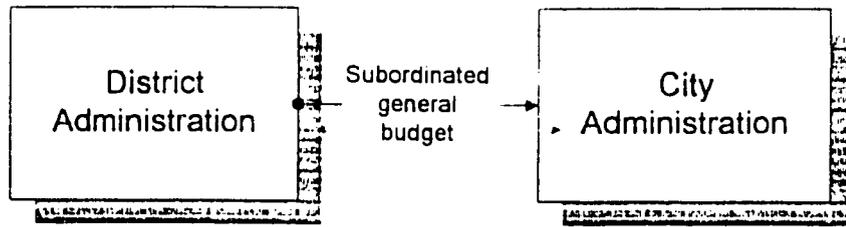
Housing

The city government has responsibility for the preponderant number of housing units in the city. It is only natural, therefore, that in times of stress all citizens look to the City Administration for relief from all problems involving housing, regardless of whether it is City housing or not. There is no uniform pattern to information on the housing stock, nor is there a uniform process whereby people qualify for a change in their housing occupancy situation. As a result there is large amounts of frustration on the part of the citizen with a housing problem and with the city official confronted with the problem of the citizen.

Further, the question of city involvement with housing will become more complex as the various forms of ownership of the housing will become more diverse with the City Administration, district administrations, housing management agencies, various companies, housing cooperatives, and privately held residences changing their importance.

The major actors in the City government involved with housing are the Housing Department, the Housing Registration and Distribution office and the Communal Services Department in the Central City Administration, the similar organization units in the five District City Administrations, and the 60 housing management organizations (formerly and still commonly known as Zheks) which relate both to the Central and District City Administration. See Schematic Diagram IV—Connections Between District Administration and City Administration on the next page.

Schematic Diagram V Connections Between District Administration and City Administration



Proposed situation

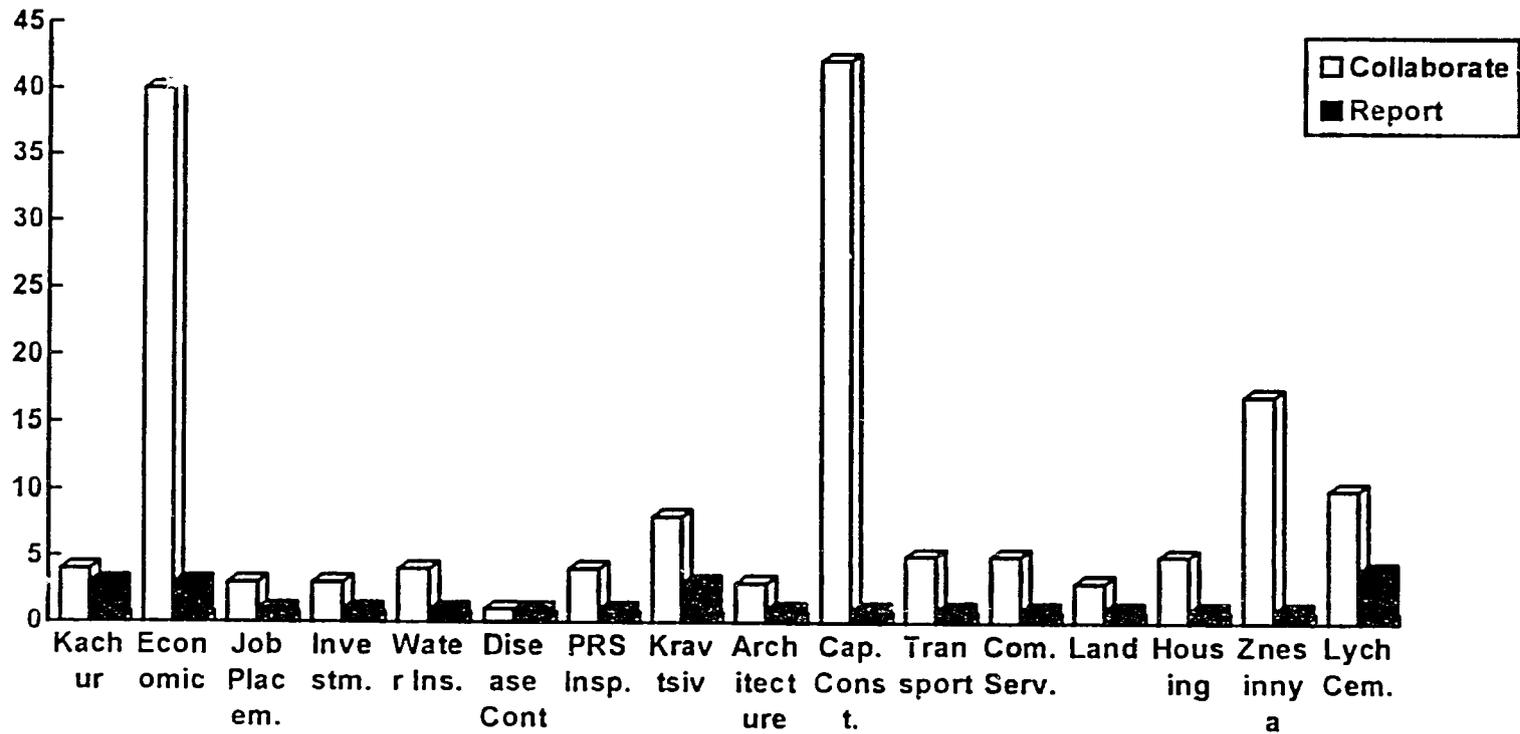
Management Decision Process (MDP)

Mayor Vasil Kuibida has indicated, as a general guide, that the following types of data would be helpful to him for the background necessary to deal intelligently with the problems that have come up in the first six months of his administration:

- Abnormal (emergency) situations in communal services
 - Summary of number, by type, by location
 - Summary of the persons assigned to deal with situation, by type
- Housing stock, commercial units, and vacant land
 - Data on units that need extraordinary maintenance, that should be rebuilt, that are so dilapidated they need to be destroyed
 - Units being privatized
 - Applicants for housing
 - Applicants for commercial space
 - Availability of building space and land
 - Improper use of land or buildings
- Economic information on business activity
 - Production levels
 - Production costs
 - Effect of current business activity on taxes
 - Effect of current business activity on utilities
 - How does production match demand (is enough bread being produced)
- Personnel, both city administration and city enterprises
 - Skills available
 - Skills not filled
- Finances
 - Revenue, actual versus budgeted
 - Expenditures, actual versus budgeted
 - Encumbrances and accruals that are real
 - Plans to deal with imbalances

The bar charts on the next following three pages (Chart I—Relation Between L'viv Departments) show the relative number of regular contacts to each organization unit from other organization units. They are based on the actual contacts identified by each organization unit. While the charts do not show the relative "value" nor frequency of the contacts for any one reporting pair, they do signal points where particular attention should be paid to improving the ease of communication.

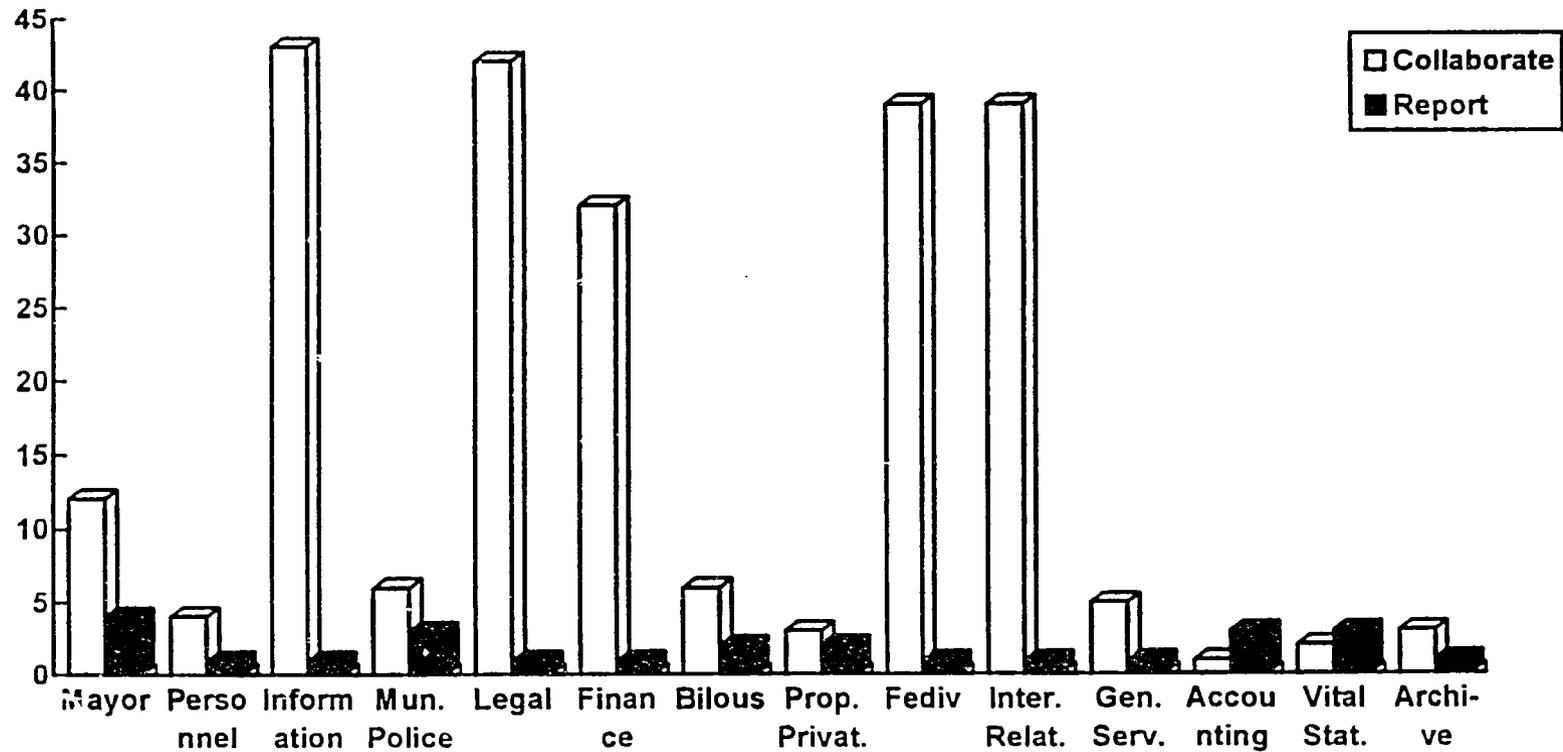
CHART 1.2. (following)
 Relations between departments
 of L'viv administration. Identification of the
 directions with major load.



- Kachur** - First Deputy Mayor
- Kravtsiv** - Deputy Mayor (construction)
- Znesinnya** - Landscape Park
- Lych. Cem.** - Historical Lychakiv Cementery

Note. The information for the chart is obtained by polling the city administration department employees.

CHART 1.1.
 Relations between departments
 of Lviv administration. Identification of the
 directions with major load.

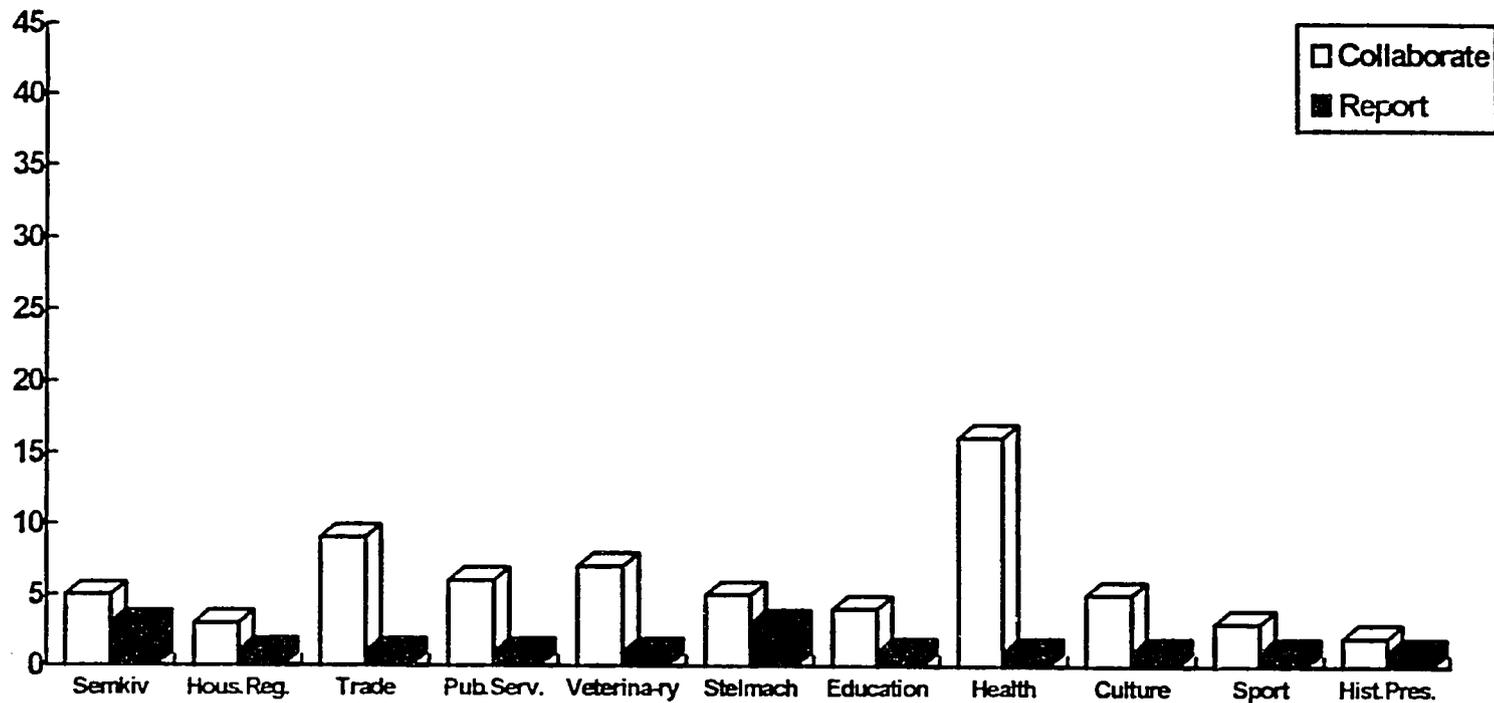


Bilous - Deputy Mayor of City Council

Fediv - Secretary of Administration

Note. The information for the chart is obtained by polling the city administration department employees.

CHART 1.3. (following)
 Relations between departments
 of L'viv administration. Identification of
 the directions with major load.



Semkiv - Deputy Mayor (housing)
 Stelmach - Deputy Mayor (education and culture)

Note. The information for the chart is obtained by polling the city administration department employees.

Central Emergency Dispatcher Service (CEDS)

As noted above as the first item under the MDP the City Administration sees the emergency dispatch operation as the most critical need in the internal operation of the City. To assure that citizens get a satisfactory resolution to their emergency situations, changes will be made quickly, starting with a simple process and moving toward more sophisticated arrangements. The first simple step has been taken already, with the urgent service phone line formerly ending on the Mayor's desk being moved to the Dispatcher.

Under the plan for the first stage, the fire, police (both national and city) and ambulance services will continue to rely on the phone lines from the public to their own dispatcher services, as will street lighting, street maintenance, and the district offices for electric distribution and heating.

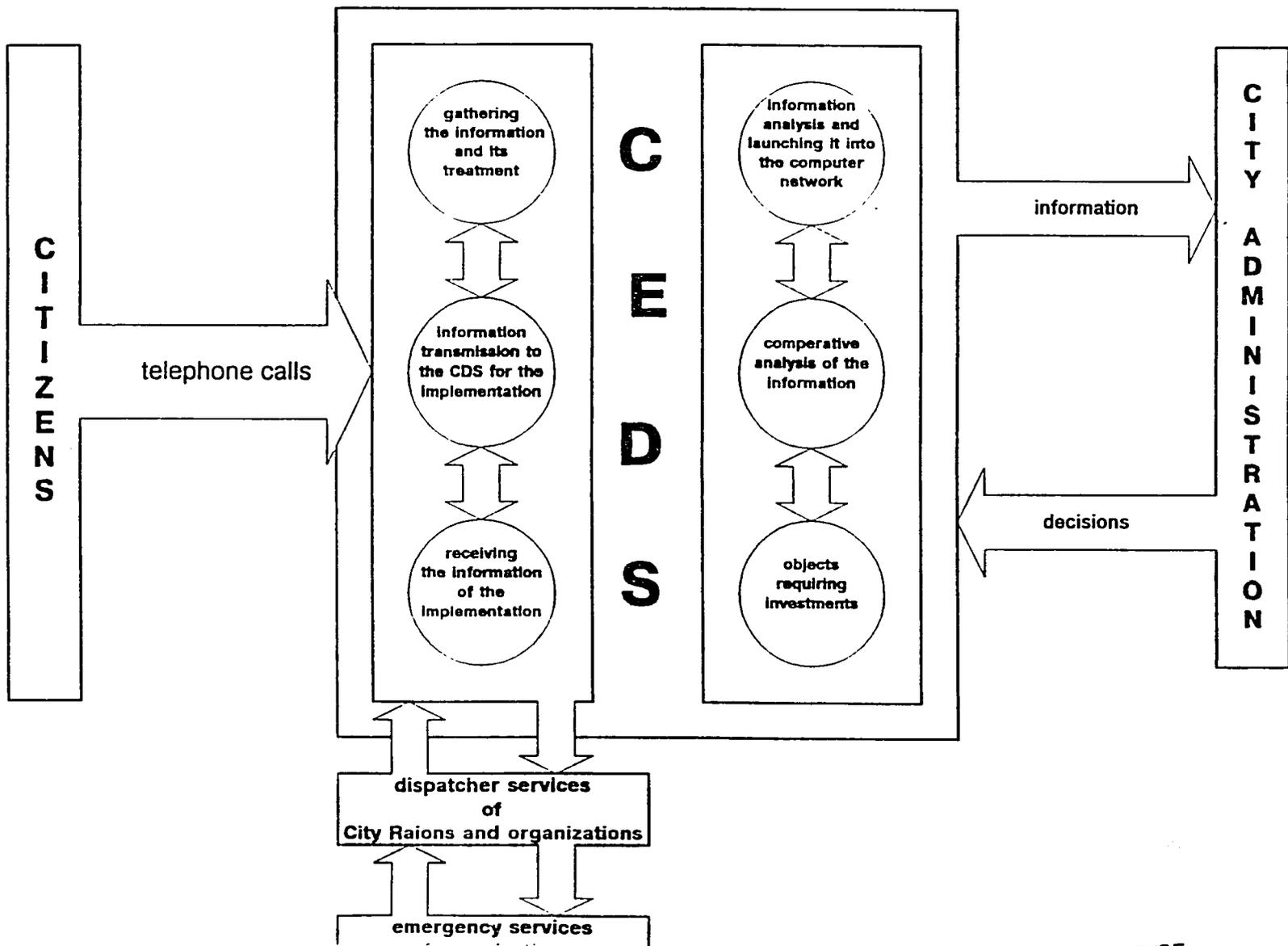
Public announcements will be made of a single number to call for the 14 emergency situations covered in the 1995 phase and listed in Table II—Emergency Dispatchers, Buildings and Offices to be Included in the Communication Network. The central dispatcher for these 14 services will to be located in the city hall. This central dispatcher will have a direct connection to the national police.

