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Paul M. Whisenand

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AUTOMATED POLICE INFORMATION SYSTEMS: AN ARGUMENT FOR VERTICAL AND HORIZONTAL INTEGRATION*

PAUL M. WHISENAND

Paul M. Whisenand Ph.D. is Associate Professor of Criminology, California State College, Long Beach and serves as Director of the Institute for Police Studies, the research and training unit of the department. Dr. Whisenand is a member of the California Crime Technology Research Foundation which serves as the Science and Technology Task Force to the California Council on Criminal Justice and is currently acting as a consultant to the Long Beach Public Safety Information Subsystem Project which is developing and implementing an integrated computer-based public safety information subsystem for the City of Long Beach.

There are three fundamental and interdependent reasons for the writing of this article. First, as a Research Associate on the Municipal Systems Research Project (1965-68) at the University of Southern California this author learned that there is definitely a difference between a dog's and a computer's bite. Through a set of combined understandings in the field of computers and local government, the project eventually conceived a computer-based, municipal information system. The writer was responsible for developing the police information subsystem. An automated or computer-based police information system and subsystem can be defined as:

A police information system consists of people, computer equipment and related programs, a dynamic data base, and institutional procedures interacting in a prescribed systems pattern. It is designed to collect, store, update, and facilitate the automated use of data on a continuing basis. Such data and its processing and analysis are related to both the internal affairs of the police organization and the external environment. The manifold purposes of such an information system are to meet operational requirements; to facilitate various summarizing or analytical techniques relevant to the definition of community problems; to assist the search for program goals; to generate cybernetic flows for evaluation and control; and to permit the exchange of information among governmental units (other law enforcement agencies, criminal justice agencies, and non-law enforcement government organizations) and with the public.¹

The second reason centers on the results of a study. Recently, the writer and a colleague surveyed 592 municipal police departments to determine their existing and anticipated future automated data processing (ADP) applications.² The response was most gratifying—42% of the questionnaires were returned. This figure alone signifies both an appreciable interest and activity in automated police information systems.

The growing interest and developments in ADP on the part of local law enforcement agencies is the third reason. So many departments are now getting involved in computer-based information systems (which brings them into contact with hardware/software manufacturers, designers, private consultants, and the various levels of governmental organizations), and with their different approaches (vertical, horizontal, total, integrated, databank, etc.) that the subsequent analysis and thinking should be both timely and useful to the concerned reader. The discussion is divided into four parts: (1) a brief review of the research findings derived from the survey, (2) a perspective on emerging automated law enforcement information systems, (3) a discussion of the often ignored but critical developments in urban information systems, and (4) a potpourri of challenges and concerns that confront all of us.

STATE-OF-THE-ART: POLICE ADP

As expected, the response to the questionnaire and the use of ADP was directly related to the size

tion, A PILOT STUDY OF A MUNICIPAL CIVIL DEFENSE INFORMATION SUBSYSTEM, QUARTERLY TECHNICAL REPORT No. 2 (Los Angeles: Municipal Systems Research Project, University of Southern California, 1967), pp. 2-A-1-2-A-18.

² For details not covered in this paper, see Paul M. Whisenand and John D. Hodges, Jr., *Automated Police Information Systems: A Survey*, DATAMATION, 91-96. (May 1969).

* This article was presented, in part, as an invited address to the Computer Applications in Law Enforcement, User Requirements Conference (October 21-23, 1969), at the Franklin Institute Research Laboratories, Philadelphia, Pennsylvania.

¹ William H. Mitchel and Kenneth L. Kraemer, *Municipal Information and Decision System Specifica-*

of the city.³ For example, 67% of the cities with population over 500,000 responded, while only 36% of cities with populations under 50,000 responded. Of the police departments responding, 110 or 44% indicated that they were using some form of automatic data processing. The proportion of cities using ADP in the five categories ranged from 100% of the cities of 500,000 population or more to only 18% of the cities with populations below 50,000. The police departments were also asked if they had plans to implement a data processing system in the next three years and an additional 49, or 19% indicated that they had plans to install ADP within a year.

