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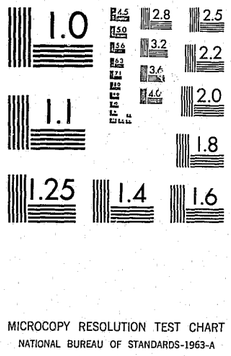

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STUDY OF POLICE MANAGEMENT INFORMATION SYSTEMS

VOLUME I: TECHNOLOGICAL ALTERNATIVES AND DEVELOPMENT INITIATIVES FOR CANADIAN POLICE

by

Robert M. Atcheson
Robert G. Hann
Jane I. Palmer
Clifford D. Shearing
Ted M. Zaharchuk
(Project Director)

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Canada

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CHAPTER I

INTRODUCTION

In the spring of 1976, Decision Dynamics Corporation was asked by the Ministry of the Solicitor General to conduct a study of police management information systems for Canadian municipal police forces.

The objective of the project is: to develop management information systems specifications that could be used by Canadian police departments to guide future information systems development. Documents developed through the study represent source books, handbooks or standards which police forces can use to identify first, their own information requirements, and second, the general specifications of information systems required to meet these needs.

This volume is the first of five separate reports which together, comprise the total documentation arising out of the "Police Management Information Systems" study. They are:

- Volume I: Technological Alternatives and Development Initiatives for Canadian Police; in this volume we project current trends in policing for Canadian municipal jurisdictions and their implications on the need for MIS in the future.

- Volume II: Police Management Information Systems Development in the United States: A Comparative Review; in this report, we review MIS development in American police jurisdictions and extract a number of basic "lessons" for the Canadian audience.

- Volume III: Police Management Information Systems: The Canadian Experience; here we describe MIS initiatives in a number of Canadian police forces and conclude with comments about the development process in the Canadian environment.

- Volume IV: Targeted Information Processing System (TIPS): A Development Program for Police Management Information Systems; this volume contains a conceptual framework for developing a management information system in a Canadian police jurisdiction. The major emphasis is on "why?" and "how?". We view this volume as a "catalogue of procedures" on developing police MIS.

- Volume V: Targeted Information Processing System (TIPS): General Design Specifications; this final volume contains most of the technical design qualities of the TIPS framework presented in the previous Volume. Each TIPS component is described by a general flow chart illustrating inputs, output reports and file interactions. The content of each file is described in terms of the various record types and data elements.

These five volumes are "stand-alone" in scope. Each can be read without reference to the others. Each contains a perspective on police MIS at a different level of generalization and detail.

In addition to these five major volumes, we have provided a short monograph entitled, Police Management Information Systems Study: Summary and Conclusions. This is designed for more extensive distribution to a broader audience which may be interested only in the highlights of the project.

A. The Meaning of Management Information Systems

It is difficult to define management information systems (MIS), primarily because the term and its application in police forces, includes such a broad range of issues and operating functions. Consider a basic definition of MIS, i.e.,

> It is the entire set of information handling procedures and instruments designed to collect, store, retrieve and deliver information to appropriate individuals in an operating organization. It satisfies the needs of operations (records and documentation), operational management (monitoring and control) and planning (forecasts to anticipate the future).

This basic definition suggests that every organization has an operating MIS. Without an MIS, an organization could not exist. Information, broadly defined, is the basic issue of management. As a result, when we consider the operation of an MIS, we must review all aspects of management in the organization and show how information intersects with decision-making. This is why the subject matter of MIS seems so broad.

Yet, traditionally, MIS is described in a much narrower domain. Since modern management information systems have become increasingly dependent on computers, many police administrators have begun to think of MIS solely as an application of computer science. This notion has confused the issue of MIS. Computers are necessary in modern information systems. As machines become less expensive due to technological change, and labour becomes increasingly expensive, there will be strong economic pressures in policing to use machines for information storage and retrieval. However, our major point is that MIS goes beyond the issue of computer hardware and software.

Our understanding of MIS suggests that the process of MIS development in Canadian policing must consider the computer issue within a much broader context of: How should information be collected and retrieved relative to its use for police operations and management. We focus on information use in police forces. This is the proper starting point for effective and efficient police MIS in Canada.

Throughout the remainder of this volume, we will use the term MIS to mean "better methods for organizing, capturing and distributing information". The development of this type of process involves the application of technology and concepts which do not yet exist in all Canadian police agencies. So, although all police agencies have some sort of MIS, we argue in this study for improved MIS which makes better use of the available technology.

B. The Purpose of This Volume

The focus of this volume of our study is on the adaptation of new technology by policing. MIS is a new technology. We develop a general historical perspective on new technology in policing to help interpret the conditions under which MIS will be implemented by Canadian police forces in the future. In other words, through this volume, we want police officers to view MIS in terms of characteristics which are common to, for example, a new communications system which fundamentally alters the "proximity" of senior levels of command to deployment of field officers. An understanding of the common properties of all new technology and its effect on police management will assist police with the implementation of new technology in the future.

We wish to demonstrate three fundamental propositions about MIS and the application of technology in police jurisdictions.

Our first proposition has already been discussed. For police departments, MIS represents a new technology. It contains properties that characterize all other new and unique forms of technology. Its application in a police department requires new support procedures. Police using this technology will be carrying out policing functions in a fundamentally different way. There is a new language associated with this technology and a host of new skills required for its successful implementation. Finally, like most other forms of new technology, MIS is "capital intensive", as opposed to labour intensive. That is, MIS

is essentially embodied in machines. It increases the police force's dependence on machinery, which in turn, improves the productivity of personnel.

Our second proposition is: new MIS technology is being developed outside of the police sector. Primarily, it's industry which is moving rapidly to develop greater computing and communications capacity in smaller and less expensive machines.

Since the technology is being developed in another sector, it must be adapted for police use. Computers are being developed with languages and specifications written in general forms. These forms must be interpreted in each sector, such as policing, where they are being applied. There is an obvious concern for proper interface between the police sector, with its own peculiar language of , and the "new technology electronics sector", with its own peculiar language and protocol. In order to effectively adapt the new MIS technology to policing, two conditions must be met:

- new skills must be developed within the police jurisdiction; and,

- senior decision-makers must be convinced that the new technology is valuable to policing.

The third proposition is: policing exists in a stable, well-defined and conservative environment. Change does not take place quickly in policing. Although police operations have changed significantly during the last 50 years, the role of the police in society, or the nature of their jobs, or even the public perception of police, has not changed drastically.

The evolution of police institutions over time has been characterized by stability. There is a "history" of police science. At any particular point in time, there are fairly well-defined rules of behaviour characterizing police departments. Police officers, and all other personnel associated with policing, identify with the general aims and objectives of policing and its role within the criminal justice system.

This final proposition suggests that we can trace the evolution of policing. We can examine the social, political and economic influences which have had an effect on the police jurisdiction. Finally, we can assess the changes in these conditions and postulate their possible effect on policing in the future.

These three propositions underline all of the material presented in this volume. We can now define the objectives of this volume in terms of each of the succeeding chapters.

C. The Remainder of This Volume

In the next chapter, we review the historical development of modern policing. The review is concise and focuses on the major themes in history which have combined to determine the scope of the modern, urban police department. We conclude that new police technology, in the long term

historical context of the last century, has influenced the style of policing. It has encouraged a reactive police role through improving the police response mechanism (through improved communications and mobility). However, we also discuss the potential for proactive policing which is contained in police MIS - through the development of strategic planning based on information generated by MIS.

In Chapter III, we examine the special social, economic and political pressures on North American police forces during the post World War II period. We are primarily interested in describing the elements that have contributed to the statiblity and conservatism of police forces in Canada. We conclude that there were a number of strong and natural pressures affecting Canadian police departments which mitigated the application of new technology.

In the next chapter, we examine a number of new pressures on municipal police departments and their implications for the incorporation of new technology in the immediate future. We conclude that there are three, well-defined and strong pressures affecting modern police which argue in favour of the acquisition of new technology.

Finally, we synthesize all of the foregoing material into a set of recommendations to help municipal police departments prepare for future technological change. Although we recommend an open, inquisitive and interested attitude towards the application of new technology in policing, we advise our readers to adopt a cautious, conservative and reasoned, "managed" implementation of

new technology.

This volume also contains an appendix which documents some of the more important sources of information which contributed to this study.

CHAPTER II

THE HISTORICAL IMPACT OF TECHNOLOGY ON THE ROLE OF THE POLICE

Policing has been affected by a number of technological "revolutions" over the past 150 years. In each case, a new technology was born and absorbed by police agencies. Also, in each case, the new technology had a subtle impact on the style and organization of the police force of the day. We briefly describe these revolutions to position the potential impact of the new MIS "revolution" on the future police force.

A. The Responsibility and Authority for Policing

Before the establishment of the "new police" in 1829, two developments took place which provided the foundation of the police system in the anglo-western world.

The first was the delegation of responsibility by the English kings for preserving the peace to local communities, thus making policing a local responsibility. The second was the crystalization of the king's authority to preserve the peace in the office of the constable which was, and has remained, a royal office. Consequently, the authority of police constables is an original authority derived directly from the sovereign authority.

As a result of these two ancient developments, policing in Canada remains by and large a local responsibility

and the authority of peace officers continues to be derived directly from the sovereign authority. It is not an authority delegated to them either by local officials, or indeed, the chief of police.