To begin the improvements the dispatcher service and the five district emergency offices will be equipped with facsimile machines.

As a second part of the 1995 phase, the central dispatcher office will be equipped with a two operator special panel telephone switch, answering and recording machines, and a computer. Upon receiving a call the dispatcher makes a decision which emergency service it is necessary to contact and does so by pressing a single button on the panel. The connection is established by the telephone switch using common or dedicated (which is preferable but not presently available from the telephone service) lines. The computer registers the phone number of the caller, the service contacted and the date and time of day. All the voice information is recorded by a tape recorder. Any additional information will be fed into the computer by the dispatcher. All the calls and the dispatcher's decisions (represented by phone numbers of the selected crews) will be recorded. The information will be used later for followup to the calling citizen, for monitoring performance of the emergency service, and for compiling statistics to help identify the causes and cures of problems.

The following two pages are Schematic Diagram VA—Concept of the Central Emergency Dispatch Service and Schematic Diagram VB—Organization of the Information Flow.

CENTRAL EMERGENCY DISPATCHER SERVICE (CEDS)



CENTRAL EMERGENCY DISPATCHER SERVICE (CEDS)

1-1 emergencies or damages in the buildings;
1-2 network damages (water, heating, electricity etc.);
1-3 warning signals about possible emergencies or damages;
1-4 proposals concerning improvement of the work.

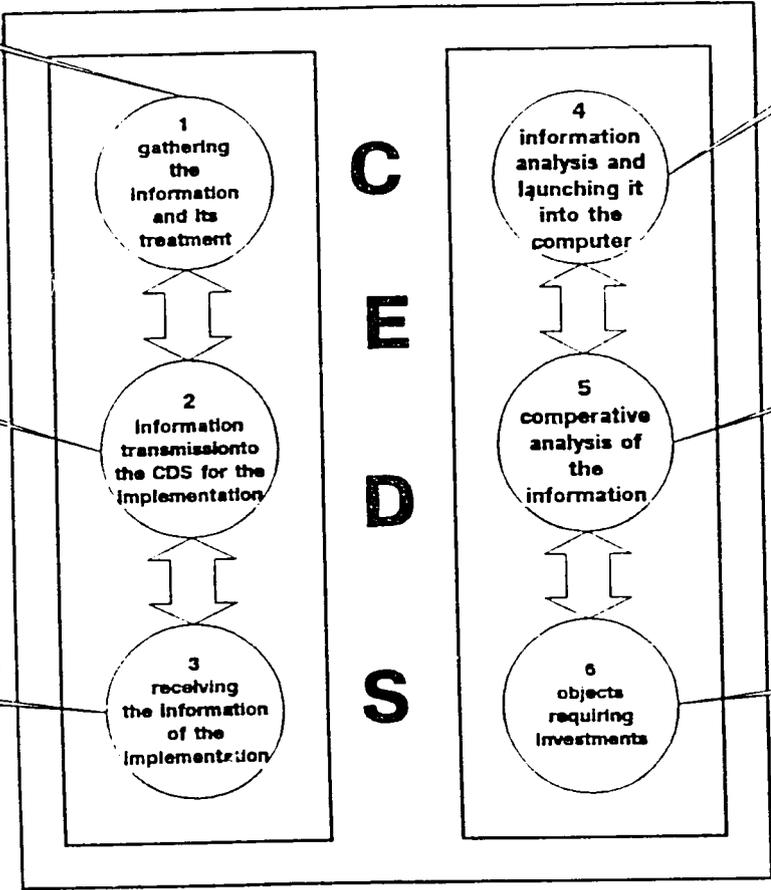
4-1 analysis according to the type of work and time it takes for implementation;
4-2 analysis according to amount of money spent (KRB);
4-3 amount of money spent per day, week, month.

2-1 transmission of the information to the specific organizations for implementation;
2-2 approval of the decision made.

5-1 analysis according to the type of work;
5-2 analysis according to the time it takes for implementation;
5-3 analysis according to the quality of work;
5-4 analysis according to the feedback from the citizens;
5-5 analysis according to the amount of money spent.

3-1 feedback to the user and his avaluation of the implementation process;
3-2 receiving the information from CDS; input into data bases;
3-3 supplying City Administration with the appropriate information.

6-1 to define the emergencies that are repeated at the same place more than twice;
6-2 to mark these places graphically on the map of the city;
6-3 to define how much money is spent per object.



Housing

The mission of this significant aspect of the LIHS is to provide the basic data needed by the City Administration, by the housing management agencies, and the people charged with operating the vast housing stock. Armed with good information, there is a better chance to keep the available housing well utilized and well maintained and to create new housing that will meet the needs of the citizens.

Housing subsidies formerly provided by the national government are being steadily withdrawn. The burden for paying for the development and operation of the housing stock is being shifted to the individual occupants of the housing, to the private sector, and to the city government. The LIHS will facilitate financial systems based on accurate data on cash flow, on expenditures, and on variations from financial plans. This in turn will permit a quality of operating and capital budgeting that will improve the housing situation from the standpoint of everyone.

When the system has been implemented some things are quite certain to be true. The housing inventory will be based on a standard arrangement so that summary information will be accurate in its meaning. Information on current receipts will be available, as well as statements of accounts receivable. Similarly, it will be possible to correlate information on expenditures with the size and condition of the housing stock. It will be possible to analyze where the greatest return can be obtained from any given expenditure of funds. The reliability of various types of building systems will become apparent and can be utilized in future construction. The cost of manipulating data, both in terms of length of time it takes and the number of person hours involved will be reduced. It will be possible to achieve a level of fairness in the assignment of available housing to people who have applied for that housing.

The implementation of the LIHS in the housing area will require, as in all areas, training of staff in the work to be done. Of lesser importance, though still important, will be the acquisition of suitable computers, telephone lines and copy equipment.

The identification of the various agencies involved in the management of the housing is shown in Appendix I—List of Organizational Units, Showing Major Functions, and Appendix II—Organization Charts of Various Major City Functions. The information flow between all the organization units involved is shown in Appendix III—Interrelationships Between Various Major City Functions.

Phasing of Work

The phases of the project over the next three years are as follows:

1 9 9 5

1995 - Dispatcher system for calls from citizens—Phase 1
Installation of facsimile machines in the city hall and district offices

1995 - Dispatcher system for calls from citizens—Phase 2
Installation of a telephone switch, dispatcher panel, computer and tape recorder equipment, connected with 14 emergency service centers by regular telephone lines.

Specifications to be developed
Telephone switch and dispatcher panel
Telephone lines
Computer
Tape recorder

1995 - Non-emergency assignments to deal with letters and visits from citizens

1995 - Creation of the housing stock data bank

1995 - Creation of the housing waiting list data bank

1995 - Interconnection between the central administration offices, four major department clusters, five districts of the city and the 60 building management organizations.

1995 - Making financial data available on the LIHS network

1995 - Learning process on the scope and use of the system

1 9 9 6

1996 - Dispatcher system for calls from citizens

Convert the system to dedicated lines.

Connecting the dispatcher panel computer to the city hall local area network.

1996 - Implementation of the network

1996 - Develop a plan to assure the safeguarding of data against deterioration of the recording media, and against loss of data as new software and hardware are introduced. See Appendix II—Ensuring the Longevity of Digital Documents, an article from the January 1995 issue of *Scientific American*.

1 9 9 7

1997 - Begin the process of implementing a geographic information system

What is involved in terms of people and processes

The planning for the people and processes to be involved in the LIHS has been confined to the phases contemplated in the 1995-1996 period. Subsequent extension of the LIHS to further parts of the City government will require additional detailed review and planning after the first phases are actively underway.

Each of the 1995-1996 phases will require a basic City staff involved in the management of the network, in providing user support, in making adjustments to the program, to provide continual training and retraining, and to spearhead the planning required for extensions to the LIHS.

Management Decision Process (MDP)

(Personnel and processes to be involved in providing suitable information from CEDS, Housing, Urban Economic Life, Personnel, and Finance to be developed)

Central Emergency Dispatcher Service (CEDS)

The personnel needed, and an outline of the processes in which the personnel will be involved are shown in Chart II—City Dispatcher Service on the following page (To be completed with city officials)

Housing

(Personnel and processes to be involved in Housing, Housing Registration (both Central and District), Communal Services and the Zheks to be developed)

		<p>3-3. Supplying City Administration with the appropriate information;</p> <p>3-4. Executors should be informed about the decision made.</p>		
4	<p>Information analysis (for 24 hours, week, month) and launching it into the computer network for the decision making by the City Administration.</p>	<p>4-1. Analysis according to the type of work and time it takes for implementation;</p> <p>4-2. Analysis according to amount of money spent (KRB.);</p> <p>4-3. Amount of money spent per day, week, month.</p>		
5	<p>Comparative analysis of the information for the different periods of time (24 hours, week, month) for evaluating the service activity.</p>	<p>5-1. Analysis according to the type of work;</p> <p>5-2. Analysis according to the time it takes for implementation;</p> <p>5-3. Analysis according to the quality of work;</p> <p>5-4. Analysis according to the feedback from the citizens;</p> <p>5-5. Analysis according to the amount of money spent.</p>		

	<p>Defining of the objects that are often repeated in the emergency situations, to include them into plans of work with investment allocation.</p>	<p>6-1. To define the emergencies that are repeated at the same place more than twice;</p> <p>6-2. To mark these places graphically on the map of the city;</p> <p>6-3. To define how much money is spent per object.</p>		
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* This column should be filled in by the City Administration.

In summary, the staff to carry out the 1995-1996 LIHS work will be as follows (to some extent, this staff will be drawn from existing city employees whose duties will be modified by the implementation of improved methods resulting from the study initiated by the LIHS.

Outline of Equipment and Programs Needed For the 1995 Phase

The City of L'viv has determined that the most important thing that can be accomplished for the City Administration is to improve the process whereby information can be used to help the citizens in their dealing with the City, and to help the City managers make decisions on both current operations and long term strategy. In this effort, the Administration is focusing on three things: the process for receiving citizen contacts, dealing with the substance of those contacts, and relating back to the citizens as far as the outcome of the City action; the way in which information is routed between decision makers in the City Administration; and the developing of a data base on the housing stock and applications for housing (which, as the landlord for 160,000 residential and 40,000 commercial units³, represents the largest single area of citizen and hence City Administration concern).

The major physical components of the LIHS include the following:

1. An adequate power system to support the electrical equipment involved
2. A communication system for both voice and data which covers all the offices in the City Administration building and the essential emergency services (PBX)
3. Printers, copiers and related reproduction equipment
4. Programs capable of manipulating the data involved in a way that will satisfy the aims of the program
5. The equipment capable of supporting the communication and data manipulation needs
6. A system of safeguarding persons and equipment from the danger of electric shock

The general performance specifications for the six major physical components

1. Power system

Each building must have enough reliable clean power to support the computer related equipment to be installed. See Table III—Additional Power Demand by the LIHS Equipment.

2. Communication system

The size of the system will be based on the following:

40 buildings to be covered: see Table II Emergency Dispatchers, Buildings, and Offices to be Included in the Communication Network for a detailed listing of locations

Number of telephone lines required:

1. In bound trunks _____
2. Out bound trunks _____

There are 270 separate individual telephone lines serving the City Administration offices, both in the City Hall and in other locations. These lines are to be consolidated within the PBX system. In addition, there are _____ locations of emergency response service centers which are to be served off the PBX.

Daily telephone calls (Average):

1. Inbound calls _____
2. Outbound calls _____

The network operating system needs approximately 1,200 meters of optical cable and four adaptors. However, the type of interconnection cable system (whether optical cable or twisted pair or other) will depend on further analysis, including the possibility of using the partially installed optical system (see Schematic Diagram VII—Conceptual Plan and Detail of Existing Cable System). Consideration to be given to the use of separate/combined wire systems for voice and data.

Equipment for the central operator telephone system (As per ATT, Motorola, Northern Telecom, or Panasonic)

Service characteristics of the system:

- Conference calls
- Direct dial
- Answering machine
- Remote recovery from the answer machine
- Call forwarding
- Recording conversations
- Identify calling number on incoming calls
- Commutation (changing) of direct channels for indefinite periods
- Touch Tone dialing
- Other?

Facsimile machines will be required in four offices, as follows:

High level

One in Room ____ Clerical Department

Standard level

- One in Room 208 Mayor
- Room 212A (Deputy Mayor)
- Room 212B (Deputy Mayor)
- Room 215 (Deputy Mayor)
- Room 217 (Deputy Mayor)
- Room 228 (Deputy Mayor)
- Room 206 (Secretary to the Administration)
- One in Room 301 General Services
- One in Room 206 International Relations
- One in Room 203(?) City Archives
- District Administration, first in the Dispatch Office, then moved to Clerical Offices
 - A. Frankivsky at Pushkin Street, 85
 - B. Shevchenkivsky at Lupynskiy Street, 11
 - C. Haleysky at Rynok Square, 1 (Room ____)
 - D. Lychakivsky at Levytskiy, 67
 - E. Zaliznychny at Vykovskiy, 34

3. Printing and Reproduction equipment

The following numbers of each type of equipment will be required:

- A. One copier—collating with capacity for 10 sets, multisheet feed, automatic feed, color
- B. Five copiers—collating with capacity for 10 sets, multisheet feed, automatic feed, black and white
- C. Fifteen copiers—single sheet manual feed, black and white
- D. Two copiers—single sheet manual feed, black and white, A3 paper format
- E. One laser printer—color
- F. Three laser printers—black and white
- G. One inkjet printer—color
- H. Four inkjet printers—black and white

- I. Three wide carriage printer (132 column) dot matrix printers, black and white
- J. Ten standard carriage printer (80 column) dot matrix printer, black and white

Details on location are shown in Table IV Location of Copy and Printer Equipment

4. Programs

All programs should:

- A. Have a user interface in the Ukrainian language
- B. Have a system of tracking the identity of the person entering the information into a data bank.
- C. Eliminate any games or other programmed activities not related to the business of the City Government.
- D. Include a statement of the disk space (both storage and operating disk) required by the program intended to respond to the needs enumerated below.
- E. Provide for licensing of the use of the program on a total site basis, or a basis greater than single machines.

Programs offered should provide for the following kinds of information to be entered into the system.

A. Calls and other personal contacts from citizens:

1. Emergency calls The process will be to collect and record the necessary information; notify, by means of voice phone, fax transmission or relay through computer, the appropriate action center of the problem; act upon the problem; report and record the action taken; notify the citizen of the action taken and advise them to make further contact if a problem still continues; prepare statistical information on calls received and action taken. Potential Entries for 10,000 calls per year will require 21,080,000 bits of storage space. See Table V—Detailed Information Needed to Respond To and Monitor Emergency Calls.

2. Non emergency contacts. The process will be to collect and record the necessary information; notify, by means of fax transmission or relay through computer, the appropriate action center of the problem; act upon the problem; report and record the action taken; notify the citizen of the action taken and advise him/her to make further contact if a problem still continues; prepare statistical information on calls received and action taken. Potential Entries for 12,400 calls per year (10,000 personal letters with or without visits and 2,400 telephone calls) would require 26,139,200 bits of storage space. See Table VI—Detailed Information Needed to Respond To and Monitor Non-Emergency Calls.

B. Inventory of the housing stock and commercial space

There are 200,000 units of useable space in 60 Zheks. Each of the 160,000 housing units will have data entered into the system in 79 fields, providing for 55,360,000 spaces of information. Each of the 40,000 commercial units will have data entered into the system in 62 fields, providing for 13,240,000 spaces of information. ~~The next page is Schematic Diagram V Connections For Housing Information Between District Administration, Zheks and City Administration.~~ See Table VII—Detailed Information Needed For the Inventory of Housing and Commercial Space.

C. Maintaining the list of applicants for housing

There are 20,000 applicants for State housing, and 12,000 applicants for Cooperative housing. There are an estimated 4,000 persons who are on both lists. Applicants will have data entered into the system in 46 fields, providing for 18,609,000 spaces of information. An estimated 30 megabytes is required for this data base. See Table VIII—Detailed Information on the Data Bank For Applicants for Housing.

D. Financial data (this area must yet be explored in detail)

Revenue, actual versus budgeted

Expenditures, actual versus budgeted
Encumbrances and accruals that are real
Plans to deal with imbalances

E. Data on City employees

There are 402 employees in City Hall, 442 city administration employees housed away from City Hall, 418 employees in the operations of the five districts, and 10,612 employees based elsewhere, for a total of 11,874 employees.⁴ Each employee will have data entered into the system in 28 fields, providing for 10,057,278 spaces of information. See Table IX—Detailed Information on the Data Bank For City Personnel

F. For making decisions

The information available in items A through E must be available to the Mayor and the primary assistants to the Mayor to enable them to make operating decisions on a daily basis. To permit ready transferability between work sites, programs needed for each work site are to be standard with other similar programs elsewhere in the city government. These programs should include the following areas (with potential standard programs—latest versions—indicated the list is not intended to be exclusive, but illustrative):

- Word Processing -- Microsoft Word, Word Perfect
- Spread Sheet -- Excel, Lotus, Quattropro
- Data Base -- Foxpro, Quattropro
- Calendar organizer -- Lotus
- Presentation Graphics -- Freelance, Power Point
- Communication -- TCP/Connect II for Windows
- Diagnostic for hardware and software problems -- Norton
- General System Utilities -- Norton
- Packages -- Microsoft Office (containing Excel, Power Point, Word), DEC LinkWorks, MultiTYPE!, Oracle

It will be necessary to determine whether there should be connections with the Internet, the Freenet, or the legislative service for the supreme rada actions. At a minimum, modem connections outside the city government should be made possible for Room 209 (Mayor), Rooms 212A, 212B, 215, 217, 228 (Deputy Mayors), and Room 206 (Secretary to the Administration). It is intended that all computers within the city government should be able to communicate with one another.