The basic results of the survey as related to ADP use are summarized as follows:

1. Of the police departments responding (251 of 592—42%), a group of 110 or 44% indicated that they were using automatic data processing.
2. By 1971 this group can be expected to increase to 159 or 63% of the departments responding.
3. A vast majority of the ADP equipment being used are computer systems (84%) as compared to electronic accounting machines (16%).
4. The future trend is also definitely in favor of computer systems although the proportion of computers to electrical accounting machinery (EAM) will remain about the same.
5. The use of ADP is directly related to city size, with the larger cities more likely to use ADP than smaller ones.
6. There seems to be no definite trend at this time that establishes a pattern of control, operation, or location of ADP equipment. Some 50% of the departments reported that they operate their own equipment, and the sentiment in law enforcement is in favor of police control of their own systems.
7. Automatic data processing, while not new to law enforcement (21% of the departments with ADP were using it prior to 1960), is relatively new to the mass of municipal police departments, as 60% of the responding agencies with ADP have started using it since 1964.
8. Within the next three years some 46% (or 51 of the 110 respondents using ADP) will up-

³ *Ibid.*

Table 1
CURRENT ADP APPLICATIONS BY POLICE
DEPARTMENTS (N = 110)

Current ADP Applications	Number of Departments	Percent of Departments
Traffic Accidents	56	51
Parking Citations	55	50
Traffic Citations	54	49
Arrested Persons	45	41
Criminal Offenses	44	40
Personnel Records	43	39
Financial-Budget	40	37
Police Activities	39	36
Patrol Distribution	33	30
Juvenile Activity	33	30
Stolen Property	31	28
On-Line Inquiries	30	27
Vehicle Registration	29	26
Vehicle Maintenance & Costs	29	26
Warrant File	28	25
Offense Location	25	23
Inventory Control	21	19
Message Switching	4	4

Source: Paul M. Whisenand and John D. Hodges Jr., "Automated Police Information Systems: A Survey," *Datamation*, 15 (May, 1969), p. 94.

grade their information system with more sophisticated equipment.

9. In terms of current ADP applications the most often used applications are in the traffic field; with traffic accidents, parking citations, and traffic citations ranking one, two, and three in use (See Table 1). The other categories of applications—crime-related, police operations and police administration—are scattered throughout the rest of the list, although all of the crime-related applications were reported as being applied by at least 25% of the departments. On the average, the data indicates that currently there are some 6.5 applications being used by each municipal police department.
10. The most significant increases, both in number and percentage, over the number of departments previously using an application is for message switching, warrant files, offense location, and stolen property (see Tables 2 and 3).
11. The applications that show a significantly below-average increase are the traffic-oriented items and the financial budget applications.

Table 2
PROJECTED ADP APPLICATIONS BY POLICE
DEPARTMENTS (N = 110)

Projected ADP Applications	Number of Departments	Percent of Departments
Arrested Persons	106	96
Traffic Accidents	103	94
Criminal Offenses	102	93
Personnel Records	100	91
Traffic Citations	99	90
Warrant File	96	88
Police Activities	95	86
Stolen Property	93	85
Parking Citations	92	84
Patrol Distribution	88	80
Financial-Budget	88	80
Juvenile Activity	86	78
On-Line Inquiries	80	77
Offense Location	77	70
Vehicle Maintenance & Costs	75	68
Inventory Control	74	67
Vehicle Registration	64	58
Message Switching	42	38

Source: Paul M. Whisenand and John D. Hodges Jr., "Automated Police Information Systems: A Survey," *Datamation* 15 (May, 1969), p. 94.

12. The applications which show the greatest numerical increase (number of additional departments using the application) are warrant file, stolen property, arrested persons, and criminal offenses.
13. The two significantly increased categories show a trend towards a greater emphasis on the use of the computer in crime-related operations and real-time, immediate response information systems that will aid in day-to-day field operations.

