The Long Beach public safety information subsystem

by GEORGE M. MEDAK
City of Long Beach
Long Beach, California

and

DR. PAUL M. WHISENAND
Institute for Police Studies
Long Beach, California

and

GARY GACK
Digital Resources Corporation
Charleston, West Virginia

INTRODUCTION

Not many years ago, officials in a city with a five year capital improvement plan, a “master” plan, and a computer that handled payroll calculations and utility billing were termed relatively progressive. This was considered a dynamic approach to the use of modern management techniques and computer technology.

In more recent years there has been a dramatic increase in the challenge of city management. A growing crime rate, financial dilemmas, problems with ecology, urban transportation and the like provide great tests of management skill for today’s municipal executive. Information about people and the urban environment is a critical requirement for effective municipal management.

It is recognized that the development of a comprehensive municipal information system is a costly and complex task. An independent effort by a municipality to research, develop, and implement a system would require substantial technological resources, together with a large appropriation of local tax dollars to fund the project. Furthermore, individual projects across the nation would lead to great duplication of effort, use of resources and cost.

It was with these facts in mind that the major federal agencies concerned with urban programs established a coordinated research effort to develop municipal information systems. The Urban Information Systems Inter-Agency Committee (USAC) Program was established on September 10, 1968, by the Secretary of the Department of Housing and Urban Development. Sponsoring the program were representatives from nine federal agencies:

- Department of Housing and Urban Development
- Department of Justice
- Department of Transportation
- Department of Labor
- Department of Commerce
- Department of Health, Education and Welfare
- Bureau of the Budget
- Office of Economic Opportunity
- Department of the Army, Office of Civil Defense

The USAC Program, supported by multi-agency funding, initiated two classes of effort. One class, a 3 year program directed at total integrated municipal information systems, and a second 2 year effort directed toward functional subsystems. The functional subsystems as defined by USAC were: (1) Public Safety; (2) Physical and Economic Development; (3) Public Finance; and (4) Human Resources Development.

During July, 1969, the Department of Housing and Urban Development, acting on behalf of USAC, initiated a nation-wide procurement action inviting 250 cities between the population of 50,000 and 500,000 to compete for the two classes of contracts. Approximately 100 proposals were received from 79 cities in 30 states. On January 13, 1970, six awards were announced by
TABLE I—USAC Municipal Information System Projects

<table>
<thead>
<tr>
<th>System/Subsystem</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Integrated Municipal</td>
<td>Wichita Falls, Texas and</td>
</tr>
<tr>
<td>Information System</td>
<td>Charlotte, North Carolina</td>
</tr>
<tr>
<td>Public Safety</td>
<td>Long Beach, California</td>
</tr>
<tr>
<td>Physical and Economic Development</td>
<td>Reading, Pennsylvania</td>
</tr>
<tr>
<td>Public Finance</td>
<td>Dayton, Ohio</td>
</tr>
<tr>
<td>Human Resources Development</td>
<td>St. Paul, Minnesota</td>
</tr>
</tbody>
</table>

the Department of Housing and Urban Development for the projects and cities shown in Table I.

A unique requirement in the request for proposals was that the government called for the creation of a consortium by all respondents. The consortium had to consist of a municipal government (as the prime contractor), a systems/software firm (as a subcontractor), and a university/research center (as a subcontractor).

The City of Long Beach, California, awarded the prime contract by HUD for development of the Public Safety Subsystem, has the primary responsibility to the federal government. Long Beach must organize, monitor and supervise the overall project to assure that all contractual performance requirements are fulfilled. The City has also made a substantial in-kind contribution of personnel and other resources.

The Project Director is an employee of the City and works closely with a Management Steering Committee established specifically for the project. In addition, the City has advisory and technical personnel assigned to the effort to assure that system development tasks lead to operational features which will best satisfy the needs of the various city user organizations.