5. Equipment

The equipment for data processing shall be of sufficient storage and operating disk space to provide twice the capacity required for the data bases and activities outlined in 4) above. The equipment suggested is as follows:

A. Electronic Data Processing

- One basic large scale server (see server specifications)
- ___ Desktop machines for resource intensive applications capable of being a large network server (see specifications for System 1)
- ___ Desktop machines for resource intensive applications capable of being a small network server (see specifications for System 2)
- ___ Desktop machines for general purpose use (see specifications for System 3)

B. Shall be installed in the following offices, according to the following configuration

- Room 209 (Mayor) ___ System ___
- Rooms 212A, 212B, 215, 217, 228 (Deputy Mayors) ___ System ___
- Room 206 (Secretary to the Administration) ___ System ___
- Room 327 (Data Processing Office) ___ System ___

Room 341 (Housing Registration Office) one System Two
Room 341 (Housing Registration Office) three System Three
Room 117 (Hearing room used for citizen visits) ___ System ___

Continue on as these are established

C. Modems

All computers in the city service shall be equipped to communicate with one another.

In addition, the following computers shall be equipped to utilize the Internet:

Room 209 (Mayor)
Rooms 212A (Deputy Mayor)
Rooms 212B (Deputy Mayor)
Rooms 215 (Deputy Mayor)
Rooms 217 (Deputy Mayor)
Rooms 228 (Deputy Mayor)
Room 206 (Secretary to the Administration)
Room 206 (International Relations Department)

6. Grounding Electric Circuits

Safeguarding persons and equipment from electric shock -- The following is the essence of Gordon Cressman comments on Grounding (919) 541-6363 <GMC%SSIDW1@RCC.RTI.ORG>
Date: Wed, 29 Sep 1994 15:54:24

Regarding the grounding issue:

You can live for some time without the ground, but serious problems may occur later.

What follows are some of the basic principles of computer system grounding. Most are routinely violated. As far as safety concerned, grounding is insurance; it's value depends on your level of risk tolerance.

Basically, grounding to prevent data signal disruption is an operational issue. The requirements are somewhat different then those required strictly to protect people. If electrical noise and unwanted ground loops do occur because of improper grounding, data transmissions can be disrupted to the point that performance is degraded significantly.

Grounding serves two purposes. First, it protects users from AC short circuits, such as those that occur when a power supply shorts against the case. If a ground is properly installed, and if the computer is properly connected to the ground, this will immediately cause the circuit breaker to activate. A properly installed ground is tied to the neutral at the service entrance or the closest transformer secondary. To complete the circuit, the neutral must be tied to an earth ground at this point. Finally, a circuit breaker or fuse must be installed on the hot line side of the circuit. Failure to follow these basic rules can result in electrocution.

The second purpose of grounding is to eliminate noise and unwanted current loops on data cables. Noise and ground current loops travelling through data cables can disrupt data transmissions, significantly affecting performance. Differences in voltage potential between ungrounded components and components not on the same ground circuit can also result in damaging static discharges. All equipment interconnected by data transmission cables (copper) should be connected to the same ground circuit. If the grounding wire is long, as it is in the L'viv Gorispolcom, it may also be necessary to interconnect components, such as the computer, display, local printer, etc., with grounding straps. This will prevent ground loops through the signal cables that interconnect these components.

The best solution here is to place a separately derived power source near each workstation. This can be an isolation transformer or a UPS containing one. The computer, display, and peripherals can then be connected to the ground circuit that is connected to the neutral line, which is connected to the transformer or UPS, that is connected to an earth ground at that point.

Separate network workstations will probably be far enough apart that the impedance of the ground cable will be lower than the impedance of the network cable between the workstations. This is important. Finally, network cables should be connected to the ground circuit at both ends.

Therefore, we should specify an isolation transformer or a UPS to be used between the computer and the wall receptacle. If we also specify a receptacle strip, the strip can be used as the receptacle for a cluster of computers, printers, or other peripherals.

- _____ UPS units
- _____ Isolation transformers
- _____ receptacle strips

SPECIFICATIONS
OF THE SERVER

RAM 16 MB (extension to 384 MB)
SRAM cache 128/256 KB
Controller FAST SCSI - 2
Two channels, control. IDE
controller FDD 82077SL
Graphic Card WD90c31 512 KB
8 slots 32 bit EISA Bus Master
ports: 2xRS232
9 pins
1xCentronics 25 pins
1xMouse (PS/2)
1xKeyboard (PS/2)
FDD 1.44 MB 3.5"
Keyboard 101
Streamer Panther 250 SI
Max 5 HDDs (5x2.1 GB)
Monitor mono

What function?

L'VIV MFM LIHS PROJECT SPECIFICATIONS

ITEM	Computers		
	Desktop/Server SYSTEM 1	Desktop SYSTEM 2	Desktop SYSTEM 3
CPU	INTEL PENTIUM	INTEL 486DX2	INTEL 486DX
CLOCK SPEED	66MHz	66MHz	33MHz
SRAM CACHE	256KB,15ns	128KB,15ns	-
RAM	6MB, 70ns	16MB, 70ns	8MB, 70ns
MAX RAM ON BOARD	128MB	64MB	32MB
FDRIVE 1	1.44MB 3.5"	1.44MB 3.5"	1.44MB 3.5"
FDRIVE 2	1.2MB 5.25"	1.2MB 5.25"	-
CDROM	DBL SPEED CDROM	DBL SPEED CDROM	-
TAPE BKUP	250MB .25" internal	250MB .25" internal	-
HARD DRIVE	540MB IDE,13ms access	540MB IDE,13ms access	540MB IDE,13ms access
HDRIVE CACHE	128K	128K	128K
GRAPHICS VIDEO TYPE	PCI local bus	PCI local bus	PCI local bus
GRAPHICS RAM	2MB	1 MB	1MB
MONITOR	17" 1024 NI color	15" 1024 NI color	14" 1024 NI color
CASE TYPE	Tower	Desktop	Desktop
AVAIL SLOTS STD CONFIG	5 16-bit 2 PCI	6 16bit 1 PCI	5 16-bit 2 PCI
BAYS AVAIL	5 total half height	4 total half height	2 total half height
POWER SUPPLY	300 watt	300 watt	300 watt
PORTS	1 P, 2 S	1 P, 2 S	1 P, 2 S
KEYBOARD	101 key	101 key	101 key
NETWORK CARD	16 bit Ethernet 10Base2	16 bit Ethernet 10Base2	16 bit Ethernet 10Base2
MOUSE	Microsoft or compatible	Microsoft or compatible	Microsoft or compatible
OS	MS-DOS 6.x & WFW 311	MS-DOS 6.x & WFW 311	MS-DOS 6.x & WFW 311
UPS	600VA, 10 min	600VA, 10 min	400VA, 10 min
Internal FAX/DATA Modem	14Kb, V.42bis/MNP 5 DC	-	-

PRINTER SPECIFICATIONS

PRINTER TYPE	NUMBER	CHARACTERISTICS (Minimum Specifications)
LASER PRINTER	P1	8 pgs/m, 600 X 600 dpi, Ethernet interface, 6 MB RAM
DOT MATRIX	P2	Wide carriage, 24 pin, Cyrillic Fonts, 32K down load RAM, 300 chr/sec @ 10pt draft bottom, rear load tractor, paper parking
DOT MATRIX	P3	Narrow carriage, 24 pin, Cyrillic fonts, 32K down load RAM, 240 characters/sec @ 10pt draft, paper parking
COLOR INK JET	P4	300x300dpi, narrow carriage
BLACK INK JET	P5	300x300dpi, narrow carriage

SCANNERS

Equipment offered shall be TWAIN compliant.

Equipment shall be flat bed, capable of scanning sheets up to 24cm by 37cm

Latest release software for driving the output to the computer, for image editing, and for optical character recognition shall be included. Such software shall perform at 250 words per minute with an error of no more than two errors per page for clear print.

It shall be possible to scan at at least a 300x300dpi scale.

FACSIMILE MACHINES

Equipment offered shall be a desktop facsimile transceiver of the CCITT Group 3.

Modem speed shall be up to 9600, with an automatic fallback.

Equipment shall be capable of taking input documents of 145 mm up to 216 mm, with a printing width of 208 mm on thermal paper, at a horizontal resolution of 8 pels/mm and a vertical standard of 3.85 lines/mm.

There shall be an automatic paper cutter.

The telephone dialing shall have 20 stations for one touch dialing and 20 additional stations with two button dialing. there shall be a provision for automatic redialing, and automatic answer after no rings.

COPIERS

MODEMS

UPGRADING RANDOM ACCESS MEMORIES

UPGRADING HARD DISK DRIVES

UNINTERRUPTIBLE POWER SYSTEMS

SUPPLIES

Paper

- Facsimile Machine paper roll, thermal, 216 mm wide, either 30 or 50 m long
- Copier
- Ink jet printer
- Laser printer
- Tractor driven
- Dot matrix

Printing media

- Plain paper facsimile
- Copier
- Ink jet printer ink shall be HP 51626A or equal to use with the printer offered
- Laser printer
- Ribbons for dot matrix printers shall be cloth carriers, automatic reversing, reloadable cases

Other to be specified and enumerated

Benefit of proposal

- To citizens
 - Change in city budget
 - Change in time involved

The implementation of the LIHS in the Housing Registration and Distribution Department will provide an opportunity for citizens to see the facts in their case, to point out inaccuracies, and to receive answers to their applications in less time than now. Applicants will for new housing will be able to occupy housing for which they are approved in less time.

To City Administration

- Change in cost

The implementation of the LIHS in the Housing Registration and Distribution Department will reduce the personnel cost per transaction because of a reduction in the amount of time necessary to research and verify the facts in each case. Further, because of the reduced time in processing applications, the length of time that an apartment will stand idle will be shorter and the cash flow of rent into the city will be larger.

The implementation of the LIHS in the Housing Department will reduce the cost of research necessary to prepare plans on the construction and reconstruction of buildings.

- Change in staffing

- Change in time involved

The implementation of the LIHS in the Housing Registration and Distribution Department will permit the Department personnel to make decisions based on factual information which is detailed, objective, and readily available.

The implementation of the LIHS in the Housing Department will reduce the staff time necessary to research and verify the physical conditions of the buildings.

Potential Budget for the LIHS

See Table X—Potential Budget for the LIHS

Potential Operating Costs for the LIHS

See Table XI—Potential Operating Costs for the LIHS

Municipal Finance and Management Project

L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Tables

~~From the Housing Registration estimates~~

1 *Data from 12/14/94 report of Ivan Fediv on Information Flow*

2 *Data from Housing Registration Department*

3 *Estimate of the Department of Housing Registration*

4 *Estimate of the Personnel Department*

Table I
 Computer Equipment Presently Installed
 (N by room number means network socket exists. See Schematic Diagram VI—
 Conceptual Plan and Detail of Existing Cable System)

<u>Location</u>	<u>Type/HD/RAM</u>	<u>Uses Being Made Of The Equipment</u>
Accounting #214N	8086/30/740K	Not used
Architecture & Constr.#409N	386sx/80/2M	Computers in boxes
City Secretary 206BN	386sx/40/2M	Word processing
Communal Property	386/120/4M 286/40/1M 486/210/4M	Word processing Accounting Software development, training
Communal Services #415N	386/80/2M	Inactive
Construction	8086/20/640K 8086/20/640K	Spread sheets, planning and accounting, word processing
Culture #321N		
Ecology Inspection	386sx/80/2M	Data base on ecology
Economy #102N	386/120/4M 386sx/80/2M 386sx/40/1M	Spread sheets Ecology, spread sheets, word processing Inoperative
Deputy Mayor #212AN		
Deputy Mayor #212BN		
Deputy Mayor #216N	386sx/40/2M	Inactive
Deputy Mayor #217N	386sx/40/2M	Word processing
Deputy Mayor #228M		
Finance #310N	386sx/40/1M 386sx/80/2M 8086/30/740K	Accounting Budget reports, check writing, payroll calculation Salary, income, personnel, warehouses
Frankivsky District		
Socio-Economic Dev	486sx/203/8M	Data base "Register" from city
General	486sx/203/8M	Inactive
Housing Privatization	386sx/60/1M 286	Data base "Galich" housing privatization
Social Security	8086/30/640K	Inoperative belongs to Zhek #205
General Service		
Archives #203	486sx/130/8M	Word processing, Visio
#438	386sx/80/2M 386	Inactive Inactive

Halytsky District		
Accounting	286/50/1M	Accounting
Legal	386dx/130/4M	Legislation
Finance	386/260/4M	"Income" banking software
Housing Privatization	Amstrad	Inactive
Education	486dx/130/4M	Inactive
Health Care #312N	286/40/1M	Spread sheets, word processing, medical statistics
# 315	286/40/1M	
Historic Preservation	286/243/640K	Accounting, word processing, data base of historic buildings
Housing #419N	386sx/80/2M	Inactive
Housing Privatization #102	386sx/40/2M	Word processing, data base on privatization
Housing Registration and Allocation #111N	386sx/120/1M	Housing queue
# 114A	286sx/40/1M	Housing queue
	286sx/40/1M	Housing queue
# 337N	286/40/1M	Data base of laws, word processing, housing allocation between Zheks
# 106	8086/20/512K	
Information #331	386sx/80/2M	Word processing
# 328N		Future home of server
# 331N		
# 327	386dx/130/4M	Data base of current legislation, e-mail
# 327	486dx/510/8M	Server, software approbation
International Relations		
# 206AM	386sx/40/2M	Word processing
# 210M	386sx/80/2M	Word processing
Legal #344N	286sx/80/1M	Data base of Current Legislation
Lychakivsky District		
Head of Exec Committee	386dx/400/8M	Inactive
Education	286/30/1M	Inoperative
	286	Inactive
Housing	386sx/100/2M	Data base on housing queue at enterprises
Accounting	386dx	Inactive
Mayor #209N	386sx/40/2M	Inactive
New Business Registration	386sx/80/2M	Data base using Register and FoxPro; used in the raions
Park and Street Inspection	386dx/130/4 M	Air pollution, transportation, word processing and data bases, construction planning, reports on existing shops, automated secretary's office
	386dx/130/4 M	

	8086	Inoperative
Personnel #215N	8086/20/540K	Inoperative
Privatization	486sx/80/4	Word processing, accounting
Shevchenkivsky District		
Finance	386dx/83/4M	Data base on payments to state budget
	286/41/1M	Local budget income and expense
Socio-Economic Dev	286/41/2M	Data base of welfare payments
	286/41/2M	Salaries for employees
Housing	386sx/210/4M	Software development
Housing Privatization	386dx/210/4M	Housing Privatization
	286/41/640K	Housing Privatization
Training #330	386sx/40/2M	Word processing
Water Canal	386sx/125/2M	Accounting ledgers
	386sx/125/2M	Accounting ledgers
	286/44/1M	Operation and Maintenance
	286/78/1M	Operation and Maintenance
	386sx/125/2M	Payroll, Personnel
	286/44/1M	Payroll, Personnel
	286/44/1M	Payroll, Personnel
	286/44/1M	Payroll, Personnel
	386dx/120/4M	Water Sales
	386dx/120/4M	Water Sales
	286/44/1M	Water Sales
	386dx/240/4M	Water Sales
	386/42/1M	Water Supply
	286/42/1M	Water Supply
	XT/20/640K	Water Supply
Water Inspection (all are LAN connected)	386sx/20/2M	Reports, data base of water users
	8086/20/640K	Bonus calculation
	8086/20/640K	Word processing of complaints and orders
	286sx/20/1M	Accounting
	386sx/130/2M	CAD, housing data base
Zaliznychny District		
Manager	386sx/120/1M	Data base on legislation
Finance	386/78/3.5M	Income and expense
	386/167/3.5M	Taxation
Education	286/40/1M	Reports, accounting
	286/40/1M	Reports, accounting
	8086	?
Zheks*		
Halytsky District		
102	286/40/1M	
110	286/40/1M	

Zaliznychny District

300 286/40/?
 301 286/40/?
 302 286/40/?
 303 286/40/640K
 304 286/40/?
 305 286/40/640K
 306 286/40/640K
 307 286/40/?
 308 286/40/?
 309 286/40/1M

Shevchenkivsky District

400 286/40/1M
 401 286/40/?/ Inactive
 402 286/40/?/ Inactive
 404 286/40/1M Inactive
 405 286/40/1M
 406 286/40/?
 407 286/40/?
 408 286/40/? Inactive
 409 286/40/?
 410 XT/20/640K/360/1.2 Inactive

Lychakivsky District

503 286/40/?
 506 286/40/?

* Each of the computers listed (except for 410) have 1.2.M slot for 5.25" and 1.44 M slot for 3.5" disks

Summary of Computer Equipment Installed

<u>Model</u>	<u>Total</u>	<u>Inactive</u>	<u>Inoperative</u>	<u>In Use</u>
486	7	2	0	5
386	46	8	1	37
286	49	1	1	47
086	10	1	2	7
XT	2	1		1
Total	117	13	4	96

Findings: 086 computers are not capable of being networked: the Random Access Memory of the other computers should be increased to 4Mb in order to be able to use modern software.