The findings of this survey research effort are encouraging (that is, they are encouraging if one is convinced of the benefits of data processing for local police agencies). The survey data substantiate a sizeable degree of involvement by police agencies with data processing technology. Moreover, all indications are that the degree, both in terms of equipment and applications, will continue to increase. *Because of current and future federal assistance, this increase will occur at a previously unanticipated rate.* By this we mean that the normal course of data processing developments in the police field will be vastly changed through the input of federal financial aid to local law enforcement and other criminal justice agencies.

THE INTEGRATION OF AUTOMATED LAW ENFORCEMENT SYSTEMS: VERITABLE TOWERS OF VERTICALNESS

This section is based on three premises. First, all of us that are either in or associated with law enforcement are enamored by the potentialities of computer-based systems. Second, the vast majority of your systems design and implementation efforts to date focus on vertical intergovernmental law enforcement relationships. Note that this means you are only *partially* integrated (in a vertical sense). Third, that you would concur with the Intergovernmental Task Force on Information Systems when they recently reported:

It is often difficult to exchange information quickly and economically among governments;
Information is often unreliable, and difficult to summarize and evaluate;
There is unnecessary duplication of systems dealing with similar kinds of information;
Unreasonable and conflicting demands for information are sometimes placed upon the lower levels of government;
State and local governments are frustrated in attempts to develop coordinated, unified systems;
Scarce resources are being wasted unnecessarily.⁴

Now the crux of the message—we are progressing quite well with the building of automated law enforcement information systems. Clearly acronyms such as: LEADS, PIN, ALERT, LEMRAS, NYSIIS, CJIS, NCIC, having meaning to some. Note, however, that the term "integrated" was not placed before that of "automated." To explain, while several systems exist or are being rapidly developed, the important linkages for an integrated law enforcement information system have not been created. The experiments over the last decade have demonstrated that the technical subsystems can be devised to produce at least the results intended by their designers. But the storage and retrieval, managerial problem-solving, and process-control capabilities of the computer have yet to be put together into a single operating police system (though such unified systems do exist in the industrial world). Consequently, our "veritable towers of verticalness" are being forged with weak linkages, both internally and externally. Internally, on the one hand, we find that the various law enforcement information systems have not been effectively inte-

⁴Intergovernmental Task Force on Information Systems, *The Dynamics of Information Flow* (Washington: U.S. Government Printing Office, 1968) p. 1.

Table 3
SUMMARY OF PROJECTED INCREASED USE OF ADP APPLICATIONS BY 110
POLICE DEPARTMENTS REPORTING ADP OPERATIONS

Type Increase	ADP Application	Number of Additional Depts.	Percent Increase in Use	Percent Increase of Depts.
Significantly Above Average Increase	Message Switching	38	950	35
	Warrant File	68	243	62
	Offense Location	52	210	47
	Stolen Property	62	200	56
Above Average Increase	On-Line Inquiry	50	166	45
	Juvenile Activity	53	160	48
Average Increase	Vehicle Maintenance	45	155	41
	Vehicle Registration	35	155	32
	Inventory Control	53	153	48
	Patrol Distribution	55	150	50
	Police Activities	56	144	51
	Arrested Persons	61	140	55
	Personnel Records	57	133	52
	Criminal Offenses	58	132	53
Significantly Below Average Increase	Traffic Accidents	47	84	43
	Traffic Citations	45	83	41
	Financial-Budget	48	83	44
	Parking Citations	37	68	34
Average	All Applications	51	144	46.5

Source: Paul M. Whisenand and John D. Hodges Jr., "Automated Police Information Systems: A Survey," *Datamation*, 15 (May, 1969), p. 95.

grated. On the other hand, we can see that our development of external linkages are poor at best.

Obviously this author is not the only one to discern the described hang-up Witness Project Search which is one attempt (and a highly important one) to improve needed linkages—within law enforcement and between other criminal justice organizations. The concern for relating law enforcement information systems to other government information systems is discussed later.