Digital Resources Corporation (DRC) is the Systems Contractor and is responsible for the planning and execution of technical efforts associated with the project. Specific areas of responsibility include: analysis of the current operations; design of the data base structures; and design, development and implementation of the computer applications. The contractor will inventory and analyze the current technology in information management systems. That technology will be employed to conceptualize and design the system for the City of Long Beach.

The Institute for Police Studies (IPS), California State College at Long Beach, is the third member of the consortium. Through the Institute, a team of public safety authorities is providing consulting services to the project. IPS is responsible for technical leadership related to the orientation and training process. The Institute will also perform project monitoring and evaluation to determine overall effectiveness of the developed system.

PROJECT ORIENTATION

The USAC Public Safety Subsystem project underway in Long Beach was initiated in March, 1970, and covers the complete development cycle in a 24 month period. It began with system analysis and includes system conceptualization, design, development, implementation, and evaluation. The project is chartered so as to result in a significant state-of-the-art advance in municipal information systems. It is not envisioned as a pure research project, however, but is committed to reaching operational status.

To maximize the utility of this project to other municipalities, all stages of conceptualization, design, development and implementation are being conducted with due consideration for system characteristics that enhance transferability.

To facilitate dissemination of information on activities relative to experience gained in the six project cities, HUD requested that all projects be organized into specific tasks. These tasks, as defined by the federal government are:

- Analysis—The project team will perform an in-depth analysis of the present operation of the Police, Fire, Civil Defense and Licensing/Code Enforcement agencies within the City of Long Beach.
- Conceptualization—Conceptualize the emerging information system including both manual and automated components.
- Design—Design in detail those system components selected for implementation by the City.
- Development—Complete programming and debugging tasks as required to achieve operational status.
- Implementation—Successfully maintain operation of the developed applications in the operational environment.
- Orientation and Training—Orient and train the affected personnel in the effective use of the system.

During the initial 12 months of activity, efforts were applied principally to the tasks of project organization, system analysis and system conceptualization. Excellent progress has been achieved to date. The following paragraphs provide a brief report on these activities.
ANALYSIS OVERVIEW

The objectives of systems analysis as stated in the Long Beach contract with HUD are:

- Analysis of the Municipal Governmental System—Broad examination of municipal affairs and the relationship of the Public Safety functions to those operations and other governmental agencies.
- Analysis of Current Operations—Detailed review of current information processes with a view toward attaining an in-depth knowledge of information carriers, flows, procedures, policies and requirements.
- Analysis of Decisions—Identification of decisions and the inter-relationship of those decisions currently made in the Public Safety functions.
- Analysis of Information Requirements—Definition of the existing data elements and their relationship to the decision making process.

The System Analysis Task findings, which were submitted to HUD in a 5-volume, 3700 page report, provide the foundation for subsequent project efforts. The significance of this effort is in the establishment of an accurate data base reflecting departmental needs. This data base is an essential information resource in designing an improved information system that is responsive to the operational needs of the city. Through a thorough analysis, we are assured that the Public Safety Information Subsystem now under development is geared to actual information needs, rather than hypothetical requirements.

Computer aided analysis techniques

Analysis of the information flow through the agency on both an interdepartment and intradepartment level is a burdensome and time consuming job. As a result, the public safety project staff developed a complete system of computer programs called META DATA/1 to aid in the analysis of both content and flow of information in the public safety function. Capable of operation on current third generation computers, the META DATA/1 system consists of two phases, each of which begins with a systematic survey or interview procedure and culminates with a series of reports and a tape file of descriptive information about the data elements.

Phase I is primarily concerned with the forms and elements of data currently used in the agency. These forms (sets) and their composing elements are processed into a series of reports which are used in systems analysis and subsequent tasks. Phase II is concerned with the flow of sets through the agency and costs (total and by functional activity) of processing the respective sets. The resultant report provides subtotals at various levels and grand totals at the end of report are printed for the following quantities: (1) average monthly volume, (2) accumulated quantity, and (3) average monthly cost.