Source: Comments and data assembled as of March 1994 by Ihor Forykevich, Deputy Department Head, Information, except for Waterkanal (assembled by Kostyantyn Trachenko of RTI/MFM staff) and for Zheks (assembled by Luybov Lyubianetska and Yuri Sinitsky of RTI/MFM staff)

Table II
Emergency Dispatchers, Buildings, and Offices to be Included in the Communication Network

<u>Building and Address</u>	<u>Phone Lines</u> <u>Present</u> <u>Desired</u>
Early Connections	
Rynok Square,1 (City Administration Building)	
Room 209 (Mayor)	
Rooms 212A (Deputy Mayor)	
Rooms 212B (Deputy Mayor)	
Rooms 215 (Deputy Mayor)	
Rooms 217 (Deputy Mayor)	
Rooms 228 (Deputy Mayor)	
Room 206 (Secretary to the Administration)	
District Administration Offices	
A. Frankivsky at Pushkin Street, 85	
B. Shevchenkivsky at Lypynskiy Street, 11	
C. Haletsky at Rynok Square, 1 (Room 1)	
D. Lychakivsky at Levytskyi, 67	
E. Zaliznychny at Vyhovskiy, 34	
Emergency Dispatch Offices—Phase 1	
Civil Defense, Stefanyka, 4	
Electric Distribution (Central Office), Buyka, 16	
Electric Transportation, I. Ukraynka, 5	
Elevator Service, F.Least, 2	
Gas, Zolota Street, 42	
Heating, Tyktora Street, 2a	
Housing, Pushkina Street, 58a	
Police, S. Bandera, 1	
Water/Sewer, Zelena Street, 64	
Later Connections	
City Administration Offices (not in City Hall)	
Education Department, Rynok Square, 9	
City Vital Statistics, Kopernik Street, 15	
City Archives, Doroshenko Street, 23	
Enterprises Registration, Valova Street,2	
Historical Environment Preservation, Valova Street, 20	
Privatization and Communal Property, Halystska Square, 15	
Transportation and Communication Sitchovykh Strilciv Street, 12	
Water Supply Inspection , Rynok Square, 42	
Emergency Dispatch Offices	
City Police, Svoboda Square, 24	
Electric Distribution (Subdivision Office), Siyvo, 10	
Heating (East end of City), Kozelnytska, 5	
Heating (North end of City), Sylikkatna, 125	
Heating (North end of City), Vyletcka	
Heating (Zaliznychny District), S. Petlupa, 4a	
Street Lighting, Doroshenka Street, 30	
Street Maintenance-1339, Pasyky Galytsky, 7	

Administration-City Hall

Mayor

**Audit and Control
Personnel
Information
Legal
Justice
Finance**

Council

Deputy for City Council

**Committees
Council Logistics**

Executive Committee

Secretary to Administration

**International Relations
General Services
Accounting**

Deputy Mayor

**Economics
Investments**

Deputy Mayor

**Architecture and City Development
Communal Services
Land
Housing**

+ 3

Deputy Mayor

**Housing Registration and Distribution
Trade**

Deputy Mayor

**Health Care
Culture**

Administration-Out of City Hall

Mayor

Municipal Police

Council

Deputy for City Council

Property Privatization

Secretary to Administration

**Vital Statistics
Archives**

Deputy Mayor
 Job Placement
 Water Inspection
 Ecological Inspection
 Statistics and Information
 Disease Control
 Parks, Roads, Streets Inspection

Deputy Mayor
 Capital Construction
 Transport and Communication
 Regional Landscape Park
 Historical Museum

Deputy Mayor
 Public Services
 Veterinary
 Communal Property

Deputy Mayor
 Education + 2
 Sports
 Historic Preservation

Communal Transportation	187
Emergency Service	110
Housing Maintenance	82
Housing Management (Zheks)	5,163
Housing Office (ZEO)	75
Lighting	116
Open Space and Parks	278
Refuse Disposal	247
Street Maintenance	477
Tram and Trolley Service	2,359
Transportation (limited liability)	10
Undertaker	218
Water/sewer	1,290

The following are departments of the Oblast, but have a direct impact upon the services to the citizens of the city:

Elevator Service	755
Gas System	915
Heat Supply Service	1,986

Civil Defense

Source: Ihor Parasiuk

Table III
Additional Power Demand by the LIHS Equipment
Demand Expressed in KVA

Item	City Hall Equipment			Other Offices Equipment		
	Number	Unit	Total	Number	Unit	Total
1. Communication system						
A. Telephone system basic PBX w/UPS	1	1.0	1.0			
B. Extensions	300					
C. Facsimile machines						
High level	1	1.0	1.0			
Standard level	4	0.15	0.6			
2. Copy and Printer Equipment						
A. Copier—collating, color	1	1.5	1.5			
B. Copiers—collating, black and white	5	1.3	6.5			
C. Copiers—manual feed, black and white	15	1.0	15.0			
D. Copiers—manual feed, b&w, A3 paper	1	1.5	1.5	1	1.5	1.5
E. Laser printers—black and white	3	0.1	0.3			
F. Laser printers—color	1	1.2	1.2			
G. Inkjet printers—black and white	4	0.04	0.16			
H. Inkjet printers—color	1	0.5	0.5			
I. Scanner—color	1	0.1	0.1			
J. Scanner—black and white	10	0.05	0.5			
3. The equipment for data processing:						
Electronic Data Processing Machines						
Central server	1	0.6	0.6			
System 1 machines)	1	0.3	0.3			
System 2 machines	21	0.3	6.3			
System 3 machines	67	0.3	20.1	33	0.3	9.9
Modems	10	0.03	0.3	70	0.03	2.1
UPS	87	0.2	17.4	33	0.2	6.6
Total			74.8			

The Above table is based on the following unit power demand:

Desktop Computer (Color)	300 watt
Inkjet printer (Black and White)	40 watt
Uninterruptible Power Supply (UPS)	175-3500 watt depending on size
Fax	220 watt
Isolation transformer	20 watt
Modem	30 watt
Copy machine	1,650 watt
PBX with UPS	500 watt (est for 200 lines)

Source: The RTI/MFM staff (Oksana Mouzytchouk)

Table IV
Location of Copy and Printer Equipment, Present and Desired

Type and Location	Present	Desired
-------------------	---------	---------

A. Copier—collating with capacity for 10 sets, multisheet feed, automatic feed, color		
Room 337 Information Department		1
B. Copier—collating with capacity for 10 sets, multisheet feed, automatic feed, black and white		
Room 121 Copying Division		1
Room 203 General Service Archives	1	1
Room 228 Secretariat		1
Room 318 Clerical Division		1
City Vital Statistics Kopernik Street, 15		1
C. Copier—single sheet manual feed, black and white		
Room 209 Mayor's Office		1
Room 212 Deputy Mayor		1
Room 212 Deputy Mayor		1
Room 216 Deputy Mayor		1
Room 217 Deputy Mayor		1
Room 228 Deputy Mayor		1
Room 101 Dispatching Service		1
Room 203 Protocol Division	2	1
Room 213 International Relations Department		1
Room 214A Personnel Department		1
Room 308 Finance Department	1	1
Room 326 Economics		1
Room 332 Information Department	1	0
Room 340 Housing Registration and Distribution Department	1	1
Room 415 Communal Services	1	1
Room 427 Housing Department		1
Education Department	1	1
Room ____ Health Care Department	1	1
Room ____ Parks Roads Street Inspection	1	1
Galitsky District Administration	4	4
Galitsky District Education	1	1
Galitsky District Finance	1	1
Zaliznychny District Administration	1	1
Zaliznychny District Finance	1	1
Lychakivsky District Administration	3	3
Lychakivsky District Finance	1	1
Lychakivsky District Educational	1	1
Lychakivsky District Social Security	1	1
Frankivsky District Administration	1	1
Frankivsky District Finance	1	1
Shevchenkivsky District Administration	1	1
Shevchenkivsky District Finance	1	1
D. Copier—single sheet manual feed, black and white, A3 paper format		
Room 203 General Service Archives		1
Room ____ Architecture/Capital Construction Department	1	1
E. Laser printer—color		
Room 332 Information Department		1

Table IV page 2

F. Laser printers—black and white	
Room 332 Information Department	1
City Vital Statistics Kopernik Street, 15	1
Archives Dopowchka, 23	1
G. Inkjet printer—color	
Room 332 Information Department	1
H. Inkjet printers—black and white	
Room 203 Protocol Division	1
Room 204 Typing Division	1
Room 228 Secretariat	1
Room 318 Clerical Division	1
I. Wide carriage printer (132 column) dot matrix printers, black and white	
Room ___ Accounting Department	1
Room ___ Clerical Department	1
J. Standard carriage printers (80 column) dot matrix printer, black and white	
Room 209 (Mayor) ___ of ___ type printer	1
Rooms 212A (Deputy Mayor) ___ of ___ type printer	1
Rooms 212B (Deputy Mayor) ___ of ___ type printer	1
Rooms 215 (Deputy Mayor) ___ of ___ type printer	1
Rooms 217 (Deputy Mayor) ___ of ___ type printer	1
Rooms 228 (Deputy Mayor) ___ of ___ type printer	1
Room 206 (Secretary to the Administration) ___ of ___ type printer	1
Room 327 (Data Processing Office) ___ of ___ type printer	1
Room 341 (Housing Registration Office) ___ of ___ type printer	1
Room 117 (Hearing room used for citizen visits) ___ of ___ type printer	1

Source: Ihor Parasiuk and the RTI staff (Oksana Mouzytchouk)

Table V
Detailed Information Needed to Respond To and Monitor Emergency Calls

In the case of any concerns about City services which are reported in person or by telephone, the following information should be obtained and recorded, in the following order:

<u>Item</u>	<u>Size of Typical Field</u>
Nature of the citizen's concern	280
Location of the problem	150
Name of the person calling	
Surname	30
First	20
Patronymic	30
Address of the person calling	
Street and number	30
Building	6
Flat number	6
Phone number of the person calling	10
Date of the call	8
Time of the call	5
Person to whom referred	20
Total Dispatcher Entry	595

The appropriate action center shall correct the problem (calling in additional assistance if necessary and shall report and record the action taken. The information from the action center shall include:

<u>Item</u>	<u>Size of Typical Field</u>
A description of the situation found	490
A description of the action taken	490
The date of the completed action	8
The time of the completed action	5
Suggestions on what might be done to prevent future situations of the type that were originally reported by the citizen	500
Person responsible for action taken	20
Total Action Center Entry	1513

Total Entries per contact	2108
Potential Entries for 10,000 contacts per year	21,080,000

The appropriate agency shall notify the citizen of the action taken and advise him/her to make further contact if a problem still continues.

The appropriate agency shall prepare statistical information on calls received and action taken., along with an analysis of the types of concerns, the action taken and remedial courses to be considered

Source: Ihor Parasiuk and the RTI Staff(Oksana Mouzytchouk)

The appropriate agency shall notify the citizen of the action taken and advise him/her to make further contact if a problem still continues.

The appropriate agency shall prepare statistical information on calls received and action taken., along with an analysis of the types of concerns, the action taken and remedial courses to be considered.

Source: Ihor Parasiuk and the RTI Staff (Oksana Mouzytchouk)

Table VII
Detailed Information Needed For the Inventory of Housing and Commercial Space

The following data fields, with estimated size of typical entries, are required for the Data Bank for Housing and Commercial Space. There will be two data banks with similar information, one for housing units, one for commercial units.

<u>Item</u>	<u>Size of Typical Field</u> <u>Housing Units</u>
Personal	
Account number	7
Surname	25
Building identification and characteristics	
Building Code	4
Ownership	12
Characteristics of the flat	
Flat number	3
Condition of flat	2
Date accepted as part of the housing stock	6
Floor of the building	2
Date, if unoccupied because of condition	6
Type of flat	1
Number of rooms	1
General space in flat	6
Living space in flat	6
Balcony space	6
Loggia space	6
Space in first room	6
Space in second room	6
Space in third room	6
Space in fourth room	6
Space in fifth room	6
Bath	1
Hot water	1
Toilet	1
Windows	1
Basement	1
Apartment with through passage	1
Kitchen	1
Gas stove - 4 burner	1
Gas stove - 3 burner	1
Gas stove - 2 burner	1
Gas tank	1
Corridor	1
Attic	1
Elevator	1
Trash disposal	1
Characteristics of the occupants	
Number of persons in flat	2
Numbers of lodgers	2
Occupying without authorization	2
Subject to legal action	2
Surplus general space	6
Privileges	2
Dependents	1
Dog	1

Radio	1
TV antenna	1
TV repair	1
Telephone	1
Heating	
Central heating	1
Installation of heating system	1
Tile heater	1
Brick heater	1
Stove	1
Firewood stove (geyser)	1
Electric heating	1
Utilities	
Water supply	1
Sewerage	1
Local hot water supply	1
Sewage Disposal (Septic Tank)	1
Electricity	1
Payment	
Rent	9
Cold water	9
Central Heating	9
Gas heat	9
Hot water	9
Electricity	9
Gas	9
Sewage	9
Dog	9
Radio	9
TV antenna	9
TV repair	9
Telephone	9
Total Rent	11
Last modification	8
Last payment	4
Number of order authorizing occupancy	6
Date of order	8
Who gave the order	20
Total number of spaces required per flat	346
160,000 flats x 313	55,360,000

Commercial Units

Personal	
Account number	7
Company name	25
Building identification and characteristics	
Building Code	4
Ownership	12
Elevator	1
Characteristics of the unit	
Space number	3
Condition	2
Date taken into the list if spaces	6
Date, if unoccupied because of condition	6
Floor of location	2
Type of space	1
Number of rooms	1
General space in unit	6
Useable space in unit	6
Loggia space	6
Space in first room	6
Space in second room	6
Space in third room	6
Space in fourth room	6
Space in fifth room	6
Hot water	1
Toilet	1
Basement	1
Kitchen	1
Corridor	1
Attic	1
Trash disposal	1
Characteristics of the occupants	
Type of commercial activity	2
Number of employees in space	2
Occupying without authorization	2
Subject to legal action	2
Surplus general space	6
Privileges	2
Heating	
Central heating	1
Introduction of heating system	1
Tile heater	1
Brick heater	1
Stove	1
Firewood stove (geyser)	1
Electric heating	1
Utilities	
Water supply	1
Sewerage	1
Local hot water supply	1
Sewage Disposal	1
Cooking	
Gas stove - 4 burner	1
Gas stove - 3 burner	1
Gas stove - 2 burner	1
Gas tank	1

Electricity	1
Payment	
Rent	9
Cold water	9
Central Heating	9
Gas heat	9
Hot water	9
Electricity	9
Gas	9
Sewage	9
Dog	9
Radio	9
TV antenna	9
TV repair	9
Telephone	9
Total Rent	11
Last modification	8
Last payment	4
Number of order setting rent amount	6
Date of order	8
Who gave the order	20
Total number of spaces required per commercial unit	331
40,000 units x 331	13,240,000

Source: Data Bank Programs presently in use by Housing Management organizations

VIII

Table X

Detailed Information on the Data Bank For Applicants for Housing
(Excluding Applicants for Housing Owned by Companies)

The following data fields, with estimated size of typical entries, are required for the Data Bank for Applicants for Housing. There will be two data banks with similar information, one for housing owned and operated by the government, one for housing that is cooperatively owned and operated.

<u>Item</u>	<u>Size of Typical Field</u>
A) Name (25,000 Public, 20,000 Cooperative)	
Surname	11
First	8
Patronymic	12
Personal Identifiers (25,000 Public, 20,000 Cooperative)	
Sex	1
Birthdate	8
Passport Number	11
Work Place	2
Social Group	1
Occupation	2
Housing factors (25,000 Public, 20,000 Cooperative)	
Type of dwelling needed	1
Category of register in list	1
Reason for opening register	1
Category of privilege	1
Right to additional housing area	1
Legal background of occupation	1
Number of persons who will occupy the space	2
Number of persons in the family	2
Present housing (25,000 Public, 20,000 Cooperative)	
Registration date in present apartment	8
Street Address	20
Region	1
Settlement (Zhek)	3
Zip code	6
Building number	2
Flat number	3
Zhek number	3
Personal account number	8
Ownership of dwelling	1
Services and utilities present	1
Total area	4
Dwelling area	4
Category of flat	1
Kitchen area	2
Number of rooms	1
Number of families in the flat	

B) The following data for each person who will occupy the space. Provide for data for five persons in addition to above information for applicant (125,000 Public, 100,000 Cooperative)

Surname, First Name, Patronymic	3 1
Relationship to the applicant	1
Birthdate, Passport Number, Social group	2 0

C) Application (25,000 Public, 20,000 Cooperative)

Date of application	8
Date of registration	8
Chronological order number on application date	4
Numerical place on the waiting list	5

E) Privileged Position Applicant (5,000 Public, 5,000 Cooperative)

Date	8
Chronological order number on application date	4
Numerical place on the waiting list	5

F) Extra Privileged Position Applicant (1,000 Public, 1,000 Cooperative)

Date	8
Chronological order number on application date	4
Numerical place on the waiting list	5

Summation of potential storage spaces needed for data:

PUBLIC HOUSING

<u>Item</u>	<u>Number of Data Bits</u>
A) Applicant data 25,000x132	3,300,000
B) Others data 125,000x52	6,500,000
C) Application data 25,000x17	425,000
D) Privileged position application data 5,000x17	85,000
D) Extra Privileged application data 1,000x17	17,000
Total	10,327,000

COOPERATIVE HOUSING

<u>Item</u>	<u>Number of Data Bits</u>
A) Applicant data 20,000x132	2,640,000
B) Others data 100,000x52	5,200,000
C) Application data 20,000x17	340,000
D) Privileged position application data 5,000x17	85,000
D) Extra Privileged application data 1,000x17	17,000
Total	8,282,000

Grand Total Public and Cooperative Housing 18,609,000 spaces needed for list data

Source: Proposed Data Bank developed by the Department of Housing Registration and the Information Department

TX
Table XI

Detailed Information on the Data Bank For City Personnel

The roster of people working for the city in the various services to the citizens contains 11,874 names. the list breaks down as follows:

Administration-City Hall	402
Administration-Out of City Hall	442
District administration	418
Communal Transportation	187
Emergency Service	110
Housing Maintenance	82
Housing management (Zheks)	5,163
Housing office (ZEO)	75
Lighting	116
Open Space and Parks	278
Refuse Disposal	247
Street Maintenance	477
Tram and Trolley Service	2,359
Transportation (limited liability)	10
Undertaker	218
Water/sewer	1,290
Total	11,874

The following are employees of the Oblast, but have a direct impact upon the services to the citizens of the city:

Elevator Service	755
Gas System	915
Heat Supply Service	1,986
Total	3,656

The following information would be held in the data bank for each employee:

Name	
Surname	11
First	8
Patronymic	12
Personal Identifiers	
Birthdate	8
Birthplace	40
Nationality	10
Sex	1
Social Group	1
Family Status	10
Address	
Street and Number	40
Building and Flat Number	10
Zip Code	8
Telephone	7
Job Related Information	
Education	18
Name of Educational Institution	40
Date of Graduation	8

Specialty	15
Position	15
Rank	1
Date Began City Work Originally	8
Date Began Present Work Period	8
background	500

Compensation Information

Salary	9
Penalties	15
Bonus factors	15
Holiday	2
Liability for Military Service	17
Pension	10

Total spaces per person 847

11,874 persons x 847 spaces = 10,057,278

Source: Proposed Data Bank Developed by the Personnel Department and the RTI Staff (Luybov Lyubianetska)