Briefly, Project Search (System for Electronic Analysis and Retrieval of Criminal Justice) is a research and demonstration study of the value and feasibility of: (1) the instant retrieval of criminal history data by criminal justice agencies on a national basis, and (2) a national statistics service. Note the term "criminal justice", for it includes law enforcement, prosecution, courts, probation, corrections, and parole organizations.

Let us examine in more detail the two primary goals of Project Search. To repeat, *the first goal is the development of a system for the interstate exchange of criminal history data.*⁵ It will revolve around a

⁵ The following tasks relate to the establishment of a criminal history file:

1. Each participating state will provide approximately 10,000 offender records for purposes of the project demonstration scheduled for July and August 1970.

2. A national index to these records will contain identification data on offenders and the name of the state(s) in which records of each offender are held. The Project Group has asked the FBI (NCIC) to operate this national index. The specific content of the index file will be determined in the near future.

3. Each participating state will be able to enter directly the computerized files of any other participating state with a standardized inquiry format to retrieve data on properly identified offenders.

4. Each of the participating states will provide for access to its system by one remote terminal in each of the other participating states with appropriate hardware and software to respond to this remote operation.

5. The Standardization Task Force is considering the desirability of a model statute for all states to adopt regarding privacy of records.

6. The offender records will not be manipulated for use in the statistical system for purposes of the project demonstration.

For further details see the bulletin *Project Search*, 1 (September, 1969).

central index, directly accessible by each of the participating states, which supplies the name of the state holding the required record. Information can then be directly accessed from the holding state by the requesting state. *The second goal is the development of a criminal justice statistical system.*⁶ It will consist of a set of summary statistical data files on a computer whereby there can be immediate and meaningful analysis and comparison of the summary data submitted by the states.

To sum up this section, we have seen to it that information linkages, admittedly somewhat weak and few in number, have been forged among police agencies from the local through the state to the federal level of law enforcement. We have only begun to look outside our borders for meaningful linkages between law enforcement and other criminal justice components. Even less attention has been given to the advantages of linkage—the sharing of certain types of information—with other government departments such as fire, disaster planning, licensing, personnel, finance, and so on. Project Search plus other efforts on the part of a growing number of state governments will assist in the development of information systems that encompass and interrelate all of the criminal justice components. The next section reviews an endeavor to develop information systems that encompass and interrelate all, or at least a part, of the departments within a single local government jurisdiction.

VERTICAL AND HORIZONTAL LINKAGES

There is an unequivocal sign of growing interest on the part of the major urban oriented Federal agencies in developing urban information systems and subsystems. "Request for Proposal No. H-2-70 for Municipal Information Systems" is a significant step in that direction. It is the product of a unique body of representatives from several Federal agencies known as USAC (Federal Urban

Information Systems Inter-Agency Committee). USAC is a mechanism for marshalling and coordinating the interest in urban information systems formally created in September 1968 by the Secretary of the Department of Housing and Urban Development. The following agencies are represented:

Department of Housing and Urban Development
Bureau of the Budget
Department of Transportation
Department of Health, Education and Welfare
Department of Labor
Department of Commerce
Department of Justice
Office of Economic Opportunity
Department of the Army, Office of Civil Defense
The Committee, chaired by HUD, reports to the Secretary of HUD.

Briefly stated, USAC's goal is to build urban information systems and subsystems—now and well into the future. Their bywork is *integration*; consequently their goals are four in number:

1. To improve the information and decision-making capabilities of municipalities.
2. To provide a broader approach in the research and development of municipal information systems, specifically the following:

To encourage the standardization of data and inventories of data, both vertically through successive levels of government, and horizontally at each level.

To develop economic solutions to the problems of data acquisition, data management, and data use.

To develop solutions to the problems generated by sensitivity of information, e.g., the protection of confidentiality.

To develop solutions to the problems of subsystems and system linking, both vertically and horizontally, e.g., the technique of facilitating systems compatibility and/or interfacing.