The Act establishing the Metropolitan Police in 1829 was an enabling Act which left the details of the organization and regulation of the "new police" in the hands of its two Commissioners and the Home Secretary. The decisions made by the Commissioners, in consultation with the Home Secretary, have proved to be of major importance for they produced an organizational philosophy that has survived remarkably unchanged. Three illustrations will serve to make this point.

Today, it is customary to dub the police as a "quasi-military" organization. This term is as misleading as it is helpful because the police organization was developed as much in opposition to military structure as in imitation of it. This is made clear by Critchley who, in describing the initial decisions about the organization of the force, writes:

> From the outset it was a deliberate policy to recruit men "who had not the work habits of station gentlemen". There was to be no caste system as in the Navy of Army, and ranks up to that of superintendent were to be drawn, typically, from ex-warrant officers and NCOs. When vacancies occurred, promotion to higher rank was to be

given to men from within the force. The wage of a constable, at a guinea a week, was deliberately fixed at a level to deter ex-officers, and at the same time to keep down the cost of the force. Among the flood of applications which poured into Scotland Yard, those from military men of senior rank and from people with influence in the Government were generally turned down. From the start, the police was to be a homogeneous and democratic body, in tune with the people, understanding the people, and drawing its strength from the people. (1967: 52)

These decisions have had far-reaching effects. The practice of recruiting only at the constable level and promoting from within the police organization remains one of the cornerstones of the police organization and management philosophy.

Other early decisions about the nature of the police organization and philosopy also continue to guide police practice, as Radzinowicz's discussion of the organization of the patrol function indicates:

> Foremost amongst the means by which it was hoped prevention might be achieved was an unremitting watch upon the whole area for which the Metropolitan Police became responsible. To this end, the

> seventeen divisions were subdivided into sections and again into beats, each constantly patrolled by a rota of constables at every hour of the day and night. At the centre of the divisions was a police station or watch house, at which an inspector was always on duty to keep order, to hold a reserve party ready to meet emergencies, to record charges, to detain persons or release them on recognizances, and to be responsible for any property brought in. A second inspector went round the division, receiving reports from sergeants, who accompanied their men on the beats. (1968: 194)

This description of police organization applies today to most Canadian police departments almost as well as it did to the Metropolitan Police. In this passage Radzinowicz introduces a theme in the philosophy of policing that is as prevalent today in Canada as it was in London in the Early 1900's, namely, that the police should be a preventative force. This concept was made explicit in the General Instructions for the Metropolitan Police issued in 1829:

> It should be understood, at the outset, that the principal object to be attained is <u>the prevention of crime</u>. To this great end every effort of the police is

> to be directed. The security of person and property, and all the other objects of a Police Establishment, will thus be better effected, than by the detention and punishment of the offender after he has succeeded in committing the crime... (cited in Radzinowicz, 1968: 163)

As this brief discussion has illustrated, the present organization and philosophy, as well as the responsibility and authority, of the public police in Canada was profoundly influenced by a long historical process culminating in the establishment of the Metropolitan Police in London. These influences provide the framework within which change has taken place. This framework has moulded the direction of such change while remaining remarkably resistant to change itself. Nonetheless, within this framework the changes have taken place that have had a profound effect on police practice. It is to these changes that we now turn.

B. The Development of a Reactive and Crime Solving Police Capacity: Technological Change and Its Impact

Many of the major changes that have taken place within the public police over the last century and a half have their origin in the introduction of new technology into the police organization.

1. Forensic Science

The first major technological "revolution" within the police environment can be traced to both the methods and philosophy of science itself.

The use of forensic science as an investigative tool appears to have received its initial motivation, strangely enough from within the field of English literature. "It would not be altogether fanciful" writes Walls (1974: 1), "to trace the beginning of forensic science to Sherlock Holmes, because his creator, Sir Arthur Conan Doyle, showed remarkable foresight in making him scientifically trained, and thereby almost certainly helped to publicize the idea that science could be applied to the policemen's problems". While Holmes first appeared as a literary character in 1887, some 50 years after the establishment of the "new police", forensic science laboratories were not established in Britain until 1935. Development was somewhat more rapid in the United States, with the establishement of the Los Angeles Laboratory in 1923. The FBI Laboratory, however, now the largest in the United States, was not established until 1932. This was also the date of the establishment in Toronto of the Province of Ontario's forensic laboratory (Walls 1974: 24).

Forensic science today is a major and integral part of criminal investigation.

When the Metropolitan Police were established

they were organized primarily as a patrol force rather than an investigative force, as they were conceived of primarily as a body who would prevent rather than solve crimes. Indeed, it was not until some 30 years after their establishment that a detective branch was included within the Metropolitan Police and this remained very small for many years. The forensic science "revolution" was partially responsible for a greater emphasis being placed on investigative work and for contributing to the high esteem that detectives now enjoy both within police departments and the community.

2. Improvements in Communications and Mobility

Another area in which technology has had a major impact on policing has been communications and mobility. These developments have had an impact on all aspects of policing but have had their most profound consequences with respect to patrol work.

One of the most difficult organizational problems that early police forces faced was the difficulty involved in communication between policemen in the field and between field personnel and central police stations.

The first technological development that allowed for better communications within police departments was the telegraph. This was introduced into the police environment during the 1850's. Its principal use was to improve internal police communications.

It facilitated better communications within the police organization first by linking police stations to each other and to police headquarters, and by linking patrolmen to their stations via the introduction of call boxes, thereby ending the isolation of the patrolman and enabling him to bring into play the entire resources of the department whenever necessary in the performance of this duty (Leonard, 1971: 6).

The subsequent introduction of the telephone both consolidated and expanded the developments made possible through the telegraph network police departments developed. At the patrol level, the "introduction of the telephone into the call box in 1880 made it a genuine two-way communication system, greatly improving contact between the patrolmen and their station house and increasing the ability of supervisors to know what the men were doing" (Rubenstein, 1973: 16).

The telephone also had an important impact on police investigations, as Leonard notes:

> Accessibility of the police by means of the telephone gave police management a tremendous advantage in terms of an increase in the volume of incidents and criminal offences reported to headquarters. As a corollary, (there was) an increase in the volume of cases cleared and in the number of offenders apprehended (1871: 7).

The telephone had its greatest impact on the relationship between the police and the public. Where citizens previously had to search out policemen, as telephone systems developed, the telephone became the principal method of contacting the police. Black (1968: 45) has illustrated the importance of the telephone for police work by showing that in a study of three major cities in the United States, 76 per cent of all incidents the police responded to were brought to their attention via telephone calls from citizens requesting police assistance.

Whereas, before the advent of the telephone, the patrolman was probably as likely to uncover a problem requiring his attention himself as have a citizen bring problems to his attention, with the establishment of telephone networks the police began to rely heavily on the public as a source of information about problems. Patrol turned from being principally an activity in which policemen kept an eye out for trouble to primarily a waiting period between calls. Black (1968: 45) for instance, found that no more than 13 per cent of all incidents the police responded to were police initiated. When it is realized that this figure includes incidents involving traffic violations, which are almost all police initiated, it is apparent that the number of police initiated incidents apart from traffic violations is exceedingly small. The telephone provided an important impetus towards the development of a reactive police force. The proactive activity that was so essential to crime prevention became increasingly less common and, accordingly, the gap between the philosophy of police work and its

reality became even wider.

The development of the two-way radio worked, together with the telephone, to facilitate the development of reactive police organizations. Before the introduction of the radio it was exceedingly difficult to relay messages about citizen calls for assistance to the policeman on the street.

The introduction of the patrol car added the final piece to the development of a reactive patrol force that relied primarily on citizen calls for assistance as a source of work. Rubenstein points to the combined effect of introducing two-way radios and patrol cars as follows:

> A man cruising in a patrol car could cover his territory with greater frequency than a man on foot, offering increased protection to everyone. When the two-way radio was first successfully used in a patrol car in 1929, it meant that a cruiser could be informed immediately of a call for help, greatly enhancing the chances of capturing suspects and deterring further crime (1973: 20).

Together, these four technological innovations -the telegraph, telephone, radio and patrol cars- have acted to place the police in a position where they could act as effective troubleshooters, respon-

ding to problems which were brought to their attention. Thus, we find that, despite a philosophy of prevention and despite the persistence of a patrol organization that was developed to facilitate the preventative policing under the impact of several technological "revolutions", the police have adopted an increasingly reactive stance. Patrolmen do not usually seek out trouble, rather they tend to wait for "calls-for-service" from their dispatchers. Similarly, detectives seldom detect crime but investigate crimes detected by others.

These scientific revolutions have transformed the functions and operating characteristics of the police. Police have evolved from their original "crime prevention" role, to one which emphasizes "response" (reaction) to crime occurences. The new orientation was supported by the development of new technology.

C. <u>The Computer Revolution: New Tools to Support Both Proactive and Reactive Policing</u>

Since the second World War a new technological revolution has influenced the social and economic affairs of Western civilization. This is the "computer revolution". As we shall show, the advent of the computer can expand the scope for both reactive and proactive policing.