Table X
Potential Budget for the LIHS

Item	First Phase Cost			Later Phase Cost		
	Number	Unit	Total	Number	Unit	Total
1. Power system						
2. Communication system						
A. Telephone system basic PBX w/UPS	1	50,000	50,000			
Extensions	300	200	60,000			
Phone lines to emergency centers			2,000			
B. Cabling (500 metersx4 floorsx\$15)			30,000			
C. Facsimile machines						
High level	1	2,800	2,800			
Standard level	4	500	2,000			
3. Copy and Printer Equipment						
A. Copier—collating, color	1	35,000	35,000			
B. Copiers—collating, black and white	5	3,500	17,500			
C. Copiers—manual feed, black and white	15	600	9,000			
D. Copiers—manual feed, b&w, A3 paper	2	1,400	2,800			
E. Laser printers—black and white	3	1,500	4,500			
F. Laser printers—color						
G Inkjet printers—black and white	4	400	1,600			
H Inkjet printers—color						
I. Dot matrix 80 column black and white		300				
J. Dot matrix 130 column black and white		300				
K. Scanner—color		1,300				
L. Scanner—black and white	10	900	9,000			
4. Programs			80,000			
Word Processing						
Spread Sheet						
Data Base						
Calendar organizer						
Presentation Graphics						
Communication						
Diagnostic for problems						
General System Utilities						
Packages						
5. The equipment for data processing:						
Electronic Data Processing Machines						
Central server	1	30,000	30,000			
System 1 machines)	1	5,000	5,000			
System 2 machines	21	2,500	52,500			
System 3 machines	100	1,500	150,000			
Upgrading existing DP to 8M RAM	63	400	25,200			
Upgrading existing DP to 250 HD	63	300	18,900			
Modems	80	300	24,000			
UPS	120	300	36,000			

6. Grounding

Total

647,800

Source: The RTI/MFM staff (Oksana Mouzytchouk)

~~Table X~~

Potential Annual Operating Costs for the LIHS

<u>Item</u>	<u>Number</u>	<u>Power</u>	<u>Paper</u>	<u>Ink.etc</u>	<u>Other</u>	<u>Total</u>
1. Power system						
2. Communication system						
A. Telephone system basic PBX w/UPS	1					
Extensions	300					
B. Cabling (500 metersx4 floorsx\$15)						
C. Facsimile machines						
High level	1					
Standard level	4					
3. Copy and Printer Equipment						
A. Copier—collating, color	1					
B. Copiers—collating, black and white	5					
C. Copiers—manual feed, black and white	15					
D. Copiers—manual feed, b&w, A3 paper	2					
E. Laser printers—black and white	3					
F. Laser printers—color						
G. Inkjet printers—black and white	4					
H. Inkjet printers—color						
I. Dot matrix 80 column black and white						
J. Dot matrix 130 column black and white						
K. Scanner—color						
L. Scanner—black and white	10					
4. Programs						
Word Processing	----					
Spread Sheet	----					
Data Base	----					
Calendar organizer	----					
Presentation Graphics	----					
Communication	----					
Diagnostic for problems	----					
General System Utilities	----					
Packages	----					
5. The equipment for data processing:						
Electronic Data Processing Machines						
Central server	1					
System 1 machines)	1					
System 2 machines	21					
System 3 machines	100					
Upgrading existing PCs to 8M RAM	63					
Modems	80					
UPS	120					
6. Grounding						

Total

Source: The RTI/MFM staff (Oksana Mouzytchouk)

Municipal Finance and Management Project

L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Appendix I - List of Organizational Units, Showing Major Functions

Appendix I
List of Organizational Units, Showing Major Functions

The following are the major divisions providing city services to the citizens of L'viv:

Administration-City Hall	4 0 2
Mayor	
Audit and Control	
Personnel	
Information	
Legal	
Justice	
Finance	
Council	
Deputy for City Council	
Committees	
Council Logistics	
Executive Committee	
Secretary to Administration	
International Relations	
General Services	
Accounting	
Deputy Mayor	
Economics	
Investments	
Deputy Mayor	
Architecture and City Development	
Communal Services	
Land	
Housing -- for the municipal housing stock: provide maintenance, technical services, capitalized repairs and improvements; provide comprehensive development programs and introduce needed reforms in the program; coordinate financial planning, including budgeting and financing.	
Deputy Mayor	
Housing Registration and Distribution -- registers applicants for apartments, monitors the list of applicants; allocates available apartments between the overall waiting list and the waiting list from enterprises; creates the drafts of orders assigning apartments; monitors and acts upon the calls and letters of concern from residents.	
Trade	
Deputy Mayor	
Health Care	
Culture	
Administration-Out of City Hall	4 4 2
Mayor	
Municipal Police	
Council	
Deputy for City Council	
Property Privatization	
Secretary to Administration	
Vital Statistics	
Archives	

- Deputy Mayor
 - Job Placement
 - Water Inspection
 - Ecological Inspection
 - Statistics and Information
 - Disease Control
 - Parks, Roads, Streets Inspection
- Deputy Mayor
 - Capital Construction
 - Transport and Communication
 - Regional Landscape Park
 - Historical Museum
- Deputy Mayor
 - Public Services
 - Veterinary
 - Communal Property
- Deputy Mayor
 - Education -- For the municipal educational institutions; forecasts the required network; makes decisions about starting new institutions; approves the operating rules; creates new programs; inspects, accredits and certifies individual institutions; orders instructional materials
 - Sports
 - Historic Preservation
- District Administration (418)
 - Halytsky District
 - Head of Administration
 - Finance
 - Accounting
 - Legal
 - Education
 - Coordinating Group for Law Enforcement Agencies
 - Civil Defense
 - Evacuation Commission
 - Deputy Head
 - Housing
 - Housing Registration and Distribution
 - Communal Services
 - Commissions:
 - Interdepartmental
 - Housing
 - Emergency
 - Deputy Head
 - Economics
 - Military Registration and Enlistment
 - Housing Privatization
 - Commissions:
 - License
 - Administrative
 - Rehabilitation
 - Under Age
 - Call to Military Service
 - Garage

Secretary

General Services
Organizational
Social Security
Commissions:
Social Security
Tutorial
Police Registration
Social Security
Monitoring
Compensation

Zaliznychny District

Head of Administration
Finance
Accounting

Deputy Head

Housing
Communal Services
Commissions:
Interdepartmental
Military Registration and Enlistment

Deputy Head

Economics
Social Security
Education
Housing Privatization
Commissions:
License
Administrative
Social Security
Garage

Secretary

General Services
Legal
Organizational
Housing Registration and Distribution
Commissions:
Housing
Tutorial
Under Age
Chernobyl Catastrophe Victims
Social Security
Rehabilitation
Religious Cult
Monitoring
Compensation

Lychakivsky District

Head of Administration
Finance
Accounting
Legal

Coordinating Group for Law Enforcement Agencies
Civil Defense

Deputy Head
Housing
Communal Services
Commissions:
Interdepartmental
Administrative
Emergency

Deputy Head
Economics
Housing Registration and Distribution
Housing Privatization
Commissions:
License
Monitoring
Rehabilitation
Housing
Call to Military Service
Garage

Secretary
General Services
Educational
Organizational
Housing Privatization
Social Security
Commissions:
Social Security
Tutorial
Police Registration
Chernobyl Catastrophe Victims
Social Security
Under Age
Compensation

Frankivsky District
Head of Administration
Finance
Accounting, Economics
Legal
Coordinating Group for Law Enforcement Agencies
Civil Defense
Police Registration
Emergency
Commission on Privatizing Papers

Deputy Head
Housing
Education
Communal Services
Commissions:
Interdepartmental
Administrative
Garage

Deputy Head

Housing Registration and Distribution

Housing Privatization

Commissions:

License

Chernobyl Catastrophe Victims Social Security

Rehabilitation

Housing

Call to Military Service

Secretary

General Services

Organizational

Social Security

Commissions:

Social Security

Tutorial

Under Age

Social Security

Monitoring

Pension

Shevchenkivsky District

Head of Administration

Finance

Accounting

Legal

Coordinating Group for Law Enforcement Agencies

Civil Defense

Evacuation Commission

Housing Commission

Deputy Head

Housing

Housing Privatization

Housing Registration and Distribution

Communal Services

Disease Control

Commissions:

Interdepartmental

Administrative

Deputy Head

Economics

Military Registration and Enlistment

Housing Privatization

Social Security

Job Placement

Commissions:

License

Rehabilitation

Chernobyl Catastrophe Victims Social Security

Secretary
 General Services
 Organizational
 Education
 Commissions:
 Under Age
 Tutorial
 Police Registration
 Monitoring

Communal Transportation	187
Emergency Service	110
Housing Maintenance	82
Housing Management (Zheks)	5,163
Housing Office (ZEO)	75
Lighting	116
Open Space and Parks	278
Refuse Disposal	247
Street Maintenance	477
Tram and Trolley Service	2,359
Transportation (limited liability)	10
Undertaker	218
Water/sewer	1,290

The following are departments of the Oblast, but have a direct impact upon the services to the citizens of the city:

Elevator Service	755
Gas System	915
Heat Supply Service	1,986

The following are departments of the National Government, but have a reporting responsibility to the Mayor:

Civil Defense

The following are departments of the National Government, but have a direct impact upon the services to the citizens of the city:

Civil Defense
 Police
 Tax Collection

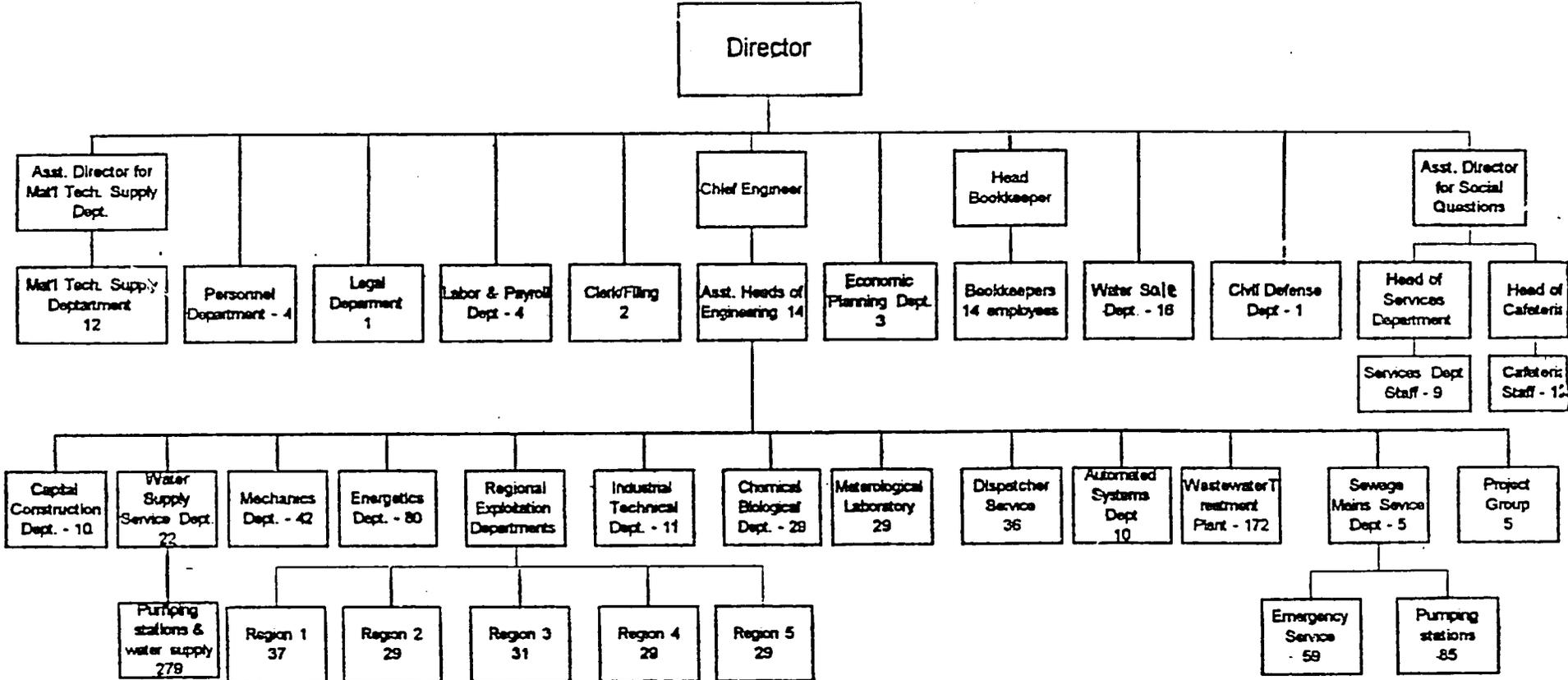
Source: Individual organization units and the RTI/MFM staff (Luybov Lyubianetska)

Municipal Finance and Management Project

L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Appendix II Organization Charts of Various Major City Functions

Lviv Water Canal



Municipal Finance and Management Project

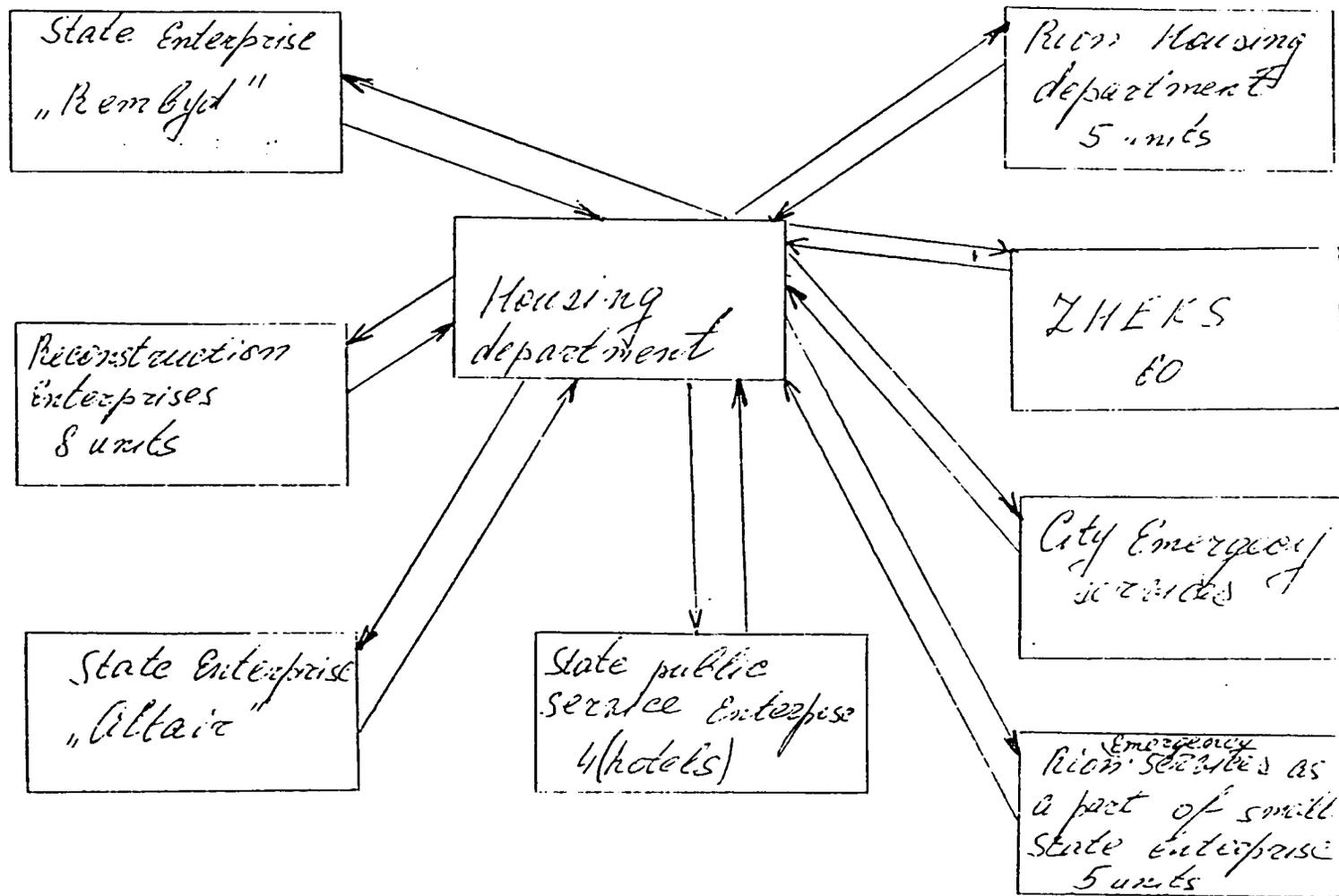
L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Appendix III **Interrelationships Between Various** **Major City Functions**

BEST AVAILABLE DOCUMENT

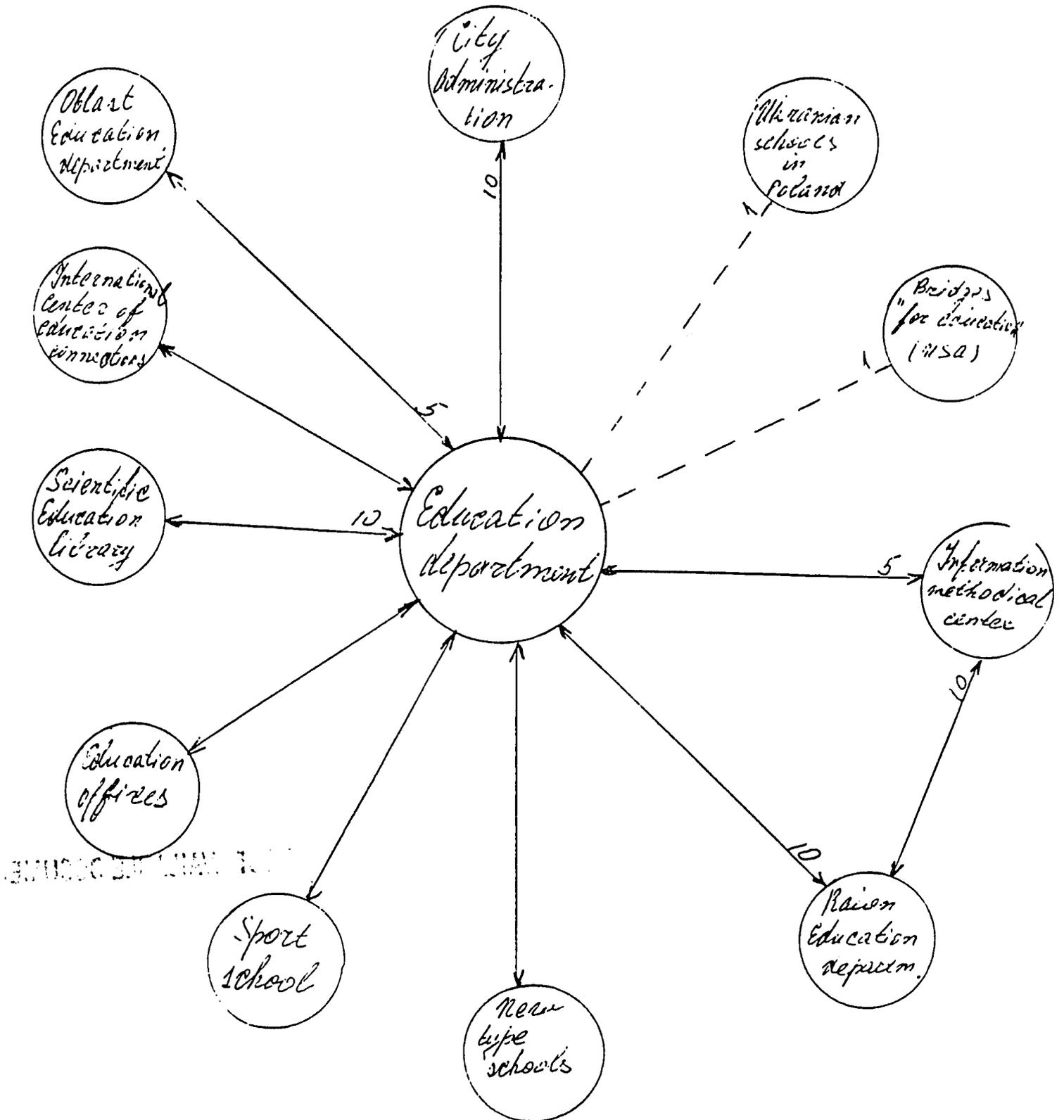
Management structure City Housing economy