3. To learn more of the impacts of the implementation of municipal information systems, e.g., their implications for administrative organization and behavior.
4. To provide for expansion and interfaces with other public or private systems, and for interfaces with existing municipality-related planning agencies, e.g., in urban transportation and comprehensive area planning.

Further, USAC has listed special requirements in

⁶ *Ibid.* The following items relate to the creation of a national prototype statistical service:

1. Statistical information in the project demonstration will consist mainly of summary statistics from *existing* state series.

2. The first task of the prototype statistical service (an organization to perform this function will be selected later) will be to construct a computer file of summary data based on the inputs provided by the participating states.

3. The center will perform comparative analyses on the data submitted from the states and will produce routine reports.

4. The prototype service will respond to special inquiries if practicable, but will provide no capability for on-line statistical manipulation or data retrieval during the project.

connection with: (1) data acquisition, (2) data base management, (3) data release, (4) data standardization, (5) geocoding, (6) interfacing, (7) documentation, (8) transferability, and (9) monitoring and evaluation.

USAC is firmly dedicated to the proposition that the fundamental building block of urban and other governmental information systems is the municipality. This is to say, most governmental information systems, whether jurisdictionally (a single government area) oriented or functionally (for several jurisdictions on various levels of government) oriented, rest upon municipal information systems.⁷

To begin with, USAC has funded two fully integrated municipal information systems, which includes all major functions performed by the municipality (approximately \$3 million per system over a three-year period). Besides integrating the processes of municipal operations and administration, the system will interface with the external environment served, and other levels of government. At the same time it has awarded contracts for four subsystems (about \$500 thousand each) of an integrated municipal information system (the City of Long Beach, California received the grant for the public safety subsystem).⁸ Each subsystem will be integrated within itself and designed for eventual integration with other subsystems, thus forming a totally integrated municipal information system.

Since USAC defines local law enforcement as a part of a public safety subsystem (police, fire, civil defense, and licensing), let us enlarge upon their concept of both "systems" and "subsystems." Essentially, USAC defines municipal government as a *system*. Groupings of related municipal governmental functions are defined as *subsystems*. Thus, functional groupings such as public safety, human resources development, physical and economic development, and public finance can be thought of as subsystems, where the municipal government is defined as the system. These functional groupings, however, may or may not correspond to organizational units within the municipality. Therefore, an important distinction must be made at this point. That distinction is between organizational units to which functions are assigned and information subsystems of a municipality. *The latter are in-*

dependent of any organizational structure. To put it another way, an information subsystem can be defined in terms of information input, storage, processing, transmittal, and output. Thus, except with respect to size, municipal information subsystems are defined exactly the same as the integrated municipal system.

When we examine municipal subsystems, we find that they are comprised of several functions. Each function consists of one or more components. For example, the police function includes, among others, the components of law enforcement, traffic control and safety, emergency and special services, and various support activities. A single component may contribute to the fulfillment of more than one municipal function. The utility of the component concept is that the component level is where information and functional subsystems can be considered to coincide. Hence, the two in combination provide a means for grasping the input and output points of the municipal information subsystems.

Further, USAC believes that subsystems have three dimensions: vertical, horizontal, and sophistication. First, vertical subsystems are a grouping of components which are reasonably related to common goals and activities, and arranged in a hierarchical manner to constitute a functional subsystem. Vertical subsystems are, therefore, functional systems. Illustrative of functional subsystems are: police, fire, planning, building, recreation, finance, and public works.

Second, horizontal subsystems are mechanisms which support automated linking of data within and among vertical functional subsystems. A variety of classifications is available. One which is frequently used divides the horizontal system into three subsystems, each identified by the kind of information which flows in it, i.e., information about people, property, and money. The critical problem in the design of horizontal subsystems is organizing the data in such a way that any current or future requirements for a combination of data, e.g., from more than one horizontal subsystem, can be made readily available.