First, let us consider the nature of the computer revolution. The first commercial computers became

operational 35 years ago. The major facility offered by computers was the ability to store, retrieve and manipulate large volumes of data quickly and inexpensively. The first major application of computers was in operations research where complex equations had to be solved in order to compute the implications of public policy and commercial decisions. The first applications of computers were associated with the use of mathematical techniques for developing "optimizing policy".

However, after a relatively short "breaking-in period", computers began to be applied in the more mundane areas of operations in the public and business sectors. They were gradually applied as devices for the storage and retrieval of large volumes of quantitative data. The major medium of information storage moved from paper files (index cards, etc.) to the world of electronic impulses. This thrust accelerated as computer technology improved through the development of more efficient, and miniaturized storage functions -from paper punch cards, to paper tape, to magnetic tapes, to disks, and now, to "bubble memories". The original punch cards contained 80 fields of information; the new mass storage devices contain many millions of data elements.

How has this "revolution in science and technology" affected police? At this point in our report, we wish only to relate the impact of computers on the "reactive" and "proactive" capacities of police forces.

The reactive influence is most profound and obvious to police scientists. The computer has increased the reactive capacity of police to respond to crime incidents, as they occur. For example:

- Computer aided dispatch improves the effectiveness of the dispatch function in police departments to deploy patrol units to the scene of crimes, in response to calls for service.

- Automated field information systems, such as CPIC and NCIC improve the ability of officers in the field to distinguish dangerous situations in the field and arrest wanted persons.

- Automated patrol allocation systems enable police forces to schedule patrol deployment to minimize the response time on calls for service. This is based on "predicted" calls for service.

Thus, the advent of computers has improved the reactive capacity of police -in the context of improving response time and service effectiveness on calls for service. At this point in time, much police thinking about computers and MIS focuses on the computer as a tool for reactive policing. The current preoccupation with mobile digital terminals confirms this proposition.

However, the computer can also improve the proactive capacity of police. Even if the computer is used primarily as a field information tool, its capacity to store and retrieve the same information, for other uses, can contribute to police proactive capacity. Consider computer aided dispatch; this is a tool typically associated with reactive policing. If a police force uses CAD, with a minimum of systems planning, it will have a data base on all calls for service, and all other field activities. This data base can be used as a basic information asset to support operational and strategic planning exercises. These are the elements of proactive policing. Analyses of crime and police response can be carried out to support:

- effective personnel deployment between and within police service functions,

- special crime prevention activities,

- service costing analyses,

- zone or team policing functions, and,

- long range planning of service requirements.

At the present time, many police forces are considering the acquisition of computers and the development of management information systems. Most police forces are assessing their need for these tools in light of their contribution to reactive capacity.

Only a few forces, notably the Kansas City and Miami police forces in the United States and, to some extent, the Surrey RCMP detachment, Edmonton and Metropolitan Toronto police forces in Canada are actively considering the proactive capacity of computer systems. We expect that the potential for proactive police development through computerized systems will begin to be explored systematically as the science of police MIS becomes more mature in the years to come.

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Chapter III

POST WAR CONDITIONS AFFECTING THE APPLICATION OF NEW TECHNOLOGY IN POLICING

The computer has not yet been overwhelmingly adopted by police forces: it cannot be called a "revolution" until a major impact has been made on policing. Why have police forces been reluctant to adopt computers to the same degree as, say, the private sector where computers are relatively common?

We must look to the conditions of policing during the last 30 years to seek the factors which may have affected the application of computers in Canadian policing. In this chapter we examine one basic premise. The conditions of policing have changed drastically during the post-war period. These changes have created a "pressure cooker" environment within which police would not naturally adopt computer systems. Yet, there is a contradiction. We believe that the same environment has made computers more important for cost-effective policing.

A. The Police Organization

Police departments are hierarchical, line-oriented organizations. Clear lines of command are evident. Responsibility and authority are well-balanced and articulated.

Historically, the need for strict hierarchial control in police departments matches that of the

military. There is a need for discipline, especially among lower ranking officers. In the military, this originated with the need to respond to dangerous situations, not as a group of uncoordinated individuals, but as an intricately coordinated team of individuals, each with his own function and responsibilities to the other individuals on the team. Police officers must also be ready to respond to dangerous situations as part of a team.

Each police force has its own peculiar organizational structure. It is impossible to select a basic model from which all structures may be described. Organizational structures may very because of:

- history and tradition; the organization of particular police departments may represent the collective experiences of individuals both in the force and within the public they serve.

- the personality of the Chief; different individuals in the position (as in similar positions in other institutions), may have widely different "management styles".

- the size and resources available to the police department; for instance, the larger and wealthier the department, the more resources are available to maintain specialized units responsible for particular elements of law enforcement, e.g. tactical units, crime prevention, planning sections, etc.

We now turn to some of the common features of police organizations and discuss their effect on the development of information systems. We are not advocating organizational changes or even suggesting that some of the changes implied in these comments are prerequisites to management information system development. At this point, we merely wish to show how the police "organization" and its characteristic style has affected the growth of information systems during the post-war period. The most obvious features are:

- Compartmentalized organizational functions; there are very few inter-bureau or inter-unit "committees" in police departments. As a result, those information systems which are developed tend to be highly specialized and satisfy the purpose of only one section or unit of the force. Yet, within today's technological framework of computerized management information systems, one of the most important features to be built into this system is the cost-saving which can be derived from "integrated" systems.

- Top-down management hierarchy; most direction for management change within a police department emanates from the most senior management levels. Middle management functions, which are strong in other institutions and tend to be a major stimulus for management information systems, do not appear to play such an important role in police departments.

- Action orientation; most police officers chose

police careers because they were interested in the vitality and physical mobility associated with police work. These are not necessarily the kind of people that would find career satisfaction going through the painstakingly detailed activities necessary for the development of a management information system.

- Police officers tend to be highly trained specialists; many police departments use civilians and external advisors (consultants, university professors, etc.) for a variety of specialized functions. However, most police departments are not comfortable in this environment. Yet, many of the skills necessary to develop and maintain management information systems can only be acquired through the use of external non-sworn personnel. It is difficult for a police department to attract top quality technical experts for full-time employment; they cannot be ensured of exciting and rewarding career potentials in an agency where their promotion horizons are limited.

These and other types of organizational and management conditions have served to constrain the development of management information systems in police departments. Record-systems exist; in fact, they are managed in an efficient and workable fashion. Yet, the ability to access large volumes of information for management purposes exists in relatively few North American police departments today.

B. Social Conditions

Where recent history has seen the development of stable well-disciplined police organizations, social conditions took a different track. In the post-world war period, society has been characterized by instability and social confusion.

Some of the more obvious changes which have affected North American society during this interval are:

- A youth "revolution"; stimulated by a post-war population expansion, the "post-war generation" has dominated the past three decades. This generation has profoundly influenced social styles and fashions and, to some extent, exhibited some "disrespect for the law", in contrast to the previous generation.

- An era of unparalleled economic prosperity; given the wealth of job opportunities which arose after the second World War, and the new "freedom orientation" of society, police departments began to face serious recruitment problems.

- Social mobility; combined with a transportation revolution which has reduced the cost of travel and physical movement, people and crime have become highly mobile.

- Inflation and social frustration; the forces of inflation combined with a mood of optimism which characterized both the youth and the prosperity of the last three decades, have caused other social frustrations. Labour negotiations have felt the effect. Strikes are now a legitimate form of social protest. The police have had to respond to this confusing social milieu.

- A complex regulatory society; today, government regulations monitor and affect all aspects of human behaviour. This has had a profound effect on the criminal justice system, primarily in areas such as juvenile justice. It has complicated the life of the policeman.

These and many other social events have complicated, and, to a great extent, hampered the work of law enforcement agencies during the post-war period. Police agencies responded to these threats in a number of ways. The two most important responses relative to our concern for MIS are:

- Social conflicts have reinforced the importance of training and personnel management in police departments. This has developed a sense of professionalism among police officers. But for police "scientists" or law enforcement specialists, pressures are created for the use of these personnel in policing functions. This deflects away from the development of manage-

ment systems.

- A strong pressure exists in most police departments to expand the field force. Most modern police departments spend between 75 and 85 per cent of their total operating budget on field activities. This reinforces the notion of policing activities in the agency as opposed to specialized management functions from which management information systems are derived.

C. Economic Conditions

Many complex changes have occurred in the Canadian economic order during the post-war period. Although many of them would have a fascinating, if somewhat complex, relationship with police environmental conditions only one major change needs to be described at this point.

Demographic changes, social outlooks and political realities over the past three decades have led to a vast expenditure of social capital on social and community services such as education and health. As a society, Canadians seemed optimistic that expenditures in these areas would reap social and economic benefits. By the middle 1970s, we became disillusioned with those prospects.

Massive social expenditures had one major corollary for Canadian police departments; these expenditures displaced society's capacity to fund larger and better

police services. There was no money left for police departments. This was complemented by a social mentality that felt uncomfortable with notions of criminality and deviance in the optimistic society.

In Canada, urban police departments are primarily financed by municipalities. Given the peculiarities of the Canadian constitution, municipalities have the greatest inherent fiscal and political weakness of our three levels of government. Municipalities have had to bear a major share of the cost of the expanding education sector over the past decade. They were incapable of simultaneously funding an expanding police sector.