1982 JANUARY 1980

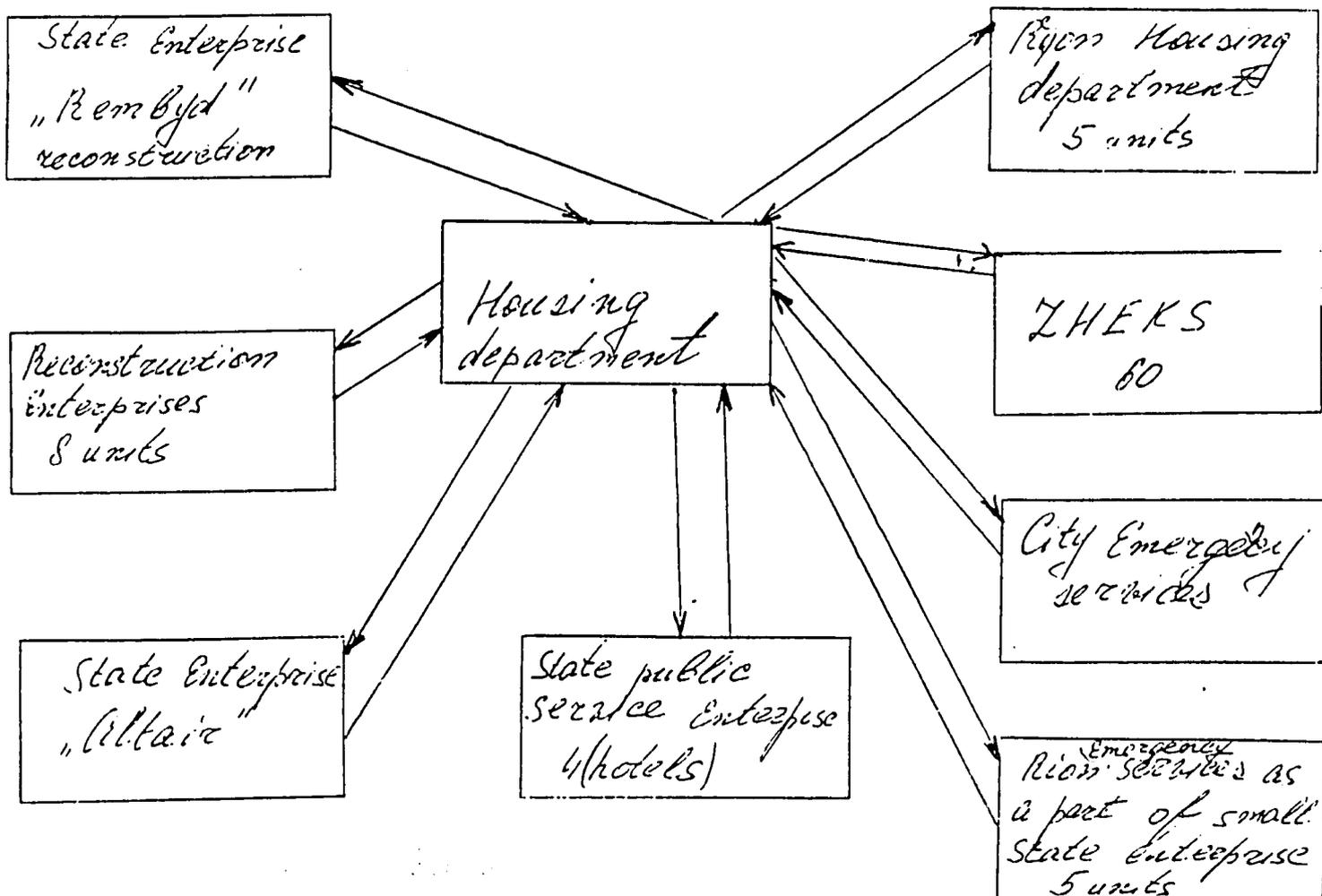


Education department

11/1/95



Management structure City Housing economy



Municipal Finance and Management Project

**L'VIV INTEGRATED INFORMATION HANDLING
SYSTEM**

**Appendix IV
"Ensuring the Longevity of
Digital Documents"
Scientific American 1/95**

BEST AVAILABLE DOCUMENT

Ensuring the Longevity of Digital Documents

The digital medium is replacing paper in a dramatic record-keeping revolution. But such documents may be lost unless we act now

by Jeff Rothenberg

The year is 2045, and my grandchildren (as yet unborn) are exploring the attic of my house (as yet unbought). They find a letter dated 1995 and a CD-ROM. The letter says the disk contains a document that provides the key to obtaining my fortune (as yet unearned). My grandchildren are understandably excited, but they have never before seen a CD—except in old movies. Even if they can find a suitable disk drive, how will they run the software necessary to interpret what is on the disk? How can they read my obsolete digital document?

This imaginary scenario reveals some fundamental problems with digital documents. Without the explanatory letter, my grandchildren would have no reason to think the disk in my attic was worth deciphering. The letter possesses the enviable quality of being readable with no machinery, tools or special knowledge beyond that of English. Because digital information can be copied and recopied perfectly, it is often extolled for its supposed longevity. The truth, however, is that because of changing hardware and software, only the letter will be immediately intelligible 50 years from now.

Information technology is revolutionizing our concept of record keeping in an upheaval as great as the introduction of printing, if not of writing itself. The current generation of digital records has unique historical significance. Yet these

documents are far more fragile than paper, placing the chronicle of our entire period in jeopardy.

My concern is not unjustified. There have already been several potential disasters. A 1990 House of Representatives report describes the narrow escape of the 1960 U.S. Census data. The tabulations were originally stored on tapes that became obsolete faster than expected as revised recording formats supplanted existing ones (although most of the information was successfully transferred to newer media). The report notes other close calls as well, involving tapes of the Department of Health and Human Services; files from the National Commission on Marijuana and Drug Abuse, the Public Land Law Review Commission and other agencies; the Combat Area Casualty file containing P.O.W. and M.I.A. records for the Vietnam War; and herbicide information needed to analyze the impact of Agent Orange. Scientific data are in similar jeopardy, as irreplaceable records of numerous experiments conducted by the National Aeronautics and Space Administration and other organizations age into oblivion.

So far the undisputed losses are few. But the significance of many digital documents—those we consider too unimportant to archive—may become apparent only long after they become unreadable. Unfortunately, many of the traditional methods developed for ar-

chiving printed matter are not applicable to electronic files. The content and historical value of thousands of records, databases and personal documents may be irretrievably lost to future generations if we do not take steps to preserve them now.

From Here to Eternity

Although digital information is theoretically invulnerable to the ravages of time, the physical media on which it is stored are far from eternal. If the optical CD in my attic were a magnetic disk, attempting to read it would probably be futile. Stray magnetic fields, oxidation and material decay can easily erase such disks. The contents of most digital media evaporate long before words written on high-quality paper. They often become unusably obsolete even sooner, as media are superseded by new, incompatible formats—how many readers remember eight-inch floppy disks? It is only slightly facetious to say that digital information lasts forever—or five years, whichever comes first.

Yet neither the physical fragility of digital media nor their lemminglike tendency toward obsolescence constitutes the worst of my grandchildren's problems. My progeny must not only extract the content of the disk but must also interpret it correctly. To understand their predicament, we need to examine the nature of digital storage. Digital infor-

mation can be saved on any medium that is able to represent the binary digits ("bits") 0 and 1. We will call an intended, meaningful sequence of bits, with no intervening spaces, punctuation or formatting, a bit stream.

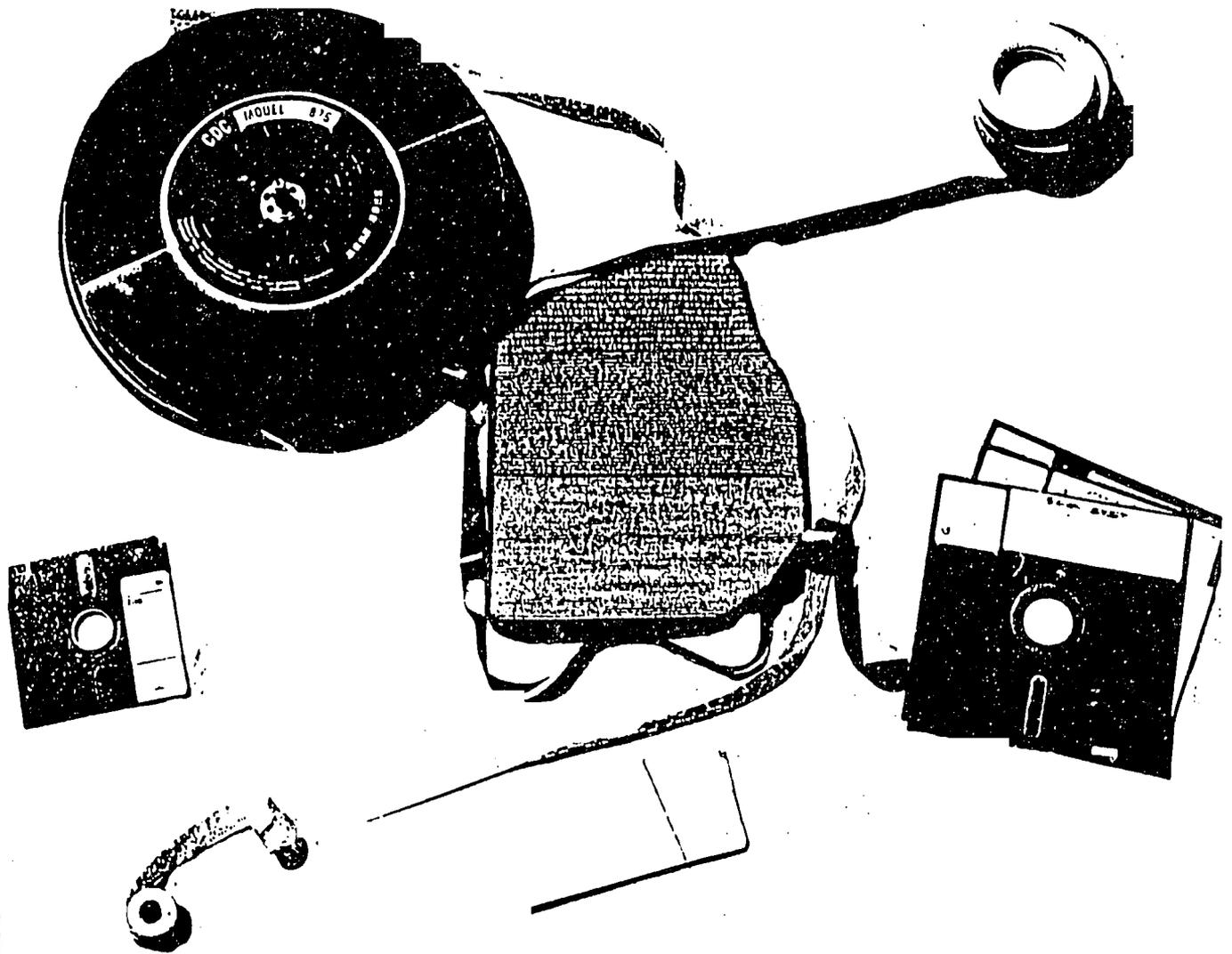
Retrieving a bit stream requires a hardware device, such as a disk drive, and special circuitry for reading the physical representation of the bits from the medium. Accessing the device from a given computer also requires a "driver" program. After the bit stream is retrieved, it must still be interpreted. This task is not straightforward, because a given bit stream can represent almost anything—from a sequence of integers

JEFF ROTHENBERG is a senior computer scientist in the social policy department of the RAND Corporation in Santa Monica, Calif. He received a master's degree in computer science from the University of Wisconsin in 1969 and then spent the next four years working toward a doctorate in artificial intelligence. His research has included work in modeling theory, investigations into the effects of information technology on humanities research, and numerous studies involving information technology policy issues. His passions include classical music, traveling, photography and sailing.

to an array of dots in a pointillist-style image.

Furthermore, interpreting a bit stream depends on understanding its implicit structure, which cannot explicitly be represented in the stream. A bit stream that represents a sequence of alphabet-

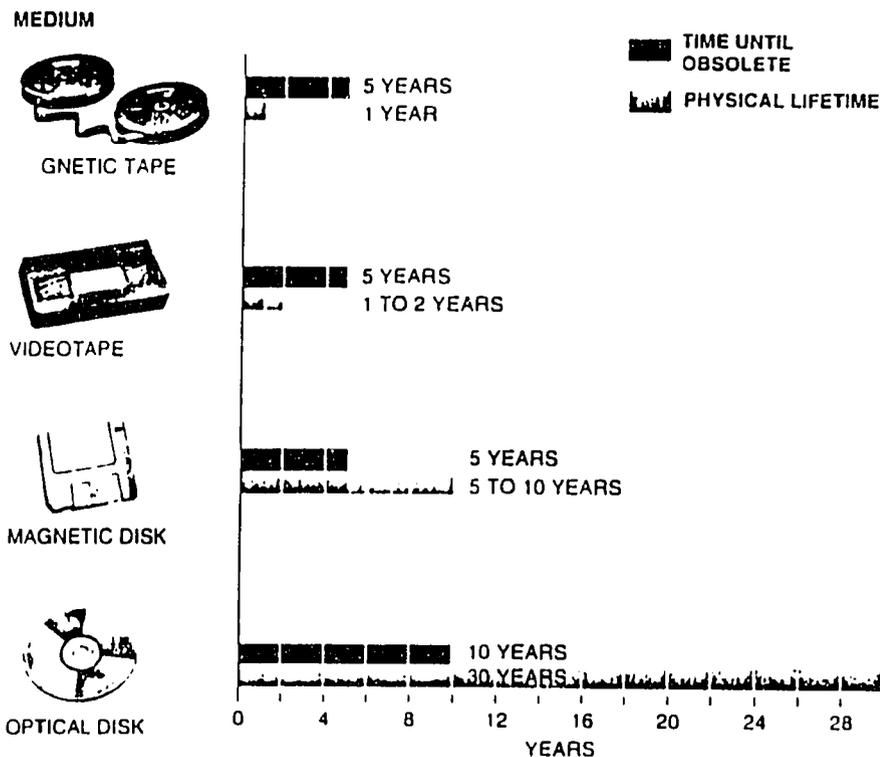
ic characters may consist of fixed-length chunks ("bytes"), each representing a code for a single character. For instance, in one current scheme, the eight bits 01110001 stand for the letter q. To extract the bytes from the bit stream, thereby "parsing" the stream into its



JEFF ROTHENBERG

OBSOLESCENCE plagues digital media. Those shown have already failed to remain readable for one hundredth the time that the Rosetta Stone has. The classical Greek script in the stone, which was found in 1799 in Egypt by a French military

demolition squad, made hieroglyphics and demotic Egyptian comprehensible. Besides being legible after 22 centuries, the Rosetta Stone (a replica here) owes its preservation to the visual impact of its content—an attribute absent in digital media.



EXPECTED LIFETIMES of common digital storage media are estimated conservatively to guarantee that none of the data are lost. (Analog tapes, such as those used for audio recordings, remain playable for many years because they record more robust signals that degrade more gradually.) The estimated time to obsolescence for each medium refers to a particular recording format.

ponents, we must know the length of a byte.

One way to convey the length is to encode a "key" at the beginning of the bit stream. But this key must itself be represented by a byte of some length. A reader therefore needs another key to understand the first one. Computer scientists call the solution to such a recursive problem a "bootstrap" (from the fanciful image of pulling oneself up by the bootstraps). In this case, a bootstrap must provide some context, which humans can read, that explains how to interpret the digital storage medium. For my grandchildren, the letter accompanying the disk serves this role.

After a bit stream is correctly parsed, we face another recursive problem. A byte can represent a number or an alphabetic character according to a code. To interpret such bytes, therefore, we need to know their coding scheme. But if we try to identify this scheme by inserting a code identifier in the bit stream itself, we will need another code identifier to interpret the first one. Again, human-readable context must serve as a bootstrap.

Even more problematic, bit streams may also contain complex cross-referencing information. The stream is often stored as a collection, or file, of bits that contains logically related but physi-

cally separate elements. These elements are linked to one another by internal references, which consist of pointers to other elements or of patterns to be matched. (Printed documents exhibit similar schemes, in which page numbers serve as pointers.)

Interpreting a Bit Stream

Suppose my grandchildren manage to read the bit stream from the CD-ROM. Only then will they face their real challenge: interpreting the information embedded in the bit stream. Most files contain information that is meaningful solely to the software that created them. Word-processing files embed format instructions describing typography, layout and structure (titles, chapters and so on). Spreadsheet files embed formulas relating their cells. So-called hypermedia files contain information identifying and linking text, graphics, sound and temporal data.

For convenience, we call such embedded information—and all other aspects of a bit stream's representation, including byte length, character code and structure—the encoding of a document file. These files are essentially programs: instructions and data that can be interpreted only by appropriate software. A file is not a document in its own right—

it merely describes a document that comes into existence when the file is interpreted by the program that produced it. Without this program (or equivalent software), the document is a cryptic hostage of its own encoding.