The dimension of sophistication facilitates the conceptualization of incremental development of the information system capabilities. At the least sophisticated level are automated data processing techniques employed in the administrative affairs of the municipality. These include personnel, finance, and property accounting, billing and disbursing, registering and licensing, and other routine tasks. The next level of sophistication is the

⁷ A diagram of such a proposed system can be found in *Request for Proposals No. H-2-70 for Municipal Information Systems* prepared by the Dept. of Housing and Urban Development (Washington: Government Printing Office, 1969) at p. C-45.

⁸ See *op. cited* note 7 at page C-58.

support of operational control in a municipality. This includes scheduling, dispatching, allocation and monitoring, e.g., traffic control, and command and central emergency vehicle dispatching. Emphasis here is on a rapid response capability, and therefore the on-line, real-time mode is more generally appropriate. A third level of sophistication is in terms of the hardware, software, and files required for planning support. Here, both batch processing and on-line, real-time modes are important. Generalized software required includes PERT and/or CPM for planning and scheduling, simulation, and statistical analysis programs. The ultimate level of sophistication is at the policy-making and management level. Here the requirement is at its fullest development: exception-reporting, time and event triggered report generation, and monitoring administrative processes.

In summation, as yet, there is no urban government information system or police subsystem utilizing the USAC approach. Regretfully, even recent or proposed urban information systems will not meet the USAC criteria. Full integration (verticalness, horizontalness, and a high degree of sophistication) are a hoped for state of development contained in H-2-70.

CHALLENGES AND CONCERNS: SOME REQUIREMENTS ON THE POLICE ADMINISTRATOR

It is appropriate that we move into an examination of some of the more demanding challenges to the police administrator.

First, there is the omnipresent requirement for police administrators to improve their *intellectual* accessibility to computers in order that it matches their growing *physical* accessibility.⁹ Who would question the thinking that expanding use of computers in police operations is inevitable? This rapidly growing use calls for an interest and investment of time that goes beyond the occasional reading of a journal or taking of a class. The computer (if it is not already) will become a potent force in your police organizations. It is up to every administrator to acquire the significant level of understanding necessary to harness this source of intellectual energy. Now the question: when and how?

Second, in conjunction with our efforts to

develop vertically oriented police and criminal justice information systems; how can we do so faster and with a greater degree of effectiveness? A portion of the answer lies with such projects as Search, NCIC, NYSIS, CJIS, LEADS, and so forth. However, the question remains—what can we do to accelerate the development of the necessary data bases at the local level of government? Further, what can we do to insure ourselves that they will be integrated with one another? Herein lie the major barriers to the creation of effective vertical police and criminal justice information systems.

Third, in the absence of any desire to establish horizontal (linking) subsystems at the local level of government: how can we instill an interest in at least exploring the potentialities and advantages of such subsystems? HUD and USAC are only a partial answer to this challenge. While progress in the use of computers in police work has been acceptable to a large degree, the gap between the computer's technical capability and its practical application is growing wider. Their effective use will require a change in police management strategy, in management's attentiveness to their full exploitation, and ultimately to the automated linking of information within and among the vertical subsystems that constitute the urban government information system.¹⁰

Four, simply stated, where are our police "management information systems?" Police management is largely a process of handling information: selecting it, comparing it, acting upon it.¹¹ From people, from paper, from personal observation, the police manager is deluged with data. *Selecting* which data to give his attention to is the manager's first, though often implicit, information-handling task. The *comparison* task is even more subtle and complex, for here the police manager must relate the new data he selects to the old he already possesses. This comparison function is the crux of decision making—it touches setting goals (where do we want to be, compared to where we are), es-

¹⁰ Perhaps the strongest and certainly the most thoroughly documented argument in favor of horizontal linkages can be found in Municipal Systems Research, *The Municipal Information and Decision System Research Project: Phase One Final Report* (Los Angeles: Municipal Systems Research, School of Public Administration of Southern California, 1968).

¹¹ For a more detailed discussion of the managers' relationship to computers see Edward F. R. Hearle, *A Symposium: Computers in Public Administration*, 28 PUBLIC ADMINISTRATION REVIEW, 487-488 (November/December 1968).