These economic conditions have had an impact on the development of information systems in Canadian police departments. An MIS can easily be interpreted as a "frill". Its relevance to policing and the reduction of crime is not obvious, especially when there is not enough money to go around. In the following chapter we will show that computers and MIS may not be considered a "frill" when labour cost (police salaries) begin to escalate drastically.

D. Technological Conditions

During the last 30 years, technological changes have been more prominent in the computer that in the communications area. But these technological changes have not been represented or translated into greater use of computers by police departments. Some of the reasons

for police reluctance to make use of this technology are:

- The capital costs; until recently, computer power was an expensive commodity. There have been major changes in the cost structure of computer power, but this has occurred only in the past few years and is not yet represented in the computer state of the art.

- The need for highly technical expertise; until recently, a well trained, experienced computer operator or programmer was a rare and expensive member of the labour market. That imbalance has now been overcome.

- Reluctance to adopt expensive, high risk experiments; police managers have been reluctant to commit their scarce resources to schemes for computerization because they seemed experimental and risky. Judging by the experience of other jurisdictions, such as education and health, their reluctance has been well-founded. The example of Computer Aided Instruction, which wasted millions of dollars for little return in the United States, proves the point. However, police information systems, and associated computer technology, are now well beyond the esperimental stage. This will no doubt, be reflected in a new interest in the technology by police managers.

E. Crime Conditions and Other Demands on Police

Canada is becoming a highly urbanized country. Urban areas are growing rapidly and are becoming more like large U.S. cities where crime and social malaise are concentrated. The Canadian urban (municipal) police department is profoundly affected by these changes. It is rapidly being pushed into a role of overseer and monitor of the urban scene.

Some of the consequences of this new role for Canadian municipal police departments are:

- A large part of the policeman's job places him in the role of social worker. Helping stranded motorists and arbitrating between combatants in family disputes takes up a much larger portion of his time than "fighting crime".

- Police departments are increasingly having to work with a variety of social service agencies in order to satisfy their demands.

- The police responsibility for records and documentation are increasing. The police department is still a major source of formally documented information on virtually all serious occurences in the city. In addition, they are a major "reference source" of information about criminal records, etc. of individuals applying for various "social rights", e.g., gun permits,

etc. Finally, for a variety of purposes, they maintain files on taxi licences, bicycle registrations, gun registrations, etc.

- As well a directly affecting social services, police departments are developing a broad responsibility for planning these services. For example, services such as traffic flows, community services, urban defence through architectural and city planning guidelines, and family crisis interventions can gain through police input and experience. Municipal and regional agencies responsible for these functional areas expect police advice.

All of these new responsiblities which police departments are faced with are overlayed by crime statistics which show ever-increasing incidence for virtually all crime categories. The traditional law enforcement role of the policeman is not decreasing. It promises to increase significantly over the next decade. This raises one final question for this chapter of Volume I. How is the police environment changing and how will this affect the need for new computer technology? The remainder of this volume addresses this question.

CHAPTER IV

NEW PRESSURES FOR TECHNOLOGICAL CHANGE IN CANADIAN POLICING

In this chapter we focus on the pressures for change which currently affect Canadian policing. We suggest that these pressures will have a profound impact on the rate and course of development of technology in Canadian policing. We begin to look at the future of policing by considering the elements which will affect the evolution of police institutions over the next 20 years.

Perhaps artificially, we separate the environmental pressures into two categories. First, we discuss the external environmental pressures. These are events, such as demographic changes, which are well beyond the control of police forces, but will influence the nature of police services provided in Canada. Second, we describe internal pressures. Although many of these, such as economic pressures, originate in sectors outside of policing, we believe that they will inherently affect the process of policing, or the way police will carry out their functions in the future.

A. External Environmental Pressures

Our comments on the external pressures on Canadian policing are largely derived from a study which members of Decision Dynamics Corporation carried out on behalf of the Federal Ministry of State for Urban Affairs early in 1976. This study was entitled, Urban Canada: The Challenge of 2001. It was designed to produce forecasts of demographic, economic and transportation

conditions affecting Canadian urban areas to the year 2001. The study was used to support the Canadian brief to the United Nations Habitat Conference on Human Settlements, held in Vancouver, 1976.

Although we will quote liberally from the statistics generated by the 1976 study, all of our notions about future events in Canada are strongly supported by numerous other forecasting studies. These were carried out by agencies such as Statistics Canada, academic research institutions and foundations involved in long term, strategic planning. None of our comments about the future are unique or particularly shocking to individuals involved in future studies.

1. Rate of Urbanization

Over all, the population growth in Canada has slowed during the past decade and is forecast to grow at a slower rate over the next two decades. However, despite the decreasing rate of growth of population, Canadian urbanization continues at a rapid rate.

In 1971, 76 per cent of all Canadian lived in "urban Centres". This is forcast to increase to 86 per cent by the year 2001. Despite a long standing dependence on primary material production, Canada may well become one of the most urbanized countries in the world by the turn of the century.

The rapid rate of urbanization has an obvious effect on Canadian policing. There are two major influences:

- as population moves from rural areas into large urban centres, and as virtually all immigration reinforces this phenomenon, Canadian cities will increase their predominance as centres of human activity and crime. Urban policing will become the major focus of Canadian law enforcement.

- although fewer people, as a proportion of the total Canadian population, will live in Canadian rural areas, law enforcement problems will continue to persist. For example, the taxation base of rural Canada will erode. Yet, because of the size of rural areas in Canada, police services cannot be reduced appreciably. It will still be necessary to maintain significant patrol and specialized investigation services for rural areas.

Nevertheless, the rate of urbanization in Canada will increase the complexity, scope and burden of urban policing over the next 20 years.

2. Age Structure of the Population

Most Canadian are aware of the "post-war baby boom" in Canada and some of its social and economic implications. However, we have only recently become aware of the long term implications of this phenomenon.

On average, Canadians born after the second World War have significantly lower fertility rates than their predecessors. Therefore, the population "bulge"

which began at the low age levels in the 1950s will not recreate itself through child bearing and, therefore, rectify the age imbalance in the population/age distribution. Population forecasts for Canada suggest that the post-war baby "bulge" will just move through the age spectrum and we will not have a "regular" age distribution of the Canadian population until the second or third decade of the 21st century.

Some simple statistics illustrate the strength of this phenomenon. For example, in 1971, 41 per cent of the total Canadian population was under 20 years of age. By the year 2001, this proportion is expected to drop to 26 per cent. By the year 2001, almost half of the population will be over 40 years of age.

The social and economic implications of this change in the age structure of the Canadian population will be massive. Some of the more obvious implications are:

- a change in texture in the conflict between generations. The youth revolution of the 1960s will be replaced by the "middle-aged malaise" as this group becomes more strident in its demands on the social and economic structure.

- enhanced competition for reward and advancement in white collar labour sectors as more people in the same age and educational bracket must compete for a fixed number of managerial positions.

- pressure in all sectors of society for earlier retirement.

- new pressures on the public sector to provide services for the new ascendent age group. During the 1960s, the major pressure was for the provision of educational facilities for the post-war "bulge". As this population moves into older age brackets, social and political pressures for more public housing or better hospital facilities will become prominent.

How will these influences affect Canadian policing over the next two or three decades? It is difficult to predict this relationship precisely, but some probable developments may include:

- much less concern for juvenile crime;

- much more concern for white collar crime, including fraud and computer crimes;

- less respect for "law and order" as the youth of the 1960s displace their more stable predecessors.

To summarize, there are major shifts in the Canadian population which have no parallel in history. They are bound to have an effect on the style and scope of Canadian policing.

3. Change in Urban Lifestyle

The demographic effects which we described in the two preceding sections have had two further ramifications on the urban living patterns of Canadians. These, in turn, will have a major impact on the future of Canadian policing.

First, declining fertility rates have affected the rate of family and household formation in Canada. Fewer people are getting married. Those that do marry have a higher probability of divorce or separation. Also, the average size of the family unit is rapidly decreasing. As a result, Canadians in the 1970s, and presumably in the next two decades, are more mobile, somewhat less materialistic and less constrained by time and space.

Second, these changes are reflected in housing and settlement patterns in Canadian urban areas. In the 1950s the predominant housing forms in Canada were oriented towards self-contained, single family, suburban dwelling units. In the 1970s, influenced by changes in fertility, family composition and the availability of housing, the predominant characteristic of housing is the multiple family dwelling. Although Canadians have, on average, more space to live in during the 1970s than in previous decades, they are living closer together in a more congested environment.

What are the implications on policing of the change in urban lifestyle? Some possibilities include:

- notions of social order and stability are reduced by the breakdown of the family unit as a major social institution.

- "highrise cities" have sprung up, replacing horizontal traditional roadways with vertical forms of thoroughfares such as elevators and apartment hallways. This requires a different type of policing function.

- crime and criminality have become inherently more mobile as the Canadian population is capable of more mobility.

4. Changes in the Economic Environment

There are a number of persistent economic trends which have been visible in the Canadian economy over the past decade and may continue over the foreseeable future. These will have an impact on policing. They are:

- persistent inflation, which seems to defy all measures of control;

- persistent unemployment, which is associated with regional disparities in Canada; and,

- persistent erosion of municipal tax bases, which requires increased dependence on senior levels of government for public resources to maintain muni-

cipal institutions such as police forces.