Trial-and-error might decode the intended text if the document is a simple sequence of characters. But if it is complex, such a brute-force approach is unlikely to succeed. The meaning of a file is not inherent in the bits themselves, any more than the meaning of this sentence is inherent in its words. To understand any document, we must know what its content signifies in the language of its intended reader. Unfortunately, the intended reader of a document file is a program. Documents such as multimedia presentations are impossible to read without appropriate software: unlike printed words, they cannot just be "held up to the light."

Is it necessary to run the specific program that created a document? In some cases, similar software may at least partially be able to interpret the file. Still, it is naive to think that the encoding of any document—however natural it seems to us—will remain readable by future software for very long. Information technology continually creates new schemes, which often abandon their predecessors instead of subsuming them.

A good example of this phenomenon occurs in word processing. Most such programs allow writers to save their work as simple text, using the current seven-bit American Standard Code for Information Interchange (or ASCII). Such text would be relatively easy to decode in the future if seven-bit ASCII remains the text standard of choice. Yet ASCII is by no means the only popular text standard, and there are proposals to extend it to a 16-bit code (to encompass non-English alphabets). Future readers may therefore not be able to guess the correct text standard. To complicate matters, authors rarely save their work as pure text. As Avra Michelson, then at the National Archives, and I pointed out in 1992, authors often format digital documents quite early in the writing process and add figures and footnotes to provide more readable and complete drafts.

If "reading" a document means simply extracting its content—without its original form—then we may not need to run the original software. But content can be lost in subtle ways. Translating word-processing formats, for instance, often displaces or eliminates headings, captions or footnotes. Is this merely a loss of structure, or does it impinge on content? If we transform a spreadsheet into a table, deleting the formulas that

JANA BRENNING

relate the table's entries to one another, have we affected content? Suppose the CD in my attic contains a treasure map depicted by the visual patterns of word and line spacings in my original digital version of this article. Because these patterns are artifacts of the formatting algorithms of my software, they will be visible only when the digital version is viewed using my original program. If we need to view a complex document as its author viewed it, we have little choice but to run the software that generated it.

What chance will my grandchildren have of finding that software 50 years from now? If I include a copy of the program on the CD, they must still find the operating system software that allows the program to run on some computer. Storing a copy of the operating system on the CD may help, but the computer hardware required to run it will have long since become obsolete. What kind of digital Rosetta Stone can I leave to provide the key to understanding the contents of my disk?

Migrating Bits

To prevent digital documents from being lost, we must first preserve their bit streams. That means copying the bits onto new forms of media to ensure their accessibility. The approach is analogous to preserving text, which must be transcribed periodically. Both activities require ongoing effort: future access depends on an unbroken chain of such migrations frequent enough to prevent media from becoming physically unreadable or obsolete before they are copied. A single break in this chain renders digital information inaccessible, short of heroic effort. Given the current lack of permanence of media and the rate at which their forms evolve, migration may need to be as frequent as once every few years. Conservative estimates suggest that data on digital magnetic tape should be copied

SHAKESPEARE'S

Though yet heauen knowes it is but as a tombe
Which hides your life, and shewes not halfe your parts:
If I could write the beaury of your eyes,
And in fresh numbers number all your graces,
The age to come would say this Poet lies,
Such heauenly touches nere toucht earthly faces.
So should my papers (yellowed with their age)
Be scorn'd, like old men of lesse truth then tongue,
And your true rights be termed a Poets rage,
And stretched miter of an Antique song.
But were some childe of yours aliue that time,
You should liue twife in it, and in my rime.

18.

Shall I compare thee to a Summers day?
Thou art more louely and more temperate:
Rough windes do shake the darling buds of Maie,
And Sommers lease hath all too short a date:
Sometime too hot the eye of heauen shines,
And often is his gold complexion dimm'd,
And euerie faire from faire some-time declines,
By chance, or natures changing course vnttrim'd:
But thy eternall Sommer shall not fade,
Nor loose possession of that faire thou ow'st,
Nor shall death brag thou wandr'st in his shade,
When in eternall lines to time thou grow'st,
So long as men can breath or eyes can see,
So long liues this, and this giues life to thee,

19

Deuouring time blunt thou the Lyons pawes,
And make the earth deuoure her owne sweet brood,
Plucke the keene teeth from the fierce Tygers yawes,
And burne the long liu'd Phoenix in her blood,
Make glad and sorry seasons as thou fleet'st,
And do what ere thou wilt swift-footed time
To the wide world and all her fading sweets:
But I forbid thee one most hainous crime,

SHAKESPEARE'S first printed edition of sonnet 18 (1609) exemplifies the longevity of the printed page: the words are legible after almost four centuries (the final couplet is especially relevant to preserving documents). But digital media can become unreadable within a decade.

once a year to guarantee that none of the information is lost. (Analog tapes may remain playable for many years because they record more robust signals that degrade more gradually.)

In the long run, we might be able to develop long-lived storage media, which would make migration less urgent. At the moment, media with increased longevity are not on the horizon. Nevertheless, the cost of migration may eventually force the development of such products, overriding our appetite for improved performance.

An ancient text can be preserved either by translating it into a modern language or by copying it in its original dialect. Translation is attractive because it avoids the need to retain knowledge

of the text's original language, yet few scholars would praise their predecessors for taking this approach. Not only does translation lose information, it also makes it impossible to determine what information has been lost, because the original is discarded. (In extreme cases, translation can completely undermine content: imagine blindly translating both languages in a bilingual dictionary into a third language.) Conversely, copying text in its original language (saving the bit stream) guarantees that nothing will be lost. Of course, this approach assumes that knowledge of the original language is retained.

Archivists have identified two analogous strategies for preserving digital documents. The first is to translate them into standard forms that are independent of any computer system. The second approach is to extend the longevity of computer systems and their original software to keep documents readable. Unfortunately, both strategies have serious shortcomings.

On the surface, it appears preferable to translate digital documents into standard forms that would remain readable in the future, obviating the need to run obsolete

software. Proponents of this approach offer the relational database (introduced in the 1970s by E. F. Codd, now at Codd & Date, Inc., in San Jose, Calif.) as a paradigmatic example. Such a database consists of tables representing relations among entities. A database of employees might contain a table having columns for employee names and their departments. A second table in the database might have department names in its first column, department sizes in its second column and the name of the department head in a third. The relational model defines a set of formal operations that make it possible to combine the relations in these tables—for example, to find the name of an employee's department head.

the software and thereby read the document. But information science cannot yet describe the behavior of software in sufficient depth for this approach to work, nor is it likely to be able to do so in the near future. To replicate the behavior of a program, there is currently little choice but to run it.

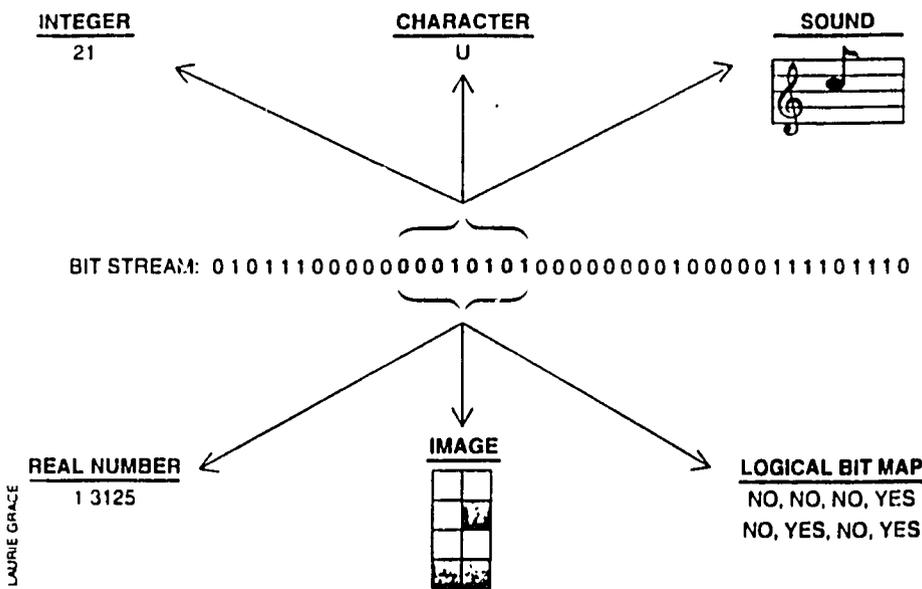
For this reason, we must save the programs that generate our digital documents, as well as all the system software required to run those programs. Although this task is monumental, it is theoretically feasible. Authors often include an appropriate application program and operating system to help recipients read a digital document. Some applications and system software may remain ubiquitous, so that authors would need only to refer readers to those programs. Free, public-domain software is already widely available on the Internet. Moreover, when proprietary programs become obsolete, their copyright restrictions may expire, making them available to future users.

How can we provide the hardware to run antiquated systems and application software? A number of specialized museums and "retro-computing" clubs are attempting to maintain computers in working condition after they become obsolete. Despite a certain undeniable charm born of its technological bravado, this method is ultimately futile. The cost of repairing or replacing worn out components (and retaining the expertise to do so) must inevitably outweigh the demand for any outmoded computer.

Fortunately, software engineers can write programs called emulators, which mimic the behavior of hardware. Assuming that computers will become far more powerful than they are today, they should be able to emulate obsolete systems on demand. The main drawback of emulation is that it requires detailed specifications for the outdated hardware. To be readable for posterity, these specifications must be saved in a digital form independent of any particular software, to prevent having to emulate one system to read the specifications needed to emulate another.

Saving Bits of History

If digital documents and their programs are to be saved, their migration must not modify their bit streams, because programs and their files can be corrupted by the slightest change. If such changes are unavoidable, they must be reversible without loss. Moreover, one must record enough detail about each transformation to allow reconstruction of the original encoding of the bit stream. Although bit streams



INTERPRETING A BIT STREAM correctly is impossible without contextual information. This eight-bit sequence can be interpreted in at least six different ways.

can be designed to be immune to any expected change, future migration may introduce unexpected alterations. For example, aggressive data compression may convert a bit stream into an approximation of itself, precluding a precise reconstruction of the original. Similarly, encryption makes it impossible to recover an original bit stream without the decryption key.

Ideally, bit streams should be sealed in virtual envelopes: the contents would be preserved verbatim, and contextual information associated with each envelope would describe those contents and their transformation history. This information must itself be stored digitally (to ensure its survival), but it must be encoded in a form that humans can read more simply than they can the bit stream itself, so that it can serve as a bootstrap. Therefore, we must adopt bootstrap standards for encoding con-

textual information; a simple, text-only standard should suffice. Whenever a bit stream is copied to new media, its associated context may be translated into an updated bootstrap standard. (Irreversible translation would be acceptable here, because only the semantic content of the original context need be retained.) These standards can also be used to encode the hardware specifications needed to construct emulators.

Where does this leave my grandchildren? If they are fortunate, their CD may still be readable by some existing disk drive, or they may be resourceful enough to construct one, using information in my letter. If I include all the relevant software on the disk, along with complete, easily decoded specifications for the required hardware, they should be able to generate an emulator to run the original software that will display my document. I wish them luck.

FURTHER READING

TEXT AND TECHNOLOGY: READING AND WRITING IN THE ELECTRONIC AGE. Jay David Bolter in *Library Resources and Technical Services*, Vol. 31, No. 1, pages 12-23; January-March 1987.

TAKING A BYTE OUT OF HISTORY: THE ARCHIVAL PRESERVATION OF FEDERAL COMPUTER RECORDS. Report 101-978 of the U.S. House of Representatives Committee on Government Operations, November 6, 1990.

ARCHIVAL MANAGEMENT OF ELECTRONIC RECORDS. Edited by David Bearman. Archives and Museum Informatics, Pittsburgh, 1991.

UNDERSTANDING ELECTRONIC INCUNABULA: A FRAMEWORK FOR RESEARCH ON

ELECTRONIC RECORDS. Margaret Hedstrom in *American Archivist*, Vol. 54, No. 3, pages 334-354; Summer 1991.

ARCHIVAL THEORY AND INFORMATION TECHNOLOGIES: THE IMPACT OF INFORMATION TECHNOLOGIES ON ARCHIVAL PRINCIPLES AND PRACTICES. Charles M. Dollar. Edited by Oddo Bucchi. Information and Documentation Series No. 1, University of Macerata, Italy, 1992.

SCHOLARLY COMMUNICATION AND INFORMATION TECHNOLOGY: EXPLORING THE IMPACT OF CHANGES IN THE RESEARCH PROCESS ON ARCHIVES. Avra Mickelson and Jeff Rothenberg in *American Archivist*, Vol. 55, No. 2, pages 236-315; Spring 1992.

Select entries from a checking account statement.

DATE	CHECK NUMBER	AMOUNT	BALANCE
4/5/94	DEPOSIT	\$500.00	\$500.00
4/26/94	CHECK	\$100.00	\$400.00
4/27/94	DEPOSIT	\$50.00	\$450.00
11/3/94	CHECK	\$100.00	\$350.00

Remove all spaces and punctuation; translate dates into six digits (mmddyy), check numbers into four digits, deposits into "0000" and dollars amounts into 11 digits.

```
04059400000000000500000000000500000
04269400000000001000000000004000000
04279400000000000500000000000450000
11039400000000001000000000000350000
```

Concatenate these entries to produce a decimal digit stream.

```
0405940000000000050000000000050000042694031400000
010000000000400000427940000000000005000000000450
0011039403150000001000000000035000
```

UNDERSTANDING A BIT STREAM demands knowledge of the format used to create the stream. If all the numbers in a monthly checking account statement were strung together—with nothing to distinguish check numbers, dates and dollar amounts—the resulting sequence of digits would be impossible to understand.

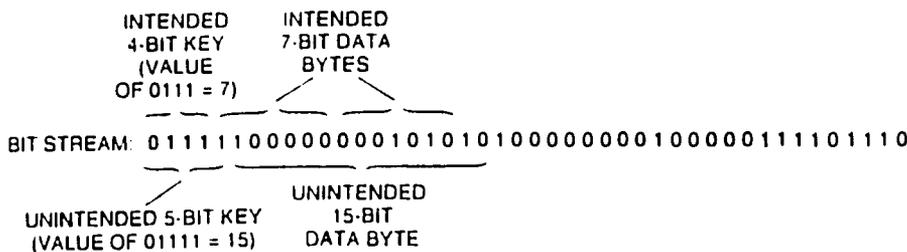
Because all relational database systems implement this same underlying model, any such database can in principle be translated into a standard tabular form acceptable to any other system. Files represented this way could be copied to new media as necessary, and the standard would ensure readability forever.

Flaws of Translation

Regrettably, this approach is flawed in two fundamental ways. First, relational databases are less standardized than they appear. Commercial relational database systems distinguish themselves from one another by offering features that extend the relational model in nonstandard ways. Moreover, the limitations of such databases are already leading to the adoption of new models. The tables in a relational database cannot transparently show structure. That

is, the database could not immediately make it clear that a corporation consisted of one headquarters, five national offices, 25 divisions and 100 departments. Various object-oriented database models (which can represent structure directly) are evolving to satisfy this need. Such rapid evolution is neither accidental nor undesirable. It is the hallmark of information technology.

Furthermore, far from being a representative example, relational databases are practically unique. No other type of digital document has nearly so formal a basis for standardization. Word processors, graphics programs, spreadsheets and hypermedia programs each create far more varied documents. The incompatibility of word-processing files exemplifies this problem. It did not arise simply because companies were trying to distinguish their products in the marketplace. Rather it is a direct outgrowth of the technology's tendency to adapt



A 4-BIT KEY may be used to indicate how a bit stream is organized. Here the first four bits stand for the integer 7, meaning that the remaining bytes are each seven bits long. Yet there is no way to tell the length of the code key from the bit stream itself. If we were to read the first five bits as the code key, we would erroneously conclude that the remaining bytes were 15 bits long.

itself to the emerging needs of users.

As yet, no common application is ready to be standardized. We do not have an accepted, formal understanding of the ways that humans manipulate information. It is therefore premature to attempt to enumerate the most important kinds of digital applications, let alone to circumscribe their capabilities through standards. Forcing users to accept the limitations imposed by such standards or restricting all digital documents to contain nothing but text as a lowest common denominator would be futile. The information revolution derives its momentum precisely from the attraction of new capabilities. Defining long-term standards for digital documents may become feasible when information science rests on a more formal foundation, but such standards do not yet offer a solution.

Translating a document into successive short-term standards offers false hope. Successive translation avoids the need for ultimate standards, but each translation introduces new losses. Would a modern version of Homer's *Iliad* have the same literary impact if it had been translated through a series of intermediate languages rather than from the earliest surviving texts in ancient Greek? In theory, translating a document through a sequence of standards should enable scholars to reconstruct the original document. Yet that requires each translation to be reversible without loss, which is rarely the case.

Finally, translation suffers from a fatal flaw. Unlike English and ancient Greek, whose expressive power and semantics are roughly equivalent, digital documents are evolving so rapidly that shifts in the forms of documents must inevitably arise. New forms do not necessarily subsume their predecessors or provide compatibility with previous formats. Old documents cannot always be translated into unprecedented forms in meaningful ways, and translating a current file back into a previous form is frequently impossible. For example, many older, hierarchical databases were completely redesigned to fit the relational model, just as relational databases are now being restructured to fit emerging object-oriented models. Shifts of this kind make it difficult or meaningless to translate old documents into new standard forms.

The alternative to translating a digital document is to view it by using the program that produced it. In theory, we might not actually have to run this software. If we could describe its behavior in a way that does not depend on any particular computer system, future generations could re-create the behavior of

Municipal Finance and Management Project

L'VIV INTEGRATED INFORMATION HANDLING SYSTEM

Schematic Diagrams

Schematic Diagram IV
Conceptual Plan and Detail of Existing Cable System

On June 17, 1994 the City of L'viv accepted an installation of fiber optic cable and thin coaxial cable with various junction boxes, network plugs and connections to the power supply. The cable was installed by LANEX Ltd under the general supervision of Anatolij Kopets and Ihor Forykevych. Before acceptance, the system was tested and approved by DIGITAL UKRAINE. The system is described in outline below and is shown graphically on the next page.

The following work was performed:

Four network junctions were mounted:

- 1) on the second floor of the building right wing in the shaft between staircases;
- 2) on the second floor in the reception room of office # 212
- 3) on the third floor at the right wing in the shaft between staircases;
- 4) on the third floor of the building left wing on the inner wall of the elevator shaft.