⁹ This expression, as well as the thinking behind this particular challenge, is drawn from Herbert H. Issacs, *Computer Systems Technology: Programs, Projections, Problems*, 28 PUBLIC ADMINISTRATION REVIEW, 488-494 (November/December 1968).

tablishing programs (which of several programs offers the best comparative advantage), evaluating progress (how are we doing in comparison to our plans). Acting upon these comparisons is that personal step of human will which no machine can ever undertake. But information-handling machines—computers—are increasingly able to perform the managerial tasks of information selection and comparison.

It is ironic and distressing that despite the tremendous amount of attention that has been afforded the development of computer-based police management information systems that exist are not used in making policy decisions of any consequence. The solution here does not lie with us in the ivory tower; for, this nation has produced many more expert police administrators than police professors. There must be answers to the problems connected with police management information systems: what are they?¹²

Five, one of the most delicate and difficult problems growing out of the application of the computer to local police information systems is the potential invasion of personal privacy.¹³ Obviously our concern here is for the confidentiality of information. It is this use of confidential information that underpins existing confidentiality laws and regulations. Is this not the invasion of privacy that we fear as the computer age engulfs us? The issue is over the individual profile use of the information, not the more limited police use.¹⁴ Most of us are aware of the anxiety that burdens the back of a person if he has ever had a criminal conviction, or an alcoholic or mental or deviant incident, or any social liability—the almost certain rejection if he admits it, and the nagging fear of exposure if he hides it. These are truths that touch every man. They merit our deepest respect, and it is the major obligation of policy makers, systems designers, and police administrators developing data systems to

accept the limitations of record confidentiality, even at the cost of reduced efficiency. The striking of a balance demands, therefore, a penetrating analysis and decision on human privacy as compared to our need and right to know facts which serve to accomplish the goals of local enforcement: how and what does it look like?

Six, it is recognized by a few that at some point in the future, police organizations will be structured in accordance with the flow of information and the points of decision. Admittedly, today they are still highly compartmentalized by functional areas that are of our doing. However, without the full knowledge of information availability and flow, major organizational revisions of police departments based on information requirements will remain in limbo: how do we avoid inaction, what should be the design of our new organizational structures? Pointedly, is there any Biblical reference or inviolable rule concerning the way we should structure our formal organizations to fulfill their assigned goals—definitely not! Consequently, let us permit the flow of information and decision centers to assist us in determining how we should organize our working relationships.

CONCLUDING REMARKS

It is hoped that the challenges presented to the reader were: first, relevant; and second, irritating. Irritating because when we become sufficiently uncomfortable, we are motivated to seek out remedies that will cure the source of irritation. The recommendation is that we focus our vexation on:

1. Upgrading our intellectual capacity to that of the physical capacity of the computer.
2. Developing automated vertical police and criminal justice information systems at a faster pace and with better linkages.
3. Developing automated horizontal urban government information subsystems that integrate the data files of the various component parts comprising the government.
4. The design and use of police management information systems.
5. Establishing a workable balance between our need and right to know certain information about an individual, and his need and right for us not to know it.
6. Restructuring our police organizations to accommodate the flow of information in order that it supports the numerous decision centers within its boundaries.

¹² Some of the solutions to this challenge are suggested in *Second Annual Management Meet Examines the Milieu of MIS*, 15 DATAMATION, 106-107 (February 1969).

¹³ An excellent treatment of the differences between federal and local information systems and a recommended plan for maintaining record confidentiality in local information systems is provided by Albert Mindlin, *Confidentiality and Local Information Systems*, 28 PUBLIC ADMINISTRATION REVIEW, 509-518 (November/December, 1968).

¹⁴ For a comprehensive discussion of the subject of computers, government, and human privacy see *The Computerization of Government Files: What Impact on the Individual?* 15 UCLA LAW REVIEW, 1371-1498 (September 1968).