We are certainly not predicting a constant continuation of the three economic diseases described above. However, to the extent that they do exist, there are a number of fundamental economic challenges for Canadian police forces. They are:

- expenditure control as municipal funding sources stagnate and senior levels of government concentrate spending priorities towards unemployment.

- some measure of social disorder caused by tensions associated with unemployment and inflation.

- vigorous development and confirmation of unionism within the police environment.

5. Over-all Impact of External Pressures on Policing

It is not feasible to trace the relationship between all of the specific items mentioned in the preceding sections and the police environment of the future. Too many of the "forecasts" are tenuous and unclear. However, we can make one general, supportable conclusion about the demands that our predicted environment will have on police management.

We strongly believe the changes taking place in the demographic, economic, political and social domains will enhance the need for a proactive police management style, as opposed to the traditional reactive framework.

The pressures that we have indicated are powerful. Police forces should cope with them before they seriously affect police services. Police management will have to spend proportionately more time anticipating the future and creating strategies for coping with future problems. Perhaps the proactive option involves a greater emphasis on preventative policing. We can not be certain. We can, however, be certain that technological options and their determination should be clearly articulated by police management before the changes of the next two decades overwhelm us.

In our field visits to North American police departments through this project, we witnessed proactive police development programs that were oriented towards future needs. In particular, we were struck by the development of this philosophy in the City of Miami Police Department (described in Volume II) and the City of Edmonton Police Force (described in Volume III).

B. Internal Pressures on Police Forces

In the previous section on the external environmental pressures for changes in Canadian policing, we described a number of situations which are bound to have an effect on policing. However, their effect, and the nature of that relationship, is rather nebulous. We cannot trace the relationship between the changing age composition of the population and pressures on police forces with any degree of precision. However, in this section we address an environment which is closer to the world of policing.

Police internal pressures and their impact on the future structure of policing will be more familiar to the police reader of this report.

1. The Economics of Policing

The police sector produces a service. This service is dependent on people. Economists would call the police sector "labour intensive", as opposed to "capital intensive" which characterizes mass production operations such as automobile or steel manufacturing. The labour-intensive character of policing is illustrated by a budget statement for a typical police department which shows that approximately 80 per cent of funds are allocate to "salaries".

Since policing is so dependent on labour resources, any drastic change in the cost of labour will have a profound effect on the police organizations. Such a drastic change has occurred over the past decade. On Figure IV-1 we have illustrated this change by charting "first class constables' salaries" between 1957 and 1977. We chose the Metropolitan Toronto Police Department because of its size and role as a "price leader" for establishing trends for labour settlements in Canadian policing.

On figure IV-1 we have converted the data on first class constables' salaries into index numbers since we wish to compare salary changes with the consumer price index. The data confirmed the following propositions:

- police salaries rose conservatively and gradually during the interval between 1957 and 1965. There was a 41 per cent increase in salaries for an

average annual increase of just over five per cent during this interval.

- since 1965 there has been a rapid rise in police salaries. Between 1965 and 1977 the increase was 192 per cent. This is an average annual increase of 16 per cent.

- the consumer price index has risen less rapidly than police salaries throughout the period 1957-1977. Despite the fact that Canada has been in a period of rapid inflation during the last 10 years, police salaries have outstripped the increase in the consumer price index.

- more importantly, since 1966 police salaries began to rise at a higher rate than comparable earnings in the Canadian economy. By 1977, the industrial composite earnings index was 368, compared to the police index of 432.

The causes of the inflation in police salaries are complex. On the one hand, during the past two decades there has been an environment of "professionalism" in Canadian policing. This has been reinforced by more selective recruitment, better training and an improvement in the image of Canadian police in society. On the other hand, particularly during the last decade, police unions have learned to exercise the strength of collective action. The escalation in salaries was caused by some combination of these two pressures.

Whatever the cause, we can be certain that the escalation of police salaries will have a major effect on police services. If we consider the impact of two man patrol cars, this effect will be even more pronounced. First of all, the municipal level of government does not have an adequate tax base to support policing expenditures that are increasing at a rate of at least 16 per cent per year. Municipalities will impose expenditure restraints on police departments. The level of police service to the public is bound to erode.

Assuming that labour costs continue to rise, albeit at a lower rate, there can be two different types of implications for the application of new technology in policing. First, Canadian police managers can seek to replace expensive professional police officers in non-policing functions, with less expensive civilian personnel. As we shall show in Volume III, this has not yet happened in Canadian policing. Alternatively, labour-saving technology can replace both civilian and sworn personnel. MIS through computerized record keeping can be developed to decrease dependence on expensive, highly trained police personnel.

Second, the labour cost squeeze in policing could have a dampening effect on the application of new technology. The pressures of unionism, intransigent municipal tax base and rising crime could decrease the interest of Canadian police managers in "experimenting" with technology that has expensive, high-risk qualities. The economic conditions affecting Canadian policing could well lead to a philosophy of "maximize

the uniform complement in the streets" to the exclusion of new technology and procedures.

2. Rate of Technological Change and Availability of More Effective "Instruments" of Policing

We have become a generation which is used to technological change and expect it to continue without diminishing into the foreseeable future. However, the reality of new technology for its potential application to policing is economic in scope. New technology is only valuable in the police environment if it enables us to perform a particular job more efficiently and effectively.

The real technological revolution has occurred in the impact of technology on the cost of doing things. For example, performing even the simplest, repeatable, arithmetic transaction was an expensive and tedious exercise 50 years ago. Large mechanical adding machines were the only tool available to assist with this procedure. In the last ten years, the electronics industry has substantially altered the need for labourious human application. The development of the electronic calculator has revolutionized all endeavours involving the use of numbers. The major revolution has occurred in both the cost of "electronic instruments" and their improved facility to carry out computations.

Consider the cost factor. Only 15 years ago a mechanical calculator capable of simple arithmetic operations cost more that $300. Today, a hand calculator, weighing only a few ounces, will perform many more complex calculations and will cost only $5.00.

The advent of the large, inexpensive computer over the past two decades has revolutionized industry and commerce. It will have the same effect on policing. We must keep one thing in mind. The computer is an instrument which is designed to store and retrieve, or "move" information efficiently. A large portion of policing, like any other endeavour, consists of information management. As computers become even more efficient and inexpensive, they will play an even more important role in policing.

The importance of the computer for the future of policing is reinforced by the escalation of labour costs which we described in the preceding section. The availability of inexpensive computing devices in an environment of high labour costs will create a pressure to replace manpower with technology in those functional areas in policing that allow such a transformation.

One of the impediments to the application of computer science in areas such as policing has been the emphasis on "generalized" computer protocols; that is, computers were designed and devised for the broadest range of applications possible. Computer languages have been written to enable the application of a particular machine to everything from payrolls, to accounting, to record storage on crime incidents. This generalized approach to computer science has made it necessary for

particular functional areas such as policing to undergo major and expensive applications development programs. To a large extent, the generalized systems have made computers into somewhat of a mystery for specialized areas such as policing.

But the computer industry is now moving towards specialized applications and development of hardware to support them. Most computer manufacturers now have extensive development programs to support applications in areas such as policing. There are a number of firms in the United States associated with particular types of computer equipment that specialize in police systems. In fact, despite the relatively small size of the Canadian market, recently a computer systems firm designed to serve Canadian policing with systems support was developed. This is just the forerunner of the development of specialized capabilities in Canada to support Canadian police in their use of computer hardware and software.

We focus on computers in our discussion of new technology because the computer "revolution" has made possible the application of new and modern management information processes. The computer is the "work horse" of MIS. Through computers, police can have access to more and better information for decision-making.

3. Demonstration Effects

Demonstration effect describes the influence of external (e.g., other sectors such as municipal govern-

ment, education, etc.) changes in managerial style and philosophy on police management.

To a large extent, until recently police forces have managed to insulate themselves from the effects of managerial changes that have occurred in other professional sectors. As a result, police departments have been able to retain a conservative, strict hierarchy of authority internally, while institutions in other sectors have moved towards a much more open managerial environment. Some of the factors which preserved this stability in police organizations include:

- the general recruitment policy which focused on young, high school-educated recruits.

- strong internal training programs, including the cadet system, which focus on internal procedures in the early education of a police officer.

- the "buddy system" of initiation for new recruits in the patrol divisions. This often involves a "training officer" who reinforced existing standards and procedures in the police force.

As a result, police departments are highly stable and conservative; their officers are characterized by an esprit de corps which conditions procedural development to traditions that were established more than a century ago. However, this stability is bound to be affected by developments in other sectors. New police

officers are being recruited. They are more exposed to the philosophies of other institutional sectors. To a larger extent than in the past, they have received some form of education in the social and management sciences. They are influenced by the communications media which serves to dramatize new technological developments in fields such as health, education and engineering.

If demonstration effects from other fields begin to influence policing, then we can expect to see a stronger internal demand for "modernization" of police procedures. This will certainly influence police interest in computers, and may well influence the interest in organizational change.

The current age structure of police complements in many large urban police departments will reinforce the strength of demonstration effects. Many of the police forces which we visited during this project have gone into large recruitment phases during the 5 - 10 years. As a result, as much as 50 per cent of the total sworn complement of police departments such as Metropolitan Toronto, the Montreal Urban area, Edmonton and Calgary is composed of officers who are under 35 years of age. This "youthful dimension" of police departments will provide a strong counterpoint to the traditional stability of the institution. Some of the counterpoint pressures may include:

- the inherent flexibility and interest in experimentation which resides with younger individuals;

- some frustration with police management, stimulated by the natural antipathy between the young and the old; and,

- an interest in modernization because it provides increased career opportunities for youthful members of the force who must compete for the few senior jobs available.

We suspect that the combination of demonstration effects from other sectors and the youthful profile of urban police forces in the 1970s will establish strong pressures for "modernization". These pressures will surface in the form of a demand for organizational change as well as technological upgrading of the instruments of policing. The demand for MIS, as one major example of new technology, will be influenced by these pressures.

CHAPTER V

THE CHALLENGE OF THE FUTURE FOR CANADIAN POLICE BEGINS TODAY

We have written this volume of the Police Management Informations Systems Study to provide our readers with a broad perspective on police technology. Much of the material has focused on the historical evolution of policing and the way that this evolutionary pattern has been influenced by new technological applications. Our interest in the history of policing is conditioned by our assumption that history offers many lessons about the application of new technology which can usefully be applied to future situations.

Our major historical focus in this interpretation of new police technology has been on the recent past. We have suggested that there are a number of strong and recurring pressures on police forces to incorporate new technology. Yet, as we have repeatedly stated, new technology cannot be absorbed effectively in a vacuum. The police organization must prepare for it. Senior management must believe in it. And finally, new technological application requires a sufficient "gestation time" to allow for the development of new procedures which must accompany the implementation of new technology.

The major objective of this chapter is to provide some substantive recommendations on: How do police forces prepare for the new technology of the future? Our recommendations are general. We do not know what the future of policing will hold. We have only one strong belief: major changes will occur in Canadian policing over the next 20 years.

Therefore, the reader needs to make but one assumption about policing. The environment for policing is changing rapidly. The key to effective police management, in an environment of rapid change, will be the ability to manage change. Police will have to anticipate and, to whatever extent possible, control the application of new technology over the next two decades. As new technological opportunities present themselves to police, they will have to pick and choose between the options available and implement those elements which support the development of strong policing functions.

This chapter is about anticipation and control. We describe some basic elements of police management, designed to increase a police force's anticipation and control over new technology in the next two decades.

A. Most Technological Innovations Are Being Tested Now

As we have stated, it takes a long time for new technology to be absorbed by a large segment of the police sector. For example, the concept of management information systems in policing was first applied in the mid-1960s. Twelve years later, only a small proportion of North American police departments have made major strides in the development of management information systems. The same type of lead time was probably evident in the adaptation of mobile cruisers and two-way radio communications in an earlier period of police history. It seems likely that the "lead time" in the development of new technology extends from 10 to 20 years.

On the other hand, at any particular point in time,

there are always a number of police forces that are trying to innovate in the application of new technology, these are the technological leaders. If we take a long-term view towards police technology, then we can look to particular police forces in 1977 and find experimental innovations which will become the prevailing technology of 1987 and 1997. Today's innovative experiences will become tomorrow's standard operating procedures.

Let us consider some of the technological possibilities in MIS. We can easily find the seeds of the future in a number of North American police forces. For example, in the field visits which accompanied this study we noted the following technological options in existing police departments:

- Totally Integrated Computer Aided Dispatch. The City of Dallas Police Force in Texas has developed a CAD which is more futuristic and sophisticated than anything contemplated only 15 years ago. A number of other police departments have developed similar systems.

- Automatic Vehicle Locators. The police department in St. Louis, Missouri, developed and implemented a system for automatic vehicle location. This has been integrated with a computer aided dispatch system. Other forces such as the Los Angeles Police Force in California are launching similar developments.

- Team Policing (Community Policing, Zone Policing). There are a number of Team Policing innovations being sponsored in police forces throughout North America. In Volumes II and III we comment on Team Policing experiments in Kansas, Missouri and Surrey, British Columbia.

- Mini- and Micro-Computer Applications for Patrol Deployment. When we visited Dallas, Texas, we saw an experiment involving the development of a new patrol car which contained a micro-computer. The computer monitors the communications between the patrol unit and dispatch and, also, maintains an abbreviated data base of current or "hot" field information for use by patrol officers.

- Totally Integrated Computerized Information Systems.

  When we visited Miami, Florida, we saw a police department which had developed a computerized information system which would be responsible for all information handling within the police force. This is the ultimate application of computerized technology. There are virtually no paper, hard copy reports filed in this police force. All information is in computer media. We describe this police force in Volume II.

The list of police forces in North America innovating through the application of new technology is extensive. In the list shown above, we have barely scratched the surface. We could have included police forces whose

experimental innovations have proved to be costly failures. For example, the San Diego, California Police Force has attempted to develop an Automatic Vehicle Locator system based on satellite communications. This system has proven to be a failure, mainly because it represented a technology that was not yet completely formulated. However, our abbreviated list is intended to prove only one point: a wide range of innovations are currently being implemented on an experimental basis, by a large number of police forces.

The existence of this experimentation with technology among North American police forces has two implications for the main theme of this chapter, i.e.:

- If new technology is to be successfully developed for policing, it is necessary to maintain a constant level of investment in experimental applications. Sources of funds must be available for experimentation at the local police force level. Few local police forces can afford to risk the resources involved in the development of demontration project designs in expensive areas such as management information systems. The over-all level of funds available will determine the degree to which new police technology is developed. In Volume II we will suggest that one of the major reasons for the development of new police technology in the United States is the Law Enforcement Assistance Administration which has made hundreds of millions of dollars available for technological developments in policing.

- There is a constant need for experimental documentation and exchange of information on the subject of technological experimentation in policing. This is the essence of technology transfer. As a rule of thumb, we advocate that at least 10 per cent of all dollars spent on experimental development projects be allocated to documentation and information exchange. The current record does not come close to this ratio. This is particularly true in the area of MIS. When we began this project, we were astonished by the lack of documented information readily available to police reviewers on the products of experimental police MIS design.

To conclude: there are many experiments taking place among North American police forces on the application of new MIS technology to policing. No police force must "re-invent the wheel" to become involved in this technology. There is however, limited access to documentary sources on the nature and outcomes of much of this experimentation.

B. Evaluation is the Key Element

Under ideal conditions, technological experimentation leads to the development of new, applicable technology when new designs are tried, tested and evaluated to confirm their application throughout the police sector. Yet, the standards of evaluation, like documentation, for police technology are notoriously poor. There is very little information available to assist police managers

with investment decisions on new technology.

There is one basic question of evaluation that must be addressed to all new forms of technology. It is: given a dollar or resource cost, how does a particular new technology improve the effectiveness of police services? To be ultimately useful, the answer must be expressed in "opportunity cost" terms. Consider the example of some new form of computerized information handling. The evaluation design must be able to answer questions such as:

- What are the dollar costs of implementing the new technology?

- How much will it cost to maintain the new equipment associated with the technology over the next ten years?

- How does the technology improve operations, in terms of releasing manpower from one form of endeavour (report writing) and making it available for more productive pursuits (preventative patrol, enforcement, crime prevention activities, etc.)?

Ultimately, every investment in new technology, has implications for manpower deployment. Evaluation design must be capable of expressing the implications of the new technology in "manpower terms". For example, if the new technology costs one million dollars, then it could be represented as a reduction of the patrol

force by 50 officers. Evaluation should be able to specify how the productivity of the patrol force, minus 50 officers, increases by an equivalent amount.

There is currently a debate among Canadian police forces on the usefulness of Mobile Digital Terminals (MDTs). This is a good example of technology that requires further evaluation before decisions are made. For a medium size police force, implementation of MDTs will cost more than one million dollars. We have not yet seen any evaluation of MDTs which addresses the impact of these new instruments on the productivity of the patrol force. Most evaluatory statements on MDTs focus on their utility in "clearing up the log jam of CPIC queries in the dispatch centre". Yet, this log jam, where it exists, could easily be "cleared up" with much simpler and less expensive expedients.

By the same token, we believe that MDTs will increase the number of CPIC queries many-fold. Proper evaluation would address the effect of this increase in terms of "increased hits" on vehicle and person searches. Again, we have not heard the MDT debate consider this level of evaluation.

Until more rigorous and candid evaluation is addressed to new police technology, the development and application of the most effective technology will be inhibited. During our travel to the United States, we were most impressed at the degree to which formal evaluation was necessary before urban police forces were allowed to attempt new technological departures. For example,

the LAPD spent more than a year formally studying and assessing its design for a new Command and Control system. Thousands of pages of reports, addressing the real issues of evaluation, were produced before municipal authorities would accept the Command and Control proposals. This was necessary even though LEAA would underwrite a large proportion of the development cost.

C. Strategic Planning Must Be Stressed

The need for strategic planning in preparing for the future is obvious. Strategic planning is defined as "long-run planning" and we speak of technological changes being implemented over a 10-to 20-year period. Therefore, the time dimension of technological change is "strategic" as opposed to "tactical".

But, our emphasis on strategic planning extends beyond semantics. In our experience we have learnod that there is an association between successful implementation of new technology and the organization's interest in thinking about the future. What is the linkage between strategic planning and successful adaptation of new technology? There are a number of basic elements:

- As we have already indicated, both strategic planning and the development of new police technology are future-oriented. A police force that is actively involved in strategic planning is "in the right frame of mind" to consider and evaluate new technology objectively.

- One of the objectives of strategic planning is to examine alternative means for providing police services. New technology, particularly MIS, provide a capital-intensive alternative for information handling through the use of computers instead of the traditional, manual, labour-intensive method. Again, through the examination of alternatives, strategic planning will improve the process of objective decision-making on new technology.

- An active strategic planning initiative in a police force will constantly "question the validity" of traditional techniques and procedures. This provides the right type of environment for assessing the importance of new technology.

- Finally, strategic planning is fundamentally proactive. It places a managerial focus on the question of : How can the police force improve the social and political environment for its services? Anticipation is the crucial element. Given the rate of change of technology in computers and electronics, effective use of this technology depends on the ability of senior management to anticipate changes in both the social and technological environments.

Despite the importance of strategic planning to the application of new technology, our field visits to North American police forces have demonstrated that most police forces are more interested in tactical planning

than strategic planning. There are few police departments were strategic planning plays a major, authoritative role in the development of the police force. The emphasis on tactical planning is both the strength and the weakness of North American policing.

On the positive side, the success of tactical planning has made North American police forces, in general, the most effective and efficient police agencies in the world in reactive policing. That is, technology and procedures in North American policing have confirmed the ability of police to react quickly and effectively to calls for service in the field. This has been confirmed by technological developments in communications and other response media. Also, the entire training orientation of North American police supports the reaction capacity of the field force.

On the negative side, the pre-occupation with field reactions has weakened the strength of proactive influences in police forces. They are less interested in speculating on the future, and being able to influence the course of social and political events. The major focus is on "rapid and disciplined reaction" to crime occurences. This focus is evident in the way the police sector traditionally evaluates new technology. For example, CAD is primarily viewed in terms of: Command and Control and rapid response to calls. Few police officers valuate CAD in terms of its facility in the development of a larga data base (on calls-for-service) which will support analysis planning and a variety of other proactive police initiatives.

We have a strong commitment to a view of MIS which complements the development of strategic planning initiatives in the police force. This is one of the reasons why we attach a lower priority (in terms of development timing) to the CAD portion of our comprehensive TIPS police MIS model. This will be reflected in subsequent volumes of this report.

D. Senior Management Involvement

In most police departments, little program initiative takes place without the active participation of senior management. Therefore, to some of our readers, it may seem redundant to recommend that senior management must be actively involved in the development of a new MIS technology.

Nevertheless, the importance of senior management initiative for the development of MIS is great enough to justify a restatement of the obvious. Some of the reasons why senior management must be actively involved include:

- There will be a certain amount of instability, through changes in the organization, associated with the application of MIS. Senior management must intervene to both convince line officers of the value of these changes and confirm the notion of career stability in the face of these changes.

- The implementation of MIS will undoubtedly involve changes in the sworn/civilian personnel ratio;

senior management must be involved to confirm the validity and permanence of these changes. In the absence of such confirmation, a rift will develop within the police force between sworn and civilian police functions.

In summary, the impact of new MIS technology on police operations will be so profound, and will have such a major effect on the way police officers carry out their jobs, that it can only succeed if senior management plays a major role in promoting and justifying its application.

E. Travel to Other Jurisdictions

As we have stated above in Section A, most of the technological innovations which will become in vogue in the next 20 years are being tested somewhere, in some North American jurisdiction. If Canadian police forces wish to avoid "re-inventing the wheel" then they must spend a significant portion of their resources visiting these jurisdictions.

Currently, few police forces in Canada have a major budget appropriation for travel to other jurisdictions. In particular, few Canadian police officers travel in the United States. Yet, most of the technological innovations originate in the United States. This is unfortunate, and unless remedied, will lead to inefficiencies in the development of Canadian police MIS.

Consider some of the practical aspects of implementing the technologically sophisticated, computer - oriented management information system. As we shall show in Volume IV of this study, an MIS system will cost many millions of dollars. There is little print documentation available to assist police forces with this endeavour. Yet, there are four or five U.S. police forces that have collectively spent $50 or $60 million in the development of their own MIS. We visited five of these jurisdictions during the phase of our study which is reported in Volume II. We discovered that the officers responsible for these systems were most eager to transfer their experiences to a Canadian audience -- in fact, we discovered that the candour and integrity of these discussions far exceeded our expectations.

A police force contemplating a multi-million dollar expenditure on new MIS technology should not be reluctant to spend $2,000 or $3,000 to expose senior members of its MIS team to the more advanced jurisdictions in the United States and Canada. The expenditure will have a multifold payback in the development of MIS.

F. A New Recruitment/Training/Promotion Policy

The traditional scheme of recruitment/training/promotion in a police is highly oriented towards developing field grade police officers. It begins with a major recruitment thrust at the high school graduate level. A large portion of the new recruits

may spend one or two years as cadet trainees. Training during the cadet apprenticeship of the young officer largely consists of: serving summons, parking enforcement and clerical work with Central Records. Formal training is supplemented by police college before induction into the category of "sworn officer". Following that, the new constable may spend up to one year working closely with senior constables who have achieved the designation of "training officer". Finally, promotion through the rank structure is usually dependent on written and oral examinations but constrained by a minimum waiting period before promotion can be achieved.

We understand that this traditional pattern is beginning to break down in many Canadian police forces. Many senior officers have begun to criticize the cadet system. They believe that this process leads to "in-breeding" and the development of an insular police force. Also, in many police forces there are strong incentives for your officers to enter into higher education programs in both the community colleges and universities. There are many signs in Canadian policing that the traditional pattern of recruitment and training is changing rapidly. For example, more police forces are focussing their recruitment program on individuals with training in other fields (e.g., university graduates, trades journeymen, etc.) and downgrading their cadet programs.

Changes are necessary before new technology such as MIS can be effectively incorporated. The traditional

pattern is overly oriented towards maintaining conventional procedures. Yet, the major function of new technology is to move police forces into new instruments and new procedures which increase the effectiveness and productivity of police officers. Conventional conservatism contradicts the application of new technology in police forces.

Here are a number of basic guidelines for policies which will create a better environment for the incorporation of new technology:

- Recruitment:

Regardless of the new technology of the future, the strength of police forces will continue to depend on outstanding field performance. Recruitment policies which focus on educational attainment will not necessarily satisfy the need for high-grade field officers. However, over time, a large proportion of young Canadians are graduating from colleges and universities. Police recruitment must recognize that the average educational attainment in Canada is moving upwards. As this occurs, recruitment policy must adjust by attracting individuals with university and college education. Similarly, it may be practical to hire a number of individuals who have achieved a measure of experience in other endeavours. For example, a competitive police hiring policy should focus on individuals aged between 25 and 30 who have worked in skilled trades or para-

professional occupations. Thus, a balanced recruitment policy will ensure a constant intake of new police officers who represent a diversity of skills and professional outlooks.

- Training:

By and large, professional police training, through the variety of police colleges in Canada, is well-conceived and well-managed. Curriculum is constantly being upgraded to account for new procedures and techniques. The over-all process of police training cannot easily be improved. However, the availability of external training (more general education) programs for police officers often leaves much to be desired. Only a few police departments have an active program of incentives for police officers to upgrade their general skills, through community colleges and universities, in diverse areas such as sociology, computer science, electronics, etc. To achieve the required balance of skills in a police force it is necessary to ensure that a significant portion of the personnel complement is constantly upgrading itself in these general areas.

- Promotions:

The area of promotion in police forces is most complex. We can make only the most general comments about this area. In our field visits, we sensed a reluctance among senior police managers to promote

individuals to higher ranks for achievement in technical, non-police areas. Many top-quality field officers were reluctant to become involved in areas such as planning, evaluation and management information systems because they felt that these were "dead end" functions. If it persists, this atmosphere will inevitably affect the integrity of technological development in policing. The only way that the atmosphere can change is if senior management recognizes that the success of policing will depend on successful technological development as well as excellence in field performance. Promotion policy must reflect this reality or technology will simply not succeed in Canadian policing.

To summarize, the areas of recruitment/training/promotion are exceedingly complex. At this stage, we can state with confidence that the "conventional" approach must change before new technology is successfully adapted for policing. Otherwise, the new technology will not be naturally accommodated as part of the standard operating procedures in the police agency. During our study, we have noted many of the required changes in effect, in many of the police departments we have visited. We describe some of these changes as they are occurring in North American jurisdictions, in both Volumes II and III.

G. A proactive Approach to the Adaptation of New Technology for Policing

We conclude this volume on technological options for Canadian police forces with the most general recommendations on the incorporation of new technology. We take a conservative view on technology in policing. In our travels to Canadian and U.S. police jurisdictions, we have seen many examples of new technological applications, many of which involve the implementation of computer systems which were overly costly, inefficient and, frankly, could not satisfy any objective criteria. Much of this waste is to be expected in areas where operations and procedures are as complex as in the police environment. However, some of the waste is inexcusable. It has resulted from lack of preparedness in the individual police forces.

Our general recommendation is that police forces take a proactive, well managed, elaborately engineered approach to new technology. They should carefully evaluate the utility of the new technology that is being proposed. It should not be implemented before significant proof is established that the new instruments are cost-effective. Finally, it should not be implemented before senior management in the police force is confident that the organization is prepared to accept the innovation.

The essence of proactive technological application is anticipation. Sufficient resources must be devoted to the evaluation of new technology in the context of its possible contribution in the future. A constant

measure of the police force's resources should be devoted to speculation, experimental tests, and evaluation. We have visited sufficient police jurisdictions in North America where a measured, reasoned and objective approach is being taken towards new technology. We conclude that all Canadian police forces have the innate capability and our police forces are capable of making the appropriate adjustments in the future.

GLOSSARY OF TECHNICAL TERMS

ADMINISTRATION OF CRIMINAL JUSTICE (System of Criminal Justice): The inter-organizational relationships that exist between law enforcement, prosecution, adjudication, probation, corrections, and parole.

AUTOMATIC DATA PROCESSING (ADP): Denotes both electronic data processing (EDP) and electric accounting machinery (EAM).

BATCH INFORMATION PROCESSING: The function of providing data within some reasonable time, but not simultaneously with operations. This type of processing is frequently accomplished in an off-line mode. Off-line pertains to operating devices not under the direct control of the central processing unit. Batch processing can also operate in an on-line mode.

CATHODE RAY TUBE (CRT): A CRT is a visual display terminal used for inquiry into the memory of a computer system. The terminal consists of a keyboard, a signal generator-interpreter, a buffer, and a visual display screen similar to a television screen.

CENTRAL PROCESSING UNIT (CPU): The component of the computer that contains the main storage, arithmetic unit, and special registers. It is synonymous with Central Processor.

CODE: It is either a system of symbols for representing data or instructions in a computer or a tabulating machine, or it is the translating of a program for the solution of a problem on a given computer into a sequence of machine

GLOSSARY (continued)

language or pseudo instructions and addresses acceptable to that computer.

COMPUTER (Digital): An electronic device capable of accepting information and performing prescribed processes to the information and supplying the required results in micro-seconds.

DATA: Facts used as a source for processing a series of actions or operations directed toward an end; the raw material for the function of information processing.

DATA COMMONALITY: The identification and use of the same data element by more than one person or organization.

DATA FOUNDATION OR DATA BASE: File or files of information existing in permanent or semi-permanent storage, excluding transitory or impermanent information to be operated upon by the system or contributing to the operation of the system.

DECISION MAKING: An organizational strategy for mounting a collective response to a problem situation.

DISK: A storage device on which information is recorded on a magnetizable surface. The disks rotate at a high speed, providing rapid (random) access to information.

DRUM: A high-speed, rapid (random) access storage device consisting of a rotating drum coated with a magnetic

GLOSSARY (continued)

material upon which data are stored.

ELECTRONIC DATA PROCESSING (EDP): The kind of automatic handling of information which is done by the million-operations-a-second electronic computer.

HARDWARE: Hardware is all of the mechanical, electrical, magnetic, and electronic components forming the equipment portion of an information system.

INFORMATION: Knowledge derived through the analysis of data.

INPUT: The acquisition of data and placement into the system.

INQUIRY (I/O): A device, generally a typewriter keyboard, used to "talk" to the computer, usually to get quick answers to random questions. Also, it may accept new data, send it into the computer for processing, receive the results, and convert them into a usable form.

INTEGRATED INFORMATION SYSTEM: Developing and coordinating the individual elements of a system to form a compatible over-all system configuration.

INTERFACE: The intersection or common boundary of two or more logical or physical entities. In the context of this report, to interface two systems or effects is to integrate and coordinate the specific systems or efforts such that the results can be combined to provide a unified solution.

GLOSSARY (continued)

MAGNETIC TAPE: A ribbon of tape impregnated or coated with a magnetic material upon which data may be stored as magnetically polarized spots or wave forms.

MODEL BUILDING: The abstract construction of an ideal state of affairs which usually acts as a guide for subsequent design, development, and implementation of the concept.

OPTICAL SCANNER: A computer input device that recognizes many characters and digits by optical scanning.

OUTPUT: To present the results of the processing or the status of any data stored in the system.

PAPER TAPE: A ribbon-like strip of paper, one inch or less in width, used as a means of recording data in the form of coded perforations.

PROCESSING (of either information or data): To manipulate data according to specified rules.

PROGRAM: A series of instructions which cause a data-processing system to process a specific application.

PUNCHED CARD: A punched card is a card of standard size and shape in which data are stored in the form of punched holes. The hole locations are arranged in 80 or 90 columns with a given pattern of holes in a column representing one alphanumeric character or one digit. The data is read by mechanical, electrical, or photo-

GLOSSARY: (continued)

electrical sensing of the hole positions.

RAPID ACCESS (Random): Pertaining to the process of obtaining information from or placing information into storage where the time required for the access is independent of the information most recently obtained or placed in storage. This type of process is capable of operating at extremely fast speeds.

REAL-TIME, ON-LINE INFORMATION PROCESSING: Real-time means the processing of information in a sufficiently rapid manner so that the results are available in time to influence the process being monitored or controlled. It is sufficiently fast that there is virtually no passage of time between inquiry and result. On-line pertains to operating devices under the direct control of the central processing unit.

RETRIEVAL: The recovering of desired information or data from a collection of documents or other graphic records.

SIMULATION: This is an exercise which generally uses a computer as a scorekeeper while people make decisions concerning a mathematical model of the business world. The model consists of a group of cause-and-effect formulas that determine what happens when a decision is made by a human competitor.

SOFTWARE: Software includes design documentation, computer

GLOSSARY (continued)

programs and their supporting description documentation for operational and support functions, operator methods and procedures handbooks, orientation materials, and system exercising and training materials.

SYSTEM: A set of components and their attributes interrelated by process or structure possessing a functional purpose and organizational unity. Depending on the context, it may be either an organization or a set of informational relationships.

SYSTEMS ANALYSIS: A specialized method of subdividing an integrated complex into its more basic parts in order to examine each component's use and relationship to other components. This process requires ascertaining some relatable denominator as quantitative value.

SUBSYSTEM: A subdivision of a system; a system contained within a system.

APPENDIX A

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APPENDIX B

Sources of Information for the Police Management Information Study

The Police Management Information Study took more than one and one-half years to complete. The final report, in five volumes, contains many hundreds of pages. It is a comprehensive effort, which touches all elements which we believe to be contained within the general subject areas of management information systems for Canadian police. Its subject matter ranges between: the history of policing, the spirit of new technology in policing, the process of MIS development and flow charts describing many characteristics of a police MIS. We believe that the five volumes of our report can be represented as a self-contained body of information on Canadian police MIS.

On what authority did we reach our conclusions on MIS ? As we have stated throughout the five volumes of this study, there does not exist a central body of research literature on police MIS which can act as an authoritative reference point to MIS studies. We hope that this study will be a starting point for such a reference in Canada. Therefore, our "authority" originates from the large number of field contacts we made during the course of this sudy, as well as a reading list of literature on police management and record systems -- many of the items on this list were contradictory, or at least characterized by a confusing language on MIS subjects.

Police managers who read this report may well want to read further to gain a better understanding of the technical

and procedural issues of police MIS. As a result, we have included Appendix A to Volume I. It is designed to act as a general outline to the types of information sources which we used in our study. It is not a comprehensive bibliography. We describe our sources of information merely to provide a general guide to the variety of sources required for an understanding of police MIS. We group the various items in a simple manner; categories of information sources are designated in the order in which we sought information at the beginning of our study. We make no attempt to divide the items into consistent areas of MIS "subjects", because the literature is simply not structured in an appropriate fashion.

The published sources of information for our study are broken up into nine categories, i.e.,

- bibliographical sources
- general
- budgeting
- dispatch
- investigation
- patrol allocation
- personnel management
- productivity analyses
- U.S. information systems.

A large number of the items, especially those listed under "U.S. information systems", were solicited directly from police sources. They are not published and cannot be found in most libraries. On the other hand, we met with great success in soliciting this material and advocate the same

approach by other Canadian interested in police MIS.

Next, we describe the various police and other law enforcement agencies we visited during the study, in Appendix C. Given the philosophy of our study, and the fact that we spent approximately 20 per cent of the project time on field visits, this "source of information" is the most important element of the study.

APPENDIX C

Field Visits

Canadian Police Forces in the Following Jurisdictions:

- Calgary, Alberta
- Edmonton, Alberta
- Hamilton Wentworth Region, Ontario
- London, Ontario
- Metropolitan Toronto, Ontario
- Ontario Provincial Police
- Ottawa, Ontario
- Quebec City, Quebec
- Royal Canadian Mounted Police (Ottawa Headquarters)
- Surrey, British Columbia
- Vancouver, British Columbia

Other Canadian Agencies Involved with Law Enforcement:

- Canadian Association of Chiefs of Police
- Department of the Attorney General, (Justice Information Services Group), British Columbia
- National Research Council
- Ontario Police Commission

U.S. Police Forces in the Following Jurisdictions:

- Dallas, Texas
- Kansas City, Missouri
- Los Angeles, California
- North Parkland Hills, Texas

- San Diego, California
- San Francisco, California

Other U.S. Agencies Involved in Law Enforcement;

- Law Enforcement Assistance Administration (LEAA)
- Police Foundation

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