The elapsed time required and the cost of processing information at each functional operation is clearly identified. The application of the META DATA/1 to other localities represents another transferable feature in the planning, design, and implementation of municipal information systems and functional systems for public safety.

One of the outputs produced by META DATA/1, Phase I, used in the Police Department, is a listing in data element name sequence of each element on each of the 1088 forms identified. This automated processing of forms and data elements enabled the staff to uncover some very interesting facts relative to the Police Function in Long Beach including the following:

- There are more forms (1088) than employees (877).
- There are a total of 12,944 data elements in all forms.
- There are 384 data elements termed “NAME,” with 10 qualifiers (arrestee, employee, applicant, suspect, etc.).
- Many synonyms are used to describe the same data element (hand gun, pistol, automatic, revolver).

The Phase II outputs, which include a record of the handling of each form, are even more revealing. These reports provided for the following observations:

- The Police Department use 1048 separate files of all types.
- It costs approximately $170,000 per month, or 19 percent of the budget to process all forms.
- Five forms account for 35 percent of the cost (Crime Report, Field Report, Accident Report, Parking Citation, Arrest Report).
- Ten forms (1 percent of the total) account for 50 percent of the cost.

Perhaps even more significant than these isolated facts is the design tool which was available as a result of the automation of this data. First, these reports provide an objective indication as to where the highest potential benefit of automation lies. Second, they provide a complete cross reference of every file and every
organizational unit which is concerned with any given
form. This makes it possible to examine the entire
effect of any change in form design or process flow.
Third, the META DATA/1 outputs also provide a
complete cross reference of every form and every file
which is used by any given organizational unit. This
makes it possible to examine the entire impact of any
organizational change on the information system.

CONCEPTUALIZATION OVERVIEW

The project efforts are currently directed toward
detailed design of the applications which will be
implemented to demonstrate the USAC philosophy and
provide the City of Long Beach with certain operational
capabilities. The concepts upon which applications are
being designed are derived from the Conceptualization
Task Completion Report recently submitted to HUD.

The conceptualized Public Safety Information Sub­
system (PSIS) for the City of Long Beach adheres to
the general guidelines described in the HUD Request
for Proposals. To obtain a better understanding of what
municipal functions are included in the Public Safety
System, a brief discussion of the total municipal
information processes will be given followed by a
definition of those elements contained in the con­
ceptualization.

As defined by USAC, a total integrated municipal
information system can be viewed as consisting of four
functionally oriented subsystems. When viewed collec­
tively, the subsystems function in a united manner and
show a high degree of horizontal information inter­
change. The concept of municipal information sub­
systems was introduced in order to separate the total
system into manageable, functional groupings which
could be incrementally developed.

To further define the makeup of an information sub­
system, each is comprised of a group of related func­
tions. Functions within the context of this definition
may or may not follow organizational lines. They are,
however, characterized by the processing of information
to accomplish a specific goal, i.e., assessing, planning,
etc. In the Public Safety Subsystem, the functions are
identified as Police, Fire, Civil Defense and those
aspects of Licensing and Code Enforcement which are
applicable to the other three functions.

For further refinement, each function is thought of as
being composed on one or more components. The
component defines the points where similar information
is input, processed and output from the subsystems.
Primary emphasis was placed throughout the Con­
ceptualization Task on the development of the concepts

<table>
<thead>
<tr>
<th>Function</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Police</td>
<td>Case Reporting</td>
</tr>
<tr>
<td></td>
<td>In-Custody</td>
</tr>
<tr>
<td></td>
<td>Traffic Reporting</td>
</tr>
<tr>
<td></td>
<td>Investigation Support</td>
</tr>
<tr>
<td></td>
<td>Calls-for-Service</td>
</tr>
<tr>
<td></td>
<td>Wants/Warrants</td>
</tr>
<tr>
<td></td>
<td>Vehicle/License</td>
</tr>
<tr>
<td></td>
<td>Stolen Property</td>
</tr>
<tr>
<td>Fire</td>
<td>Fire Suppression</td>
</tr>
<tr>
<td></td>
<td>Fire Investigation</td>
</tr>
<tr>
<td></td>
<td>Fire Prevention</td>
</tr>
<tr>
<td></td>
<td>Fire Dispatching</td>
</tr>
<tr>
<td>License/Inspection/Code</td>
<td>Fire Code Enforcement</td>
</tr>
<tr>
<td>Enforcement</td>
<td>Police Permit and Licensing</td>
</tr>
<tr>
<td></td>
<td>Civil Defense Shelter Licensing</td>
</tr>
<tr>
<td>Civil Defense</td>
<td>Shelter Management</td>
</tr>
<tr>
<td></td>
<td>Resources</td>
</tr>
</tbody>
</table>

for components since they represent the operational
elements of the information subsystems. Table II is a
listing of the functions and their related components as
identified in Long Beach.

Each of the components is defined as a logical
implementation block which can be developed and
implemented either singularly or in conjunction with
several other components.

Public safety horizontal and vertical interfaces:
design concepts

The vertical subsystem may be described as the sub­
system which links various levels of government along
functional lines. Within public safety, the vertical
relationships between city, county, region, state, and
federal levels of government are well defined and
structured as compared to other similar municipal
relationships.

The most pronounced vertical intergovernmental
relationship is in the Police Information function
because of presently established interfaces between the
regional, statewide, and federal criminal justice in­
formation systems. For example, the Long Beach
system must interface as shown in Table III.

Public Safety is a subsystem to not one, but many
information systems at various levels of government.
It does become a logical building block for the other
systems since it is operational in the municipal govern­
ment structure.
USAC has stated that “as a matter of emphasis, this project is aimed at the discovery, establishment and automation of the horizontal subsystem.”

A horizontal subsystem may be described as a set of data linkages which exists between one subsystem and another, one function and another, or one component and another. These linkages appear in three primary forms:

- Informal—phone calls, meetings, etc.
- Formal hardcopy interchange—memos, reports, etc.
- Data Sharing

The latter form is the one most subject to automation and is, therefore, the prime target of project effort. A three step approach to the development of design concepts was adopted.

**Subsystem concept**

In order to perceive the rather complex array of interfaces to which the Public Safety Subsystem contributes, it is necessary to examine each function of each subsystem at the component level. For ease of understanding, the project team has chosen to classify components as to their nature. Components are identified according to the following classes:

- Supportive components—Those information processes concerned with the internal operations of one or more functions.
- Environmental components—Those information processes concerned with collection and maintenance of data which describes the community or environment to be served.
- Operational components—Those information processes which are triggered by specific events such as crimes, fires and so forth.

In view of the fact that those components defined as supportive and environmental in relation to public safety are also operational components in other subsystems, they were not included in the conceptualization of the Public Safety Subsystem. Table IV illustrates the horizontal linkages which exist in relation to public safety at the subsystem level.

As indicated in Table IV, the various data bases are the mechanism which implements data sharing. In other words, data base concepts are employed because they are in fact an operational necessity of the system. The technical benefits derived are only incidental and were not the motivating factor behind this approach.

**Function/component concept**

After arriving at a general conception of horizontal relationships at the subsystem level, the project team looked next at the function level and at components within each function. The perspective of the data bases as a data sharing mechanism was maintained. The rationale behind the identification of components as presented is too lengthy to go into here, but the result of this step is illustrated in Figure 1.

---

**TABLE III—Typical Systems Interface**

<table>
<thead>
<tr>
<th>Government Level</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>NCIC (National Crime Information Center)</td>
</tr>
<tr>
<td></td>
<td>SEARCH (System for the Electronic Analysis and Retrieval of Criminal Histories)</td>
</tr>
<tr>
<td>State</td>
<td>Auto-Statis (California Highway Patrol)</td>
</tr>
<tr>
<td></td>
<td>DMV-AMIS (Department of Motor Vehicles—Automated Management Information System)</td>
</tr>
<tr>
<td></td>
<td>CJIS (California Criminal Justice Information System)</td>
</tr>
<tr>
<td>Regional</td>
<td>RJIS (Los Angeles Regional Justice Information System)</td>
</tr>
<tr>
<td></td>
<td>AWWWS (Los Angeles Automated Want/Warrant System)</td>
</tr>
</tbody>
</table>

**TABLE IV—Horizontal Linkages**

<table>
<thead>
<tr>
<th>Public Safety Horizontal Interfaces</th>
<th>Supportive</th>
<th>Environmental</th>
<th>Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>People Data Base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical and Economic Development</td>
<td>Property Data Base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance</td>
<td>Fiscal Data Base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Safety</td>
<td>People Data Base</td>
<td>Property Data Base</td>
<td></td>
</tr>
</tbody>
</table>

- Environmental components—Those information processes concerned with collection and maintenance of data which describes the community or environment to be served.
- Operational components—Those information processes which are triggered by specific events such as crimes, fires and so forth.
Figure 1—Public safety subsystem conceptualization

Data base concept

To implement the subsystem function and component design, we have reached a point at which information technology must be employed to the full extent of its capabilities. Without attempting to address the organizational issue of centralization, it does seem clear that informational centralization is necessary to implement the Long Beach Public Safety concept. Informational centralization, in contemporary terms, is an integrated data base.

The Data Base Management Software (DBMS) technology to be employed in Long Beach has three primary attributes which are essential to informational centralization.

The first attribute, of which much has been written and little has been done, is the “integrated data base.” The integrated data base technique of storing data in a computer system differs from the traditional approach in terms of the means used to associate elements of data together. It has been traditional to associate data together in terms of use. In contrast, the integrated data base approach suggests that data be associated by object.

There is considerable evidence that association based on object will reduce operational costs associated with redundant acquisition, storage and maintenance of data while at the same time improve the currency, accuracy and reliability of the data. The second attribute provides the capability for the information system to tolerate change.

Development of an integrated information system, of the scope anticipated for the Long Beach Public Safety Subsystem, requires an incremental approach. This approach necessarily assumes that additions may be made without major modifications to initial programs or components. Were this not the case, an incremental development would be economically impractical.

To resolve the problem, data definitions are separated from the program. This approach creates a software environment which supports a single data definition, known as a “data dictionary”, that is shared by all programs accessing the file.

The data dictionary facilitates the development of a system which permits independent evolution of both the data files and programs without excessive modifications to either, as only the dictionary requires maintenance, not the programs.

In keeping with the idea of organizing data by object, the Public Safety Subsystem employs two primary data bases: People and Property.

The Property data base (Figure 2) acts as a data sharing mechanism at the subsystem level between all four subsystems, and the function level within Public

Figure 2—Segment detail of a property data base

Figure 3—Segment detail of a people data base
Safety between Fire, Police and Civil Defense and at the component level within the Fire Function between Dispatch, Suppression, Prevention and Investigation.

The People data base (Figure 3) acts as a data sharing mechanism at the subsystem level between all four subsystems, and at the component level within the Police Function between in-Custody, Case Reporting, Investigation Support, Calls for Service and Traffic Reporting.

PERSPECTIVE

During the remainder of this project, Long Beach will proceed with the phased implementation of selected applications to substantiate the hypothesis proposed by the concepts developed. The conceptualization described above is expected to evolve into a multi-year implementation plan for the City of Long Beach and become the basis for planning in other municipalities.

If the Long Beach Public Safety Subsystem is successfully transferred to another jurisdiction, the USAC objective of transferability will be validated. This can occur only if the recipient municipality openly approaches change to its existing policies and operations. Such change appears to be desirable in view of anticipated benefits to be derived from the implementation of an integrated municipal information system or subsystem.