Network junctions on the third floor are connected by the optic fiber cable and feeder boxes are installed

Network junctions between the second and the third floor are connected by thin coaxial cable. Each network junction is connected to the power supply via the nearest switchboard. In rooms 102, 111, 206.1, 206.2, 209, 210, 212.2, 212.1, 214-217, 228, 310, 312, 321, 325, 328, 330, 331, 337, 344, 409, 415, 419 network plugs are installed and connected to the appropriate network junctions by stranded twin cable.

Source: Ihor Forykevych, Deputy Director of Information

V III
Schematic Diagram V Explanation
Housing Waiting List Data Bank—Reference Modes

Key to Diagram

1-6 Characteristics of housing units

1-3 Buildings

1. Number of buildings, arranged according to number of stories
2. Number of buildings, arranged according to specialized equipment such as elevators, trash pipes, etc.
3. Structural conditions: good, poor, to be reconstructed, being reconstructed

4-6 Apartments

4. Number of public apartments arranged according to number of rooms (total area, area of room of rooms)
5. Number of privatized apartments arranged according to number of rooms (total area, area of rooms)
6. Fitting out of housing units

7-19 Movement of housing units

8-19 Housing units available on January 1, 1994

9. Housing units added

11. Input of vacant housing units
12. New housing units
13. Housing units taken into account by City Council
14. Housing units purchased from citizens

10. Housing units lost

15. Housing units poor and unusable
16. Housing units demolished
17. Housing units lost through natural disasters
18. Housing units vacant because of reconstruction
19. Housing units demolished to provide space for new construction

20-29 Housing units being used

20. Number of inhabited units; number of people housed in these units

- 23A. Number of housing units that belong to local councils
- 23B. Number of housing units that belong to enterprises
- 23C. Number of housing units that belong to cooperatives
- 23D. Number of housing units that are privately owned

21. Number of available units

25. Under distribution
26. Under discussion about joining
27. Applied, non-applied
28. Finally applied or non applied
29. List of units

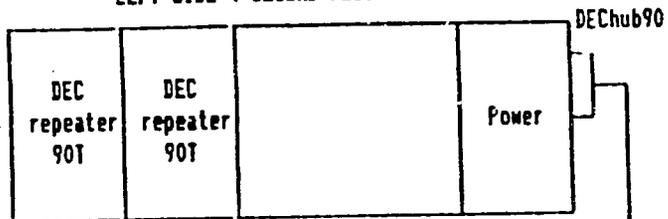
22. Number of voluntarily inhabited units

24. Information about cases in legal institutions

30-33 Social-economic development

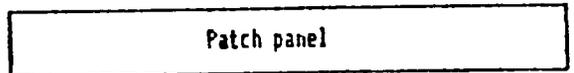
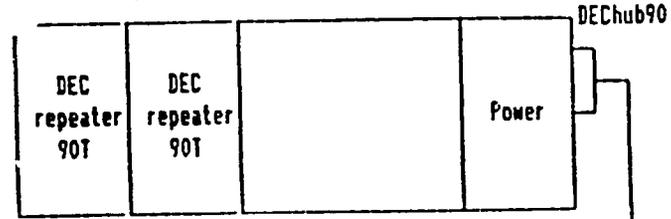
30. Needs in primary schools in the district
31. Needs in secondary schools in district
32. Stores and other services
33. Transportation

LEFT SIDE (SECOND FLOOR)



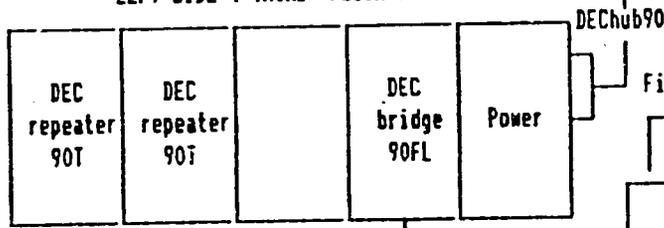
go to the 16 computers
(max 64 computers)

RIGHT SIDE (SECOND FLOOR)



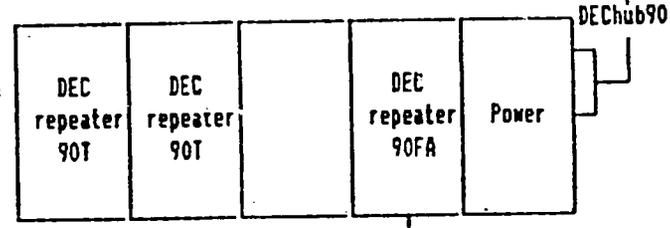
go to the 16 computers
(max 64 computers)

LEFT SIDE (THIRD FLOOR)



go to the 16 computers
(max 56 computers)

RIGHT SIDE (THIRD FLOOR)



go to the 16 computers
(max 56 computers)

55m ThinWire

55m ThinWire

Fiber combo patch

Fiber optic

!!! Will instal 25 computers in first phase by JUNE 1.

Typical Summary Data to be Produced From Data Bank

Buildings

- Total number
- By number of floors
- With or without trash disposal
- With or without elevator
- By condition

Apartments

- Total number
- By number of rooms
- Total area at beginning of year
- Area added during year
- Area vacant
- Area taken into account by City Council
- Area bought from citizens
- Area abandoned
- Area in dangerous condition
- Area demolished
- Area lost by natural disaster
- Area under reconstruction
- Area lost to make way for new construction
- Area in habitable rooms
- By type of ownership
- Number inhabited
- Number vacant
- List of vacant apartments
- Number of inhabitants
- Number available for use
- Number occupied without authorization
- Number under distribution
- Number under discussion about joining
- Number applied
- Number non-applied

Needs

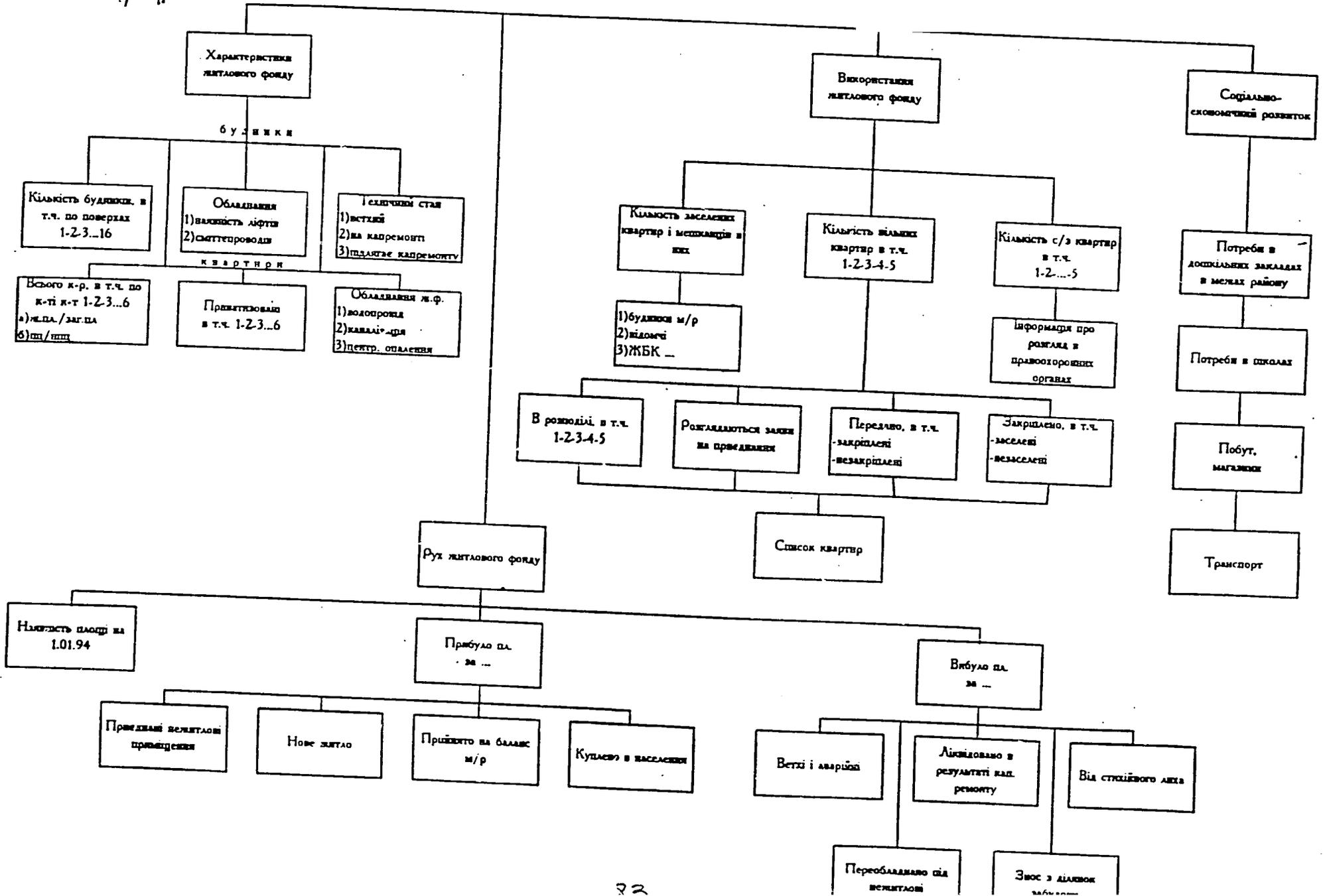
- Primary education
- Secondary education
- Stores and services
- Transportation

Source: Housing Registration Department and the RTI/MFM staff (Luybov Lyubianetska)

2003-01-16 11:26 AM

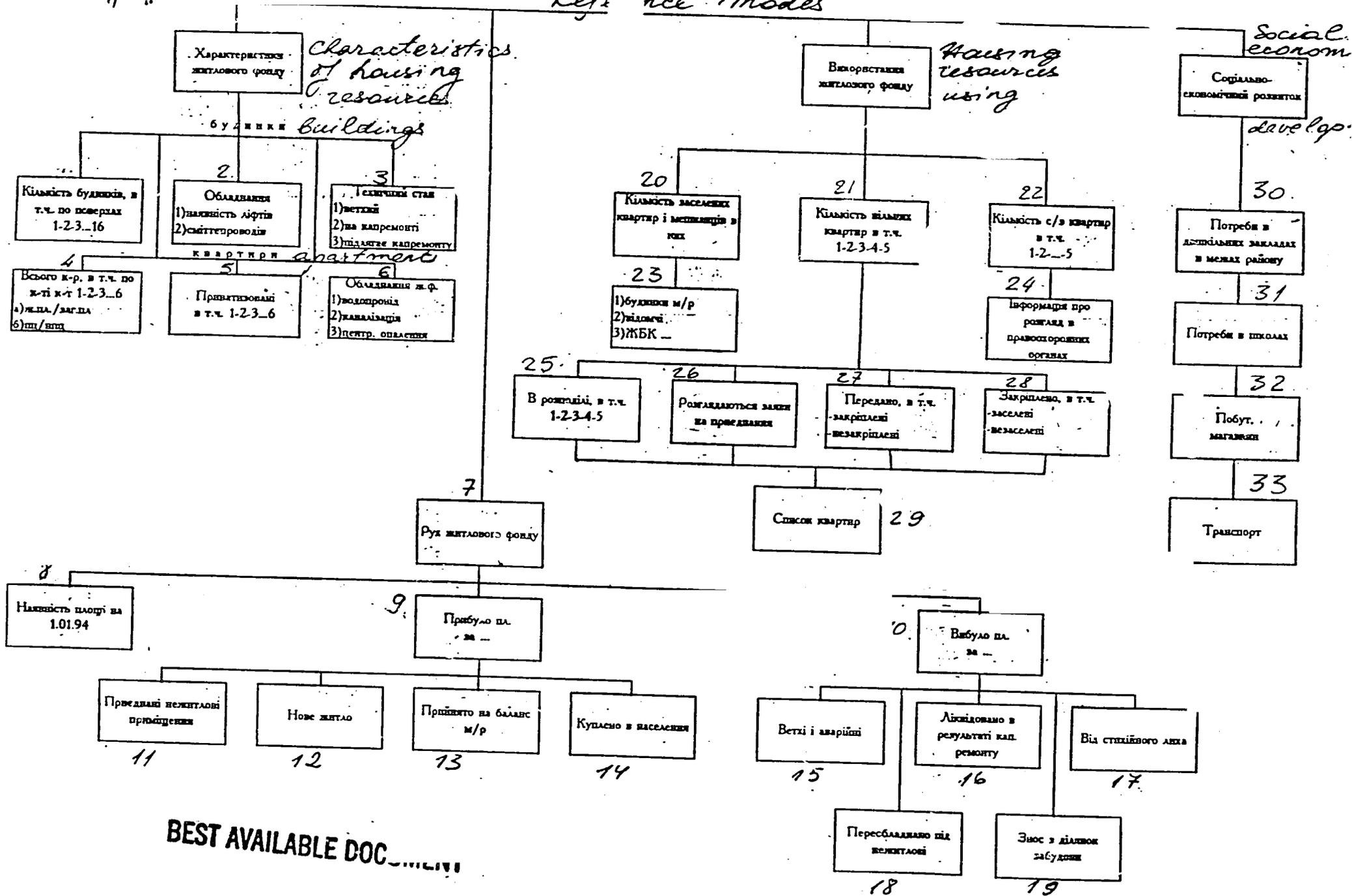
Додаток до режисури

ст. 4
ст. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16



11/23/6
11/6/6

Довідкові зими
Reference Modes



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VIII.
Schematic Diagram ~~VI~~ Explanation
Housing Waiting List Data Bank—Data Base of Housing Fund

Key to Diagram

Data Base of the Housing Fund

1. Reference Modes—see previous diagram
2. Buildings, apartments, references

3.-4. Available units

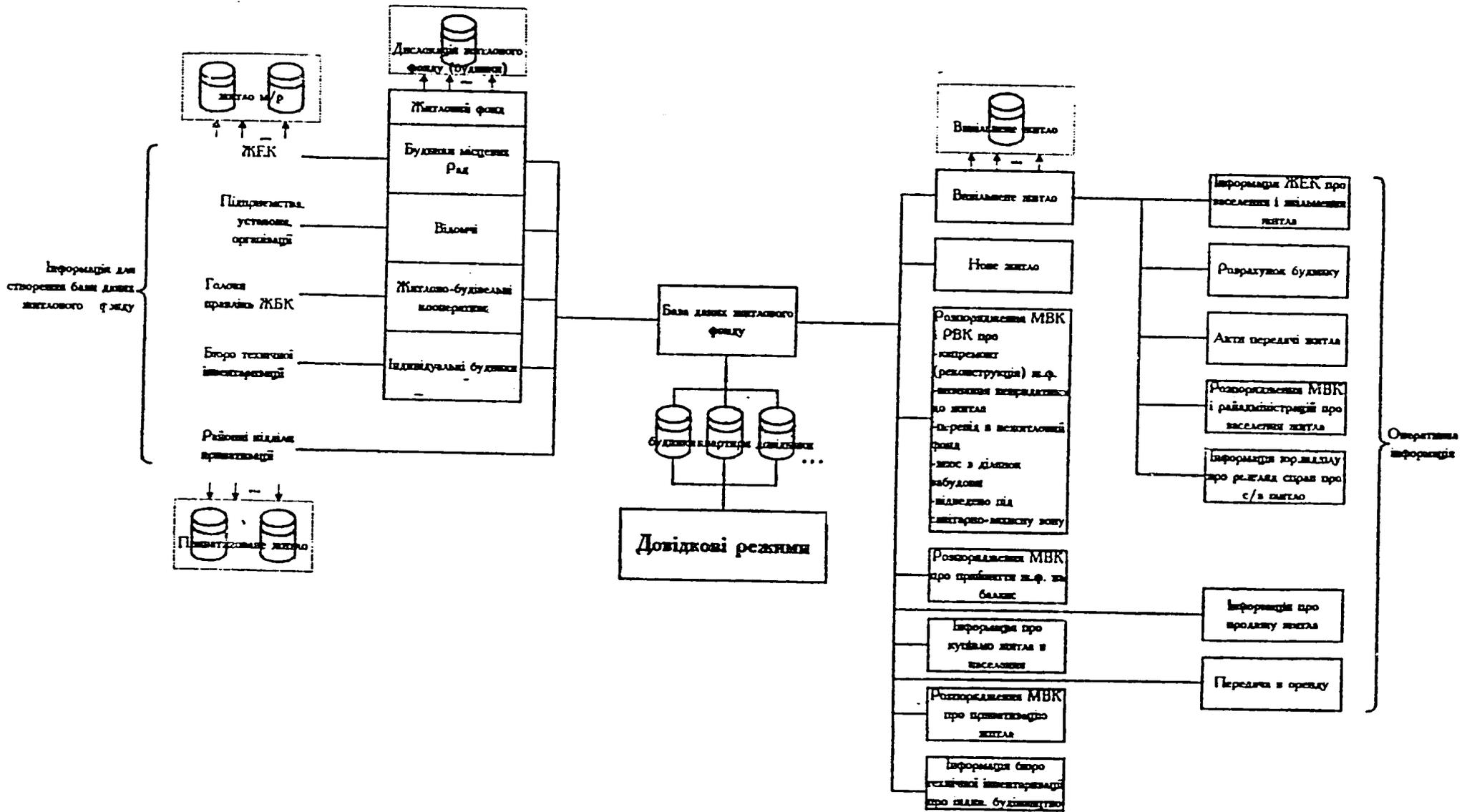
Current Information modifying the Data Base of Housing

5. New dwellings
6. Orders of City Council and District Council about:
 - reconstruction
 - removals
 - transfers to the uninhabited list
 - removing old buildings to make way for new construction
 - forming environment secure zones
7. City Council orders about taking on balance
8. Information about units bought by City
9. Information about units sold
10. Information about units rented
11. Information from Zheks about vacant and inhabited apartments
14. Builder's drafts
15. Deeds showing transfers of units
16. Orders from City and District Administrations about occupation
17. Information from Legal Department about cases involving housing

Information needed to create the Data Base of Housing

18. Location of the housing stock
19. Housing stock
- 20., 24. Housing units belonging to the local councils
- 21., 25. Housing units belonging to enterprises and organizations
22. Housing units that are cooperatives
23. Private units
26. Presidents of Housing Cooperative Boards
27. Technical Inventory Bureau
28. District departments responsible for privatization
29. List of privatized housing

Source: Housing Registration Department and the RTI/MFM staff (Luybov Lyubianetska